

Declaration

I declare that this Dissertation is my own, unaided work. It is being submitted for the Degree of Master of Science at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

A handwritten signature in black ink, appearing to be 'M. J. M.', is written on a light gray rectangular background.

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(Signature of candidate)

27th day of May 2019

Abstract

Our understanding of sustainability has evolved dramatically over the past four decades and recently there has been considerable emphasis on the understanding that sustainability is systemic in nature, and any tools or models that seek to enhance sustainability should follow suit. That is to say that understanding the strengths and weaknesses of sustainability may be comparable to understanding the strengths and weaknesses of the social ecological system in which development is to occur. This is an approach to understanding the systemic nature of sustainability while also considering the increasing degree of uncertainty in social and ecological systems today. Understanding the components of one's social ecological system and the components that contribute to the resilience of that system may be essential to ensure continued functionality in light of future uncertainties. My study set out to analyse the current state of social ecological resilience in a sample of companies listed on the Johannesburg Stock Exchange. The integrated reports of 25 JSE-listed companies were assessed using four principles of social ecological resilience adapted from *The Resilience Roadmap*, developed by the CSIR and PwC in 2016. In addition, I outlined and discussed any possible correlation between a selected company's economic group, impact category and social ecological resilience principle scores. Specifically, correlations that may act as significant predictors of an improved state of social ecological resilience in companies listed on the Johannesburg Stock exchange. Following generalised linear modelling and correlation tests, the natural resource utilisation group (NRU) was found to perform significantly better than other groups in terms of resource dependencies, while overall, the innovation and foresight principle was the least adequately addressed principle in my study. Findings may be attributed to the unfavourable pressures associated with the current reporting paradigm as well as currently established methods of best practise and the siloed, reactive nature of business today may be a limiting factor to improving social ecological resilience.

Keywords

Social ecological systems, social ecological resilience, system resilience, Johannesburg stock exchange, CSIR, resilience roadmap, resource decoupling, governance, innovation and foresight

Dedication

I'd like to dedicate my dissertation to my family. To my parents, Michelle and Steven Robson, for your unconditional and unwavering support. To my sisters, Victoria and Alexandra Robson, for your reassurance and confidence. Thank you for your time, effort and patience.

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Nomenclature

Abbreviation	Description
Avg. score	Average score achieved
CSIR	Council for Scientific and Industrial Research
FIS	Financial and Investment services economic group
FY: 2016	The financial year 2016 - 2017
GHG	Greenhouse gas
GRI G4	Global Reporting Initiative: Fourth Guideline
IIRC <IR>	International Integrated Reporting Council's integrated reporting framework
IFRS	International Financial Reporting Standards
IR	Integrated reports of 2016 - 2017
King III	King III report on Corporate Governance in South Africa (2009)
King IV	King IV report on Corporate Governance in South Africa (2016)
KPI	Key Performance Indicator
Min	Minimum value
Max	Maximum value
NRU	Natural resource utilisation economic group
PwC	PricewaterhouseCoopers
SD	Standard deviation
SP	Service provider economic group
SER	Social ecological resilience
SES	Social ecological system
WRT	Wholesale and retail trade economic group

Chapter 1: Introduction

The concept of sustainability has received considerable attention over the last 50 years and subsequently, many interpretations and understandings have emerged. The term 'sustainability' can be defined as the product or desired goal of sustainable development; a term coined in the 1970s that outlines the management of resources available to a group, an industry, a community, a household or even an individual in a manner that does not compromise the resource's integrity for future growth (Elkington, 2004; Wayne and MacDonald, 2004; Brown *et al.*, 2006; Todorov, 2006). These resources are diverse and include resources required by a group to achieve desired goals and, although resources may differ between groups, these resources are routinely categorised as economic, social and/or environmental resources (Elkington, 2004; Wayne and MacDonald, 2004; Cato, 2009). While these categories aid in grouping and understanding resources in the context of sustainability, often one resource may fall into two or more categories, for example raw timber as an economic and environmental resource to the timber industry. Economic resources are those typically associated with financial survivability and growth, social resources are those associated with social well-being, such as relationships, education and social equity, and environmental resources are those relating to the natural environment (Wayne and MacDonald, 2004; Cato, 2009). Natural resources include raw materials and ecosystem goods and services, products and services derived directly from the natural environment (Elkington, 2004; Wayne and MacDonald, 2004; Solomon *et al.*, 2007). Ecosystem products may include timber, water, meat or vegetables whereas ecosystem services may include carbon sequestration, noise pollution buffering and air purification (De Groot *et al.*, 2004; Elkington, 2004).

Understanding and categorising resources in this way is a common theme throughout many interpretations of sustainability. These categories were evident in the initial, simpler models devised in the late 1900s as well as in the more complex, systemic approaches to sustainability prominent in the last decade. Our understanding of sustainability has also evolved and recently there has been considerable emphasis on the understanding that sustainability is systemic in nature, and any tools or models that seek to enhance sustainability should follow suit (Linnenluecke and Griffiths, 2010; Abdallah *et al.*, 2012; Griggs, 2012; Wells, 2012; Adams, 2013; Lee *et al.*, 2013; Global Reporting Initiative, 2014; Gosling, 2017; Integrated Reporting Committee of South Africa, 2017). Social ecological systems are complex, adaptive systems that combine

social networks, ecological networks and the intra- and interactions of these networks (Folke *et al.*, 2004). This study hopes to understand sustainability as an emergent factor of social ecological systems and promote the resilience of these systems to promote sustainability may be humanity's best effort considering future uncertainty.

1.1 Aim and Objectives

The aim of the study was to analyse the current state of social ecological resilience in a sample of companies listed on the Johannesburg Stock Exchange (JSE).

Integrated reports of 25 JSE-listed companies were assessed using four principles of social ecological systems resilience adapted from *The Resilience Roadmap*, developed by the CSIR and PwC in 2016. My studies research objectives were to outline and then discuss any possible links between a company's economic group or impact category and their received score as per the social ecological resilience principles. Specifically, correlations that may act as significant predictors of an improved state of social ecological resilience in companies listed on the JSE. The scope of my study will focus on four specific areas of social-ecological resilience, namely systems thinking, resource decoupling, collaborative governance and innovation and foresight. These areas broadly represent the fundamental pillars of sustainability while also presenting emergent concepts yet to be considered the norm.

1.2 Layout of dissertation

My dissertation consists of an introduction chapter (Chapter 1), a literature review chapter (Chapter 2), methods and results chapters (Chapters 3 and 4), a discussion chapter (Chapter 5) and a conclusion chapter (Chapter 6). My dissertation also includes references and three appendices after chapter 6. Chapter 1 introduces sustainability and social ecological systems. Chapter 2 provides a detailed review of sustainability, social ecological systems and resilience literature. Chapter 3 outlines the tools and methods used in my study to analyse the current state of social ecological resilience in the sampled companies. Chapter 4 outlines the results and trends found in the sampled companies following the methods outlined by Chapter 3. Chapter 5 discusses the social ecological trends found in relation to global literature and provides some explanation as to the significance of these trends. Chapter 6 concludes my study with a brief

204 summary and presents limitations and recommendations moving forward. Appendices include the
205 resilience tool used in my study as well as result summary tables for the economic group and
206 impact category analysis.

Chapter 2: Literature Review

2.1. A brief history and the relevance of fundamental sustainability theories

Serious considerations of sustainability were evident in the 1970s with the implementation of the United States Clean Air and Water Acts (1972), emerging limits-to-growth discussions (Behrens-III *et al.*, 1972) and the Brundtland Report (1987) (Brown *et al.*, 2006). Passet (1979) first discussed sustainability, in the context of sustainable forest management, as a model of three separate spheres that overlapped in the centre (Passet, 1979; Elkington, 2004; James, 2014). These spheres represented economic, social and environmental areas of operations and “sustainability” was said to have been achieved by operating within the area of overlap (Figure 1a). Cato (2009), along with other experts, realised that these areas were not separate areas with a small area of overlap, but rather areas nested within one another (Cato, 2009). Later known as the 3-dependency-model, it describes an economy as a social structure which operates within the natural environment, i.e. the economy is part of society which is part of the natural environment (Passet, 1979; Cato, 2009; Griggs, 2012; Gleeson-White, 2014; Figure 1b). The 3-dependency-model (also referred to as the nested model) is considered to be a stronger sustainability framework than the three spheres model as it attempts to understand the links between operating areas and their relationship to sustainability.

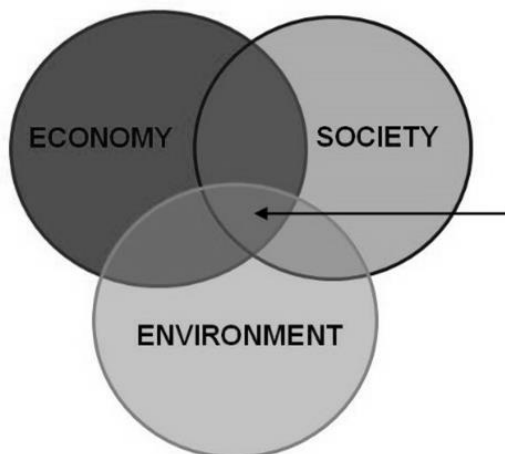


Figure 1a (weaker)

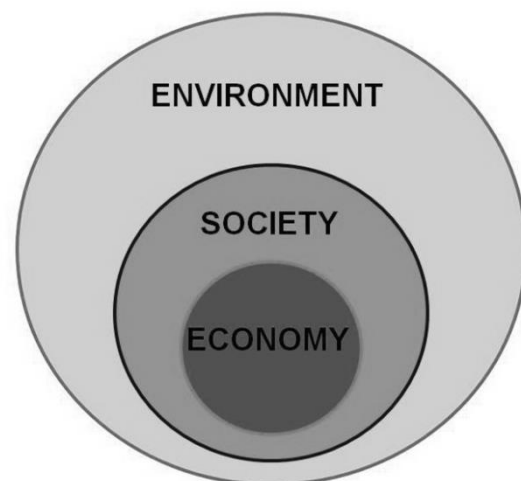


Figure 1b (stronger)

Figure 1: Sustainability described as three spheres with an overlapping centre (1a) and three spheres nested within one another (1b) (Behrens-III, *et al.*, 1972; Elkington, 2004; Gleeson-White, 2014).

While the understanding of sustainability has grown over recent decades, emergent challenges have always involved the practical application of sustainability – how is sustainability achieved, can it be measured and maintained and what is sustainability’s relevance to business (Wayne and MacDonald, 2004; Solomon *et al.*, 2007)? In response, a variety of corporate models, tools and practises have emerged to aid the application of sustainability theory and as of 2018 many of these are considered ‘best practise’ (Bisang, 2018). These include but are not limited to the triple bottom line, the six-capital model, risk management, a range of assessments that aid business in promoting sustainable development in new operations and finally conveying the information generated by these tools in public reports, often focusing on sustainability performance, financial performance and holistic integrated performance (Higgins *et al.*, 2014; Marr, 2018). It is important to note that these models are not the only models for sustainability to emerge during this time, they are just some of the most commonly recognised models (Sakalauskas, 2010).

The triple bottom line (TBL) evaluates an organisation’s performance across the three spheres mentioned above (Elkington, 2004). The TBL, one of the first serious considerations of sustainability in business, is a three-part accounting framework designed to create balanced organisational value across the three operating areas (spheres) of sustainability (Elkington, 2004; Brown *et al.*, 2006). The concept of the three nested spheres formed the basis for the six corporate capitals commonly used today, a model that was developed to aid business’ understanding of sustainability and more importantly how sustainability theory could be applied by businesses (IIRC, 2013). The capitals are defined as (1) natural capital, (2) intellectual capital, (3) social-relationship capital, (4) human capital, the value of individuals, their relationships and specific knowledge, (5) financial capital and (6) manufactured capital (IIRC, 2013) (Figure 2). According to the Associations of Chartered Certified Accountants (ACCA, 2014), the six capitals describe the use of an organisation’s financial and non-financial resources as well as a business’s dependency and impacts on these resources (Nessa *et al.*, 2007; Adams *et al.*, 2013; Gleeson-White, 2014). Business assessment practises, inspired by these models have emerged to improve an organisation’s progress towards sustainable development. More specifically, these tools address a business’s operational impacts on society and the environment, while also addressing the repercussions of these impacts (Gormley *et al.*, 2011; Gleeson-White, 2014). Some examples of these global tools include environmental and social assessments. These Assessments are methods (“tools”) used before an operation begins in order to gauge the scope of the potential

impacts to an area or community. (Holling, 1978; Boyd and Banzhaf, 2007; Gormley *et al.*, 2011; Abdallah *et al.*, 2012; Gleeson-White, 2014; James, 2014).

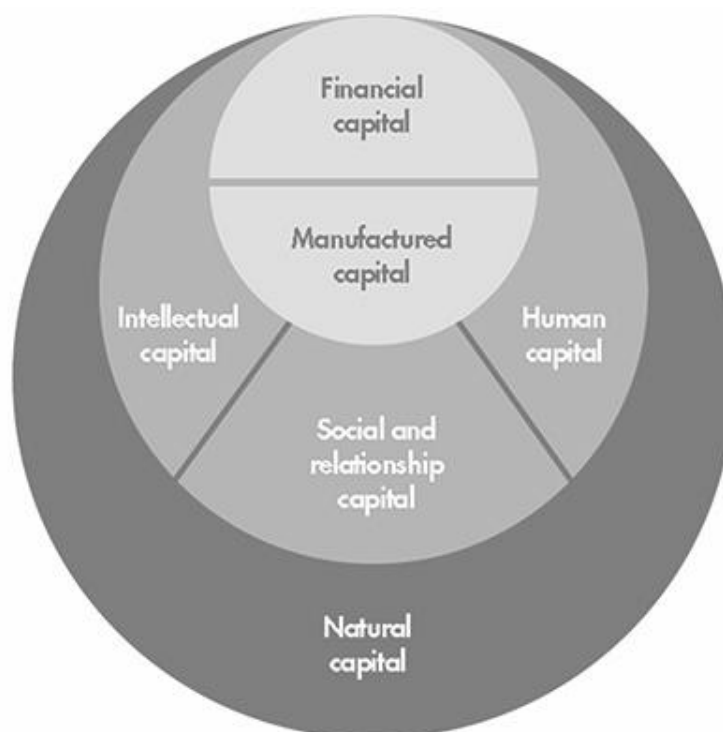


Figure 2: The six capitals of sustainability as described by the IIRC (2013) and Gleeson-White (2013)

Another fundamental progression in the evolution of sustainability is the concept of impact and risk management. It has been well-established that business operations have significant impacts on the operating spheres of sustainability, however in recent years has it been realised that the impacts and changes made to aspects of these spheres of sustainability may potentially result in knock-on effects and changes felt by the business itself. Thus, the concept of risk management attempts to proactively plan for these inevitable knock-on effects to ensure that a business conducts itself in a manner that minimises the risks involved in doing business (Culp, 2002; Anderson and Anderson, 2009; Institute of Risk Management, 2016). Traditionally, risk management was used to assess the financial risks associated with decision making, business policies and operations. However, more recent risks may be environmental or social in nature and arise as a result of the businesses' operations; most commonly these include environmental degradation and the associated bad reputation, as well as labour strikes and revenue loss as a result of poor working conditions (Gormley *et al.*, 2011).

Risk management has useful applications in sustainable development with methods of assessing the scale and severity of potential risks to organisations. This is done by means of a risk matrix which provides an assessment of the probability / likelihood along the x-axis and severity of impact along the y-axis (Anderson and Anderson, 2009; Institute of Risk Management, 2016). For example, a business may consider an operational risk, such as operating during extreme flooding or civil unrest and attempt to gauge the potential risk by means of a risk matrix. The matrix may deem a risk to have a high likelihood of occurring (x-axis) and high severity (y-axis). Subsequently, the organisation's management team can take steps to prevent or at the least minimise such risks (Culp, 2002; Gormley, *et al.*, 2011). The 2010 BP oil spill in the Gulf of Mexico had tremendous environmental and social impacts and subsequently increased the risk profile of oil-related organisations around the world (CNN, 2015). In this case, environmental and social impacts not only turned out to be a significant risk to BP but to the oil transport and refinery sector as a whole (CNN, 2015).

The risk management process can be applied to financial, social or environmental risks. However, due to the model's foundation as a financial tool in the 1970s, the integration of risk management into the other spheres has only recently emerged (Gormley *et al.*, 2011). Sustainability risk management (SRM) addresses risk in the context of sustainability by establishing links between the economy, its growth and resource usage within limits set by the natural environment. However, the lack of social aspects in SRM is a significant challenge (Brown *et al.*, 2006; James, 2014). While organisations are addressing sustainability by making use of specialised risk management tools, there is still evidence that organisations continue to conduct business as usual with a minimal degree of sustainable development plans or social and environmental risk management (Gormley *et al.*, 2011).

2.2. Sustainability in integrated reporting

In theory, these above-mentioned corporate models, tools and practises, are holistically integrated into the over-arching concepts of integrated reporting. For many companies listed on local and international stock exchanges as well as companies attempting to engage with the latest in best practise, the publication of publicly accessible annual integrated reports promotes corporate reporting beyond financial and economic performances and shareholder expectations. The integration of models such as the six capitals attempts to ensure the long-term viability of a business' strategies and to aid a business in meeting expectations set by various stakeholders

and to promote effective scarce-resource management (Adams *et al.*, 2013; IIRC, 2013; Gleeson-White, 2014).

While integrated reporting is rooted in models like the TBL and the six capitals, risk management and proactive planning, the reports themselves are published according to a number of guidelines to ensure effective resource and operations monitoring, year-to-year reporting accuracy and consistency. South Africa is an interesting case in the corporate reporting space due to our commitment as one of the only countries to name sustainable development as a constitutional right (Du Pooiy, 2006; Haywood 2016). This commitment, along with concepts based in King III founded the Integrated Reporting committee of South Africa (IRCSA) who contributed significantly to work by IIRC in developing an international integrated reporting <IR> framework (2013) (du Toit *et al.*, 2017). Furthermore, the Global Reporting Initiative (GRI) provides a guideline that outlines reporting standards to aid businesses and governments in understanding and reporting on impacts related to current sustainability-related issues such as climate change, governance and social well-being (Global Reporting Initiative, 2014; Integrated Reporting Committee of South Africa, 2017). The GRI guidelines were first published in 1997 and since then the framework has become the most adopted sustainability reporting standard across the globe; according to the GRI website, their standards influence 93% of the top 250 companies in the world (Global Reporting Initiative, 2014). However, many academics question the effectiveness of standards-based reporting, claiming that these standards and many other standards and outlines like the GRI mislead decision makers and may act to disguise unsustainable practises, particularly at a site level (Fonseca *et al.*, 2014).

Despite critiques of integrated reporting guidelines, publishing integrated reports are a fundamental part of business communication. These reports convey important information to interested stakeholders at the end of a financial year. Unlike a financial report, which focuses intensely on a company's finances, or a sustainability report which focuses on the efforts of a company towards sustainability, integrated reports amalgamate information across all aspects of the business. These reports include company finances (financial report), a breakdown of operations, operational impacts and risks (safety report), resource usage measures and the company's general sustainability effort (sustainability report), to name a few. Given this, an integrated report is a document that conveys a company's performance for the given year alongside its justification for any inadequate performances, as well as its commitments to improving these performances. Integrated reports (IRs) also often include additional sustainability-promoting practises or partnerships such as local farming initiatives or effective

waste management partnerships to illustrate their invested commitments to future sustainability (Adams *et al.*, 2013; IIRC, 2013; Gleeson-White, 2014).

2.3. Understanding our planet's current state

The number of models, tools and practises that claim to improve or facilitate sustainable development can be overwhelming. However, despite the large number of different tools and different variations of the same tools, fundamentally all of the above-mentioned practises and justifications of sustainability theory can be linked to the fact that we, as an industrialised people, have exceeded several of our planet's finite boundaries. Interestingly, researchers at the Resilience Centre in Stockholm have determined that the condition or state of the environment is worse than most realise. This claim was based on the planetary boundaries model, which was designed to illustrate the safe operating thresholds of certain planetary systems. These boundaries include (1) climate change, (2) biodiversity loss, (3) biogeochemical flows (phosphorus and nitrogen), (4) ocean acidification, (5) land use, (6) freshwater, (7) ozone depletion, (8) atmospheric aerosols, and (9) chemical pollution (Global Reporting Initiative, 2014; Steffen *et al.*, 2015). The earth's population has already exceeded three of these boundaries, namely the climate change, biodiversity and biogeochemical boundaries, while rapidly approaching the upper thresholds of others (Steffen *et al.*, 2015). Some fundamental questions for the planetary boundaries model include what will happen when these thresholds or boundaries are crossed? What should be expected? The answer is unknown, however the framework itself stipulates that when these thresholds are crossed, we can expect an increased degree of uncertainty and unexpected environmental change (Rockström *et al.*, 2009; Steffen *et al.*, 2015).

Given the recent global political barriers to climate change action, the planetary boundaries framework is heavily debated (Biermann, 2012; Foster, 2012). Whether one accepts the planetary boundaries as fact or fiction, there is overwhelming evidence across many disciplines (both scientific and non-scientific) to support the fact that we are experiencing or rapidly approaching an era of increasing uncertainty regarding our ecological systems (Elkington, 2004; Todorov, 2006; Anderson and Anderson, 2009; Johannesburg Stock Exchange, 2016; Steffen *et al.*, 2015; Integrated Reporting Committee of South Africa, 2017). Given the evidence, reactive business as usual is no longer good enough and neither is the proactive approach of risk management. To cope with uncertainty, especially the increasingly complex uncertainty often observed in social ecological systems, businesses need to pay attention to their resilience in the context of the greater social ecological system within which they operate. Novel research in sustainability

focuses on the links between a business and its interconnected relationship with the social ecological system in which it exists and operates. More specifically, this avenue of inquiry investigates the factors that influence an organisation's ability to cope with social and ecological change and how an organisation's facilitation of its own social ecological system may affect this ability to maintain functionality, let alone increase business growth (social ecological resilience). The corporate aim of increasing the resilience of a social ecological system is to promote functional business operations in uncertain social ecological environments. While the characteristics and interactions of operating environments may change, organisations can maintain a functional level of product or service delivery without dramatic, high-risk management change (Mcmanus *et al.*, 2008; Fonseca *et al.*, 2014; CSIR and PricewaterhouseCoopers, 2016). While this systemic approach to sustainability and social ecological systems appears theoretically sound, the question of practical implementation remains, with the addition of a new line of questioning: how effective are the above-mentioned corporate models, tools and practises at promoting or facilitating improve social ecological resilience?

2.4. Understanding the systemic nature of social ecological resilience

The term resilience has several different meanings depending on the field of study and the context in which it is applied. In engineering, the resilience of materials refers to a numerical value assigned to materials as a result of the force required to alter their structures. One material may have a number of resilience indices indicating its breaking point, boiling point or melting point (Fridolin & Jax, 2007). Resilience in a social context refers to the capacity of social groups to learn and adapt to change in societal structures, such as a change in political leadership or national constitutions. Alternative understandings of resilience can be found in fields such as economics, anthropology, english literature and a range of sciences (Fridolin and Jax, 2007; Linnenluecke and Griffiths, 2010; Council for Scientific and Industrial Research and PricewaterhouseCoopers, 2016).

In contrast, ecological resilience describes the ability of an ecosystem or specific ecosystem components to withstand a disturbance or consecutive disturbances (e.g. severe drought and/or fire) and to return to a state of equilibrium or a stable state (Fridolin and Jax, 2007; Council for Scientific and Industrial Research and PricewaterhouseCoopers, 2016). Traditionally, ecological resilience was understood as a factor of ecological resistance, i.e. the degree of disturbance an ecological system can withstand without changing. However, a systems approach to resilience

views it as the maintenance of functionality despite significant changes to the social ecological system. A more encompassing understanding of resilience can be found in systems and complexity literature, where resilience is described as a system's ability to resist, absorb or recover from a significant disturbance and maintain a degree of functionality (Weick and Sutcliffe, 2001; Lee *et al.*, 2013).

Systems and complexity literature describe resilience as a product of adaptive cycles, identified over a decade ago by Holling and Gunderson (2002), who observed productive ecosystems which maintain a functional level of biomass generation, decay and regeneration (Holling and Gunderson, 2002; Folke *et al.*, 2004). The study concluded that systems do not tend toward a point of equilibrium, but rather remain in a state of fluctuation, passing through four distinct phases, namely growth and exploitation (r), conservation (K), collapse or release (Ω) and renewal and reorganisation (α). Understanding these adaptive cycles and their natural progression through the different phases of growth and decay supports the idea that restoring a previously known state of equilibrium may not be the only solution according to social ecological resilience (Linnenluecke & Griffiths, 2010).

The earliest considerations of social ecological resilience in business were predominantly developed by Starik and Rands (1995), Egri and Pinfield (1996) and Linnenluecke and Griffiths (2010). Starik and Rands (1995) proposed an open system view of organisations and assessed the dynamic relationships between organisations and various structures at an individual, political-economic, environmental and cultural level. Egri and Pinfield (1996) suggested the notion of organisational management in the context of the greater social ecological system they are nested in. This conceptualisation was found to be too broad, making practical application difficult. Finally, Linnenluecke and Griffiths (2010) conducted an extensive review of organisational resilience literature and proposed a framework for assessing organisational resilience. The Linnenluecke and Griffiths (2010) framework made use of simplified adaptive cycles plotted as a linear model in relation to organisational performance. In this framework, performance was measured according to measures of organisational performance that have already been established (e.g. the number of consumers or customers served). The linear fashion of the framework limited its application due to the assumption that firstly, organisations will inevitably go through the phases of an adaptive cycle without the possibility of variation and secondly, undesirable events (e.g. natural disasters) affect organisations independently and in isolation (Linnenluecke and Griffiths, 2010; Lee *et al.*, 2013).

Social ecological resilience is often confused with many of today's tools and practices due to a large majority of these tools and practises detailing a reactive process to a single event or crisis that resembles resilience. As mentioned, resilience is the ability to maintain functionality in uncertainty and changing environments, not having tools or practises that maintain functionality after an isolated event. For example, business continuity is the ability of an organisation to continue delivering their products or services at an economically acceptable, usually predetermined, level following an undesirable incident (Calori & Sarnin, 1991). In addition, business survivability and susceptibility are described as the capacity to withstand incidents without significant impairment, as well as the degree of impairment that can be withstood (Calori and Sarnin, 1991; Linnenluecke and Griffiths, 2010). These business concepts are based on individual, unforeseen events and assume that the system has not changed, i.e. they seek to restore equilibrium in the known system. Social ecological resilience is focused on uncertainty with regards to the future of the system itself, where multiple events or crises can occur over a given timeframe and, as mentioned, restoring the system to a known state of equilibrium is not necessarily the only option (Linnenluecke and Griffiths, 2010; Garmestani, 2013; Steffen *et al.*, 2015).

2.5. Addressing Sustainability and Resilience in South Africa

Addressing sustainability in South Africa is challenging given our country's young democracy and past social inequalities. South Africa is a culturally and socially diverse country with rich biological diversity and precious natural resources, and due to our complex history, sustainable development is crucial in addressing many socio-political and socio-ecological challenges. The country is in the midst of development, placing increasing pressure on improving economic performance and growth, pressurising the other aspects of sustainability such as resource usage and social stability (Abdallah *et al.*, 2012). Furthermore, the country's natural resources are under siege by both mankind and climate change; a recent article by Fin24 (2017) reported more than 50% of South Africa's population lives in poverty (Omarjee, 2017) and as a result, low-income households turn to the natural environment to sustain their livelihoods (Shackleton and Shackleton, 2004). Further global change-related challenges, such as the severe droughts South Africa faces throughout the country, places our economy, people and environment under immense pressure (Gosling, 2017).

In response to these and other challenges, the Department of Environmental Affairs (DEA) has begun to consider a systems approach to sustainability in South Africa (Abdallah *et al.*, 2012; Department of Environmental Affairs, 2013). This approach entails addressing sustainability from the perspective of the social ecological system within which business operates. The DEA understands sustainability as described by the 3-dependancy-model and is governed by an integrated governance dimension (Abdallah *et al.*, 2012). Sustainability is defined as the continuous and mutually compatible integration of the economic system, social-political system and natural ecosystems (Department of Environmental Affairs, 2013). South Africa has done well to define sustainability in the past and has a promising future with commitments to the National Framework for Sustainable Development (NFSD) and the National Strategy for Sustainable Development (NSSD) (Abdallah *et al.*, 2012; Department of Environmental Affairs, 2013).

The National Framework for Sustainable Development outlines South Africa's sustainability vision and proposes strategies to re-direct the development path in South Africa. The framework was adopted in 2008 in response to the sustainable development agenda and is South Africa's commitment to long-term change and "resource-impact decoupling" (Department of Environmental Affairs, 2013) - a phrase describing the reduction of impacts to resources while increasing resource efficiency (Abdallah *et al.*, 2012). The framework encourages partnerships between societies, government and corporate citizens to help achieve a set list of measurables and requirements that outline the country's sustainability agenda.

The National Strategy for Sustainable Development in conjunction with other interested parties, namely Todorov (2006) and Abadallah *et al.*, (2012) have identified five strategies to achieve the country's sustainability objectives. These strategies include: (1) improving integrated planning and implementation, (2) maintaining ecosystems while using natural resources efficiently, (3) developing a green economy, (4) developing sustainable communities, and (5) effective response to climate change (Todorov, 2006; Abdallah *et al.*, 2012; Department of Environmental Affairs, 2013). According to the DEA, South Africa plans to promote sustainability work in conjunction with the country's business sector and their commitment to integrated reporting (DEA, 2013). Similarly, international stock exchanges expect organisations to meet a range of listing criteria in order to be affiliated with the exchange, however, different exchanges may enforce different rules and requirements. The Johannesburg Stock Exchange (JSE) requires organisations to comply with principles outlined in the King Code on Corporate Governance 2016 (King I-IV) and to report on this compliance annually (Johannesburg Stock Exchange, 2016). The compliance to codes like

the King Code ensures that sustainability-related concepts are addressed in these organisations and their reporting.

Understanding the complex history of development in South Africa and the constraints on our natural and social systems, approaching sustainability in a systemic manner, focusing on greater social ecological systems and facilitating their sustainability is key. South African researchers are considering social ecological resilience as a response to global change related uncertainties and the effects these uncertainties may have (Ncemane and Weeks, 2012; Council for Scientific and Industrial Research, 2016; Haywood *et al.*, 2010; Pricewaterhouse Coopers, 2016). To support this, the Council for Scientific and Industrial Research (CSIR) and PricewaterhouseCoopers (PwC) have developed seven principles to integrate social ecological resilience into business strategy and operations (CSIR and PwC, 2016) and to manage social ecological system components and interactions to support systems resilience and thus business resilience. The proposed principles of social ecological resilience in business are (1) Systems principle – “a big picture approach to value creation which shows an understanding of the interconnected relationships between the six corporate capitals, coupled with evidence of this understanding in business models”; (2) Risk and adaptation – “company’s risk landscape includes risks to the vulnerability of the social ecological system and measures to improve the social ecological system’s adaptive capacity are included”; (3) Resource decoupling – “a resource usage management approach which describes the absolute decoupling of resources from economic or business growth, while the relative decoupling of resources / resource usage efficiencies / resource use per unit commodity is considered in this principle, it is not the primary focus of the RDP”; (4) Restoration – “financial contribution towards restoring the social ecological system from which benefits are derived”; (5) Well-being – “Employee nurturing for value creation and innovation”; (6) Collaborative governance – “an approach to engagement and relationships that encourages the development of social aspects of an industry’s social ecological system in a multi-faceted way, for example co-learning and co-involvement in the preservation and growth of the social ecological system”; (7) Innovation and Foresight – “the coupling of important business innovations with the proactive direction of these innovations in a direction that facilitates zero-negative impact and/or one-planet thinking, inclusive of an research and development element towards the social ecological system” (CSIR and PwC, 2016; page 5). A more detailed breakdown of these principles and the different scoring indicators is presented in Appendix 1.

This study assesses integrated reports from South African companies focusing on four of the seven social ecological resilience principles mentioned above, namely (1) Systems principle, (2)

Resource decoupling, (3) Collaborative governance, and (4) Innovation and Foresight. These principles were chosen for my study as they are adequate representatives of common, fundamental management areas while also addressing all three spheres of the 3-dependency-model (Elkington, 2004). Furthermore, these principles represent emergent issues within a South African context, while also balancing older, more established business practises (such as those in the collaborative governance principle that target stakeholders) with novel business concepts, such as transformation towards one planet thinking. The study focused on these four principles as a means of limiting the scope of the assessment, while also maintaining a considerable degree of emphasis on assessment principles and criteria across the primary facets of sustainability. In order to effectively assess a company's social ecological resilience IR were only considered for this study due to the social ecological resilience principle's systemic nature and assessing any other type of corporate report would not present enough information to satisfy this systemic nature.

Assessing IRs in this manner broadens our understanding of the most current challenges and modes of problem solving being implemented in listed companies today. Specifically, current challenges and modes of problem solving in the context of sustainability. Assessing IRs and using these reports as representatives of listed companies is a successful global practise and it allows assessors to gauge the current state of a variety of business practises. Assessing IRs according to a scorecard, specifically designed to target specific information, was made mainstream by auditing institutions like Deloitte and Ernst and Young (EY) in the late 2000s. Ernst and Young, for example, created an annual award for companies that published integrated reports that conveyed comprehensive social, environmental and financial information to the public. According to EY (2016), only publishing annual financial reports does not adequately convey the true performances and the current states of business practises in companies listed on local and international stock exchanges (Ernst and Young, 2016; Buitendag *et al.*, 2017). These methods have also found their way into academia with many academic reviews and assessments of IRs as representations of the inner workings of listed companies (Buitendag *et al.*, 2017). Global examples of IRs as assessment tools include; Hąbek *et al.*, (2016) who used IRs to assess the quality of corporate social commitment presented by the European Union and Kılıç *et al.*, (2018) used similar methodologies to assess IRs from Europe, Asian and the USA in accordance with the IIRC integrated reporting framework (2018).

Throughout the globe, listed companies aim to publish concise IRs that convey specific, solidified business information to various stakeholders (Johannesburg Stock Exchange, 2016). This

pressure is reassurance that the information presented in these reports is a fundamental part of the business and a fundamental part of the business's management. In terms of using IRs as assessments tools, this pressure reassures assessors that firstly, the information being assessed in IRs is not the idealistic opinion of a single individual (which is often the case in interviews assessment methods) but rather representative of the company's thinking and management strategy (Buitendag *et al.*, 2017). Secondly, because the information presented in IRs can be considered part of the business's management strategies, the IRs can be assessed to gauge a business's consideration of alternative management techniques, such as social ecological resilience thinking (Buitendag *et al.*, 2017; Hąbek *et al.*, 2016). This means that IRs, along with a well formulated scorecard, could demonstrate the current state of social ecological systems thinking and social ecological resilience present in businesses listed on the Johannesburg Stock Exchange. Interestingly, this method of assessment, if incorporated by the management teams producing an IR, could strengthen the social ecological resilience of their own systems. Using methods like these to assess one's own IR, could outline areas of concern with regards to the current state of resilience in a business's social ecological system. Doing so could also outline predictors of potential risks relating to a business's social ecological system and in light of uncertainty, these areas of concern would predict areas of system stress that may worsen any given impact.

Chapter 3: Methodology

3.1. Sampling Method

The study included a sample of 25 organisations selected from the top 100 companies listed on the JSE in 2017. Companies from the top 100 were selected based on their position as market or industry leaders as per the JSE. Sample organisations were grouped according to their economic group, namely service provision, wholesale and retail trading, financial and investment services and natural resource utilisation (Table 1). These economic groups were based on the Industry Classification Benchmark (ICB) as outlined by FTSE Russell (2017), an internationally recognised provider of benchmarks, analytics and data solutions, affiliated with various international stock exchanges including the JSE (FTSE Russell, 2017). This classification is reviewed yearly and as a result, these classifications may differ from those published in 2018 or 2019.

Table 1: The economic group titles, in text abbreviations and sample sizes used in this study, adapted from (FTSE Russell, 2017).

Economic Groups	Economic group description	In-text abbreviation	Sample size (n)
Service providers	These businesses rely on rental / service provision as their primary revenue source	SP	7
Wholesale and retail traders	These businesses include bulk wholesalers and manufactured goods retailers	WRT	6
Financial and investment service providers	These businesses include registered financial service providers	FIS	5
Natural resource utilisation	These businesses rely on raw / processed natural resources as their primary revenue source	NRU	7
Total sample (N)			25

Selected companies were also grouped according to their impact categories as either direct or indirect impactors; this grouping was independent of the economic grouping and reflected the interaction between selected companies' operations and the natural environment. Direct environmental impacts are those caused by direct interactions between a company's operations and the natural environment; these organisations were categorised as direct impactors (Allinson *et al.*, 2013). Usually, these are companies that utilise natural resources as their primary commodity, which included but was not limited to those in the extraction, manufacturing and retail sectors. Indirect environmental impacts are impacts that are not a direct result of operations, but rather a result of complex impact pathways (Allinson *et al.*, 2013). One such example of an indirect impact pathway is the association between credit providers and the extraction sector. The credit providers are not directly involved in degrading the environment for resource extraction but their financial contributions to these types of projects are not negligible. Companies associated with these types of impacts were categorised as indirect impactors and included companies in the financial or advisory sectors.

As per the impact categories defined by Allinson *et al.* (2013), this study included 10 companies in the indirect impact category and 15 companies in the direct impact category. The impact categories are not dependent on the economic groups; while there could be a correlation between these two, economic groups in this study could include companies across both indirect and direct impact categories. This is due to the fact that a company's economic group is determined by the company's operations and target markets, among other characteristics, whereas the company's operational impacts and impact scope determine the company's impact category (Allinson *et al.*, 2013; FTSE Russell, 2018).

3.2. Integrated report analysis

The integrated reports (FY: 2016 -17) of the selected companies were assessed against four resilience principles adapted from the seven resilience roadmap principles developed by the CSIR and PwC (CSIR and PwC, 2016). The principles used were (1) Systems principle, (2) Resource Decoupling principle, (3) Collaborative Governance principle and (4) Innovation and Foresight principle (definitions for each are provided in Chapter 2 and Appendix 1).

The integrated reports (FY: 2016 -17) were assessed in their entirety using a scorecard (Appendix 1) adapted from the scorecard used by the CSIR and PwC (2016) to create the original seven resilience roadmap principles, of which only four were used in this study. The adapted four-

resilience principles consist of 20 indicators in total; three systems indicators, nine resource decoupling indicators, four collaborative governance indicators and four innovation and foresight indicators (Table 3). Each of these indicators has a range of possible scores (0, 1, 2, 3 or 4) which corresponded to the different criteria within an indicator. For example, the systems principle has three indicators that assess accountability, value creation and shared resources (Appendix 1). For the *accountability* indicator, selected companies could have scored *accountable* or *not* (0), while *accountable* had three possible scores describing the varying degree of accountability, (1) accountable in performance measures, (2) accountable in strategic governance, (3) accountable in both performance measures and strategic governance.

The scorecard used in this study differs from the original as some indicators in the resource decoupling principle were altered to include resource usage increases and not only decreases or undisclosed resource information. These included 3.1.2 – water usages, 3.1.4 – energy usages, 3.2.2 – GHG emissions, 3.2.4 – waste sent to landfills. Systems indicator 1.1.2 – the companies operating system described as a narrative or system map, was dropped because the indicator did not attempt to assess the quality of the systems map or narrative and thus replicated the data obtained in systems indicator 1.1.1 – recognition of the SES.

Table 2a: Principles and indicators for social ecological systems resilience adapted from *The Resilience Roadmap* (CSIR and PwC, 2016). Table 2a includes principle and indicator descriptions as well as the score range (minimum and maximum possible scores) for each indicator.

Principle and indicator description		Score range	Score description
Systems Principle	1.1.1: Recognition of the social ecological system	0	Undisclosed
		1	Minor mention
		2	Partially achieved
		3	Fully achieved
	1.2.1: Shared social ecological resources	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	1.2.2: Social ecological accountability	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
Resource Decoupling Principle	Water usage	0	Undisclosed
		1	Reduction
		2	Increase
	Energy usage	0	Undisclosed
		1	Reduction
		2	Increase
	Greenhouse gas emissions	0	Undisclosed
		1	Reduction
		2	Increase
	Refuse sent to landfills or incinerators	0	Undisclosed
		1	Reduction

Table 2b: Principles and indicators for social ecological systems resilience adapted from *The Resilience Roadmap* (CSIR and PwC, 2016). Table 2b includes principle and indicator descriptions as well as the score range (minimum and maximum possible scores) for each indicator.

Principle and indicator description		Score range	Score description
Collaborative Governance	6.1.1: Stakeholder contribution towards governance	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	6.1.2: Network nurturing	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	6.2.1: Values and ethics are disseminated	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	6.2.2: Collaboration and system improvements	0	Undisclosed
		1	Minor mention
		2	Partially achieved
		3	Fully achieved
Innovation and foresight	7.1.1: Provision to promote creativity and innovation	0	Undisclosed
		1	Minor mention
		2	Partially achieved
		3	Achieved
		4	Fully achieved
	7.1.2: Employee opportunities linked to creative innovation	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	7.2.1: Promotion of transformative, one-planet thinking	0	Undisclosed
		1	Partially achieved
		2	Fully achieved
	7.2.2: Trans-stakeholder value created through zero-impact products	0	Undisclosed
		1	Partially achieved
		2	Fully achieved

3.3. Data analysis

The collected data consisted of a variety of resilience scores specific to various principles and indicators. The data were analysed using Microsoft Excel 2016 (V 1712), Statistica (V 13 ©StatSoft (2017)), R (V 3.3.2) and RStudio (V 1.0.136 (2016)). The indicator and principle scores received by selected companies were grouped according to the selected company's economic group and impact category. These scores were firstly expressed as percentages to show the percentage distribution scores for either the economic group or impact category across the various principles of social ecological resilience. Secondly, the received scores were standardised according to the number of possible scores within each criteria of each principle (std score = avg score / number of possible scores in indicator), this standardisation allowed for comparable principle scores despite an unequal number of indicators used to originally generate the principle score. Due to the scores in the Resource Decoupling principle as either undisclosed (0), increasing (1) or decreasing (2) throughout, these scores were comparable without standardisation.

Score data were tested for normality using the Shapiro Wilks test in R (V 3.3.2, 2016) and RStudio (V 1.0.136, 2016). The data were found not to be normally distributed and thus analysed using nonparametric tests. The economic groups and impact categories were ranked in order to include these variables in correlation tests; these ranks included service provision as economic group 1, financial and investment as economic group 2, wholesale and retail as economic group 3 and natural resource utilisation as economic group 4 (SP = EG1, FIS = EG2, WRT = EG3, NRU = EG4). Correlation analyses for economic groups, impact category and social ecological resilience principle scores were done using multiple Spearman Ranked Order Correlation tests (Poisson distributions and $\alpha = 0.05$) in Statistica (V13 ©StatSoft, 2017). Spearman Ranked Order Correlation tests tested for proportional (monotonic) relationships between the variables, which further indicated whether the relationships between variables were directly proportional (positive) or inversely proportional (negative).

Finally, in order to identify significant predictors of social ecological resilience, the data were analysed using Generalised Linear Models (GLM) in Statistica (V13 ©StatSoft, 2017) for multiple dependents. Company economic groups and impact categories were fixed response variables and the principles and indicator scores were dependent variables. Specific predictors were tested for using LSD post-hoc tests. For all statistical analyses, the significance level was set at $\alpha = 0.05$.

Chapter 4: Results

Key abbreviations: Natural resource utilisation economic group (NRU), Wholesale and retail trade economic group (WRT), Service provision economic group (SP), Financial and investment economic group (FIS), Key performance indicators (KPIs), Integrated reports (IRs).

4.1. Economic Group Analysis

A considerable number of companies (75%) acknowledged their social ecological system, however the resources derived from the system were not considered as shared resources. There was strong emphasis placed on social and environmental stewardships without major links to the social ecological system presented. Also, throughout the sample, KPI measures were inadequately addressed and stakeholder information was emphasised by all companies in distinct, stand-alone stakeholder sections of the IRs. Finally, the majority of companies across all economic groups discussed a link between the company's recent innovation and impact reduction strategy, however very few linked the opportunities available to employees in light of innovation and impact reduction. While many companies discussed concepts of transformative thinking, few linked these discussions to other sections of their IR. The innovation and foresight principle was found to be the most inadequately addressed principle in the economic group analysis.

4.1.1. Systems Principle – ‘A big picture approach to value creation which shows an understanding of the interconnected relationships between the six corporate capitals, coupled with evidence of this understanding in business models’ (CSIR and PwC, 2016 page 5).

The social ecological system was well recognised throughout the sample; however, this recognition was limited to the performance sections of the sampled IRs (Figure 3; Appendix 2). While differences between economic groups were not statistically significant ($F_2 = 12.266$ and 1.034 ; $p = 0.276$), distinct patterns did emerge. Economic group scores were somewhat consistent throughout the sample for the systems principle; the FIS economic group performed marginally better than the others and the WRT group marginally worse than the other groups (67% and 33% of companies acknowledging the social ecological system respectively). Although many companies acknowledged their social ecological system through KPIs, there was a considerable degree of variation in the manner in which these KPIs were reported on. Thus, the overall quality of information pertaining to the companies' social ecological system was

inconsistent. Organisations that performed marginally better than others did so by reported KPIs as well as acknowledged that their company may significantly influence the external environment, and that the influences may affect their value creation process.

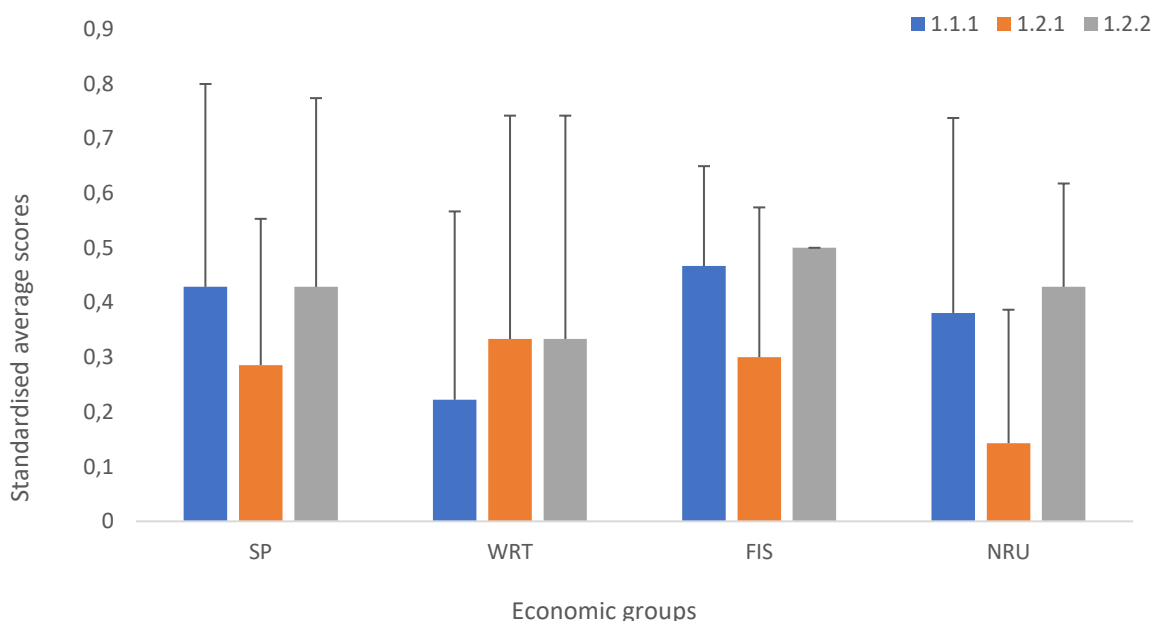


Figure 3: The standardised average scores (AVG. score / No. of criteria in indicator) received by the SP (service provision), WRT (wholesale and retail trade), FIS (financial and investment sector) and NRU (natural resource utilisation) economic groups for the indicators in the system principle, with corresponding standard deviation bars.

Most of the sampled economic groups (90% of companies) did not express any shared SES resources with other members of the social ecological system (*Indicator 1.2.1 - The IR documented shared resources with other users and describes the implications of this relationship on their organisation, as well as their management approach for optimising such circumstances*). However, a small number of companies (about 10%) acknowledged other users of shared resources when reporting KPIs, most commonly the communal sharing of natural water sources. While all scores were consistently low throughout the sample, the WRT group showed the most variation and the NRU group showed the least variation in scores for indicator 1.2.1 (Appendix 2).

Despite not being statically significant, most of the selected economic groups accounted for their impacts and influences on the social ecological system through reporting KPIs; for example, after acknowledging an increase in water usage from each source, many companies discussed future strategies to improve water efficiency and to reduce their dependence on naturally sourced water

(Indicator 1.2.2 - *The IR documents accountability for the organisations direct and indirect impacts on the dynamics of the social ecological system*). The WRT group performed marginally worse in this regard with approximately 50% of the IRs lacking any accountability for their impacts and influences on the social ecological system ($F_2 = 12.266$ and 1.034 ; $p = 0.677$; Figure 3; Appendix 2). A small percentage of companies across all economic groups accounted for impacts and influences strategically as well as through KPIs. These companies went beyond reporting only KPIs and rather considered the greater system from which these KPIs are derived. For example, some companies considered the business' impacts and influences on socio-economic and geopolitical systems and briefly discussed these influences. None of the companies in the FIS group went beyond KPI reporting and none indicated systemic impact accountability. Many companies placed strong emphasis on their social and environmental stewardship initiatives, however these stewardships, while crucially important, are an indirect means of recognition and not the proactive, strategic recognition outlined in this indicator's highest possible score. Only three organisations, one in the service provision group and two in the wholesale and retail trading group, strategically accounted for their impacts and influences in the governance section of the IR. These organisations discussed their impacts on the greater social ecological system, explained the causes of the impacts and provided further discussions outlining the mitigation of organisational risks relating to specific impacts.

4.1.2. Resource Decoupling Principle - *A resource usage management approach which describes the absolute decoupling of resources from economic or business growth, while the relative decoupling of resources / resource usage efficiencies / resource use per unit commodity is considered in this principle, it is not the primary focus of this principle (CSIR and PwC, 2016 page 5).*

The conveying of resource usage and resource-related KPIs were found to be below average throughout the sample of IRs. Scoring categories included (0) undisclosed, (1) reduction and (2) increase, and based on the low average scores received throughout the sample, companies favoured leaving resource disclosure information undisclosed ($0 < \text{avg. scores received} < 0.8$; Figure 4; Appendix 2). There was little statistical significance found in the trends of the resource decoupling principle, however interesting trends did emerge throughout the sample. A considerable number of companies (65%) did not report any quantitative water-related KPIs, such as water usage or water recycled, specifically the WRT group performed worst of all in this regard ($F_2 = 11.59$ and 1.36 ; $p = 0.410$). Interestingly, organisations that did not report any quantitative

reduction in water usage left this KPI undisclosed. The NRU group performed significantly better than the other economic groups, by reporting presenting companies who decreased their water usage ($F_2 = 11.59$ and 1.36 ; $p = 0.045$).

Approximately half of the sampled companies reported quantitative increases in energy usage. There was no statistical significance found in the reporting of energy-related KPIs, however IRs from companies in the WRT group performed below average with the majority of these companies leaving energy data undisclosed ($F_2 = 11.59$ and 1.36 ; $p = 0.446$). Meanwhile, IRs from the NRU and SP groups appeared to perform better than the other economic groups with more IRs showcasing energy reductions ($F_2 = 11.59$ and 1.36 ; $p_{NRU} = 0.09$, $p_{SP} = 0.09$; Figure 4). More than half of the FIS group reported increases in energy usage when compared to previous financial years however, this was found to not be statistically significant ($F_2 = 11.59$ and 1.36 ; $p_{FIS} = 0.329$). Furthermore, the companies in the FIS group all openly reported their energy KPIs and thus, were found to be the most consistent in the reporting of energy usage KPIs ($sd = 0.44$) (Appendix 2).

In this sample of 25

IRs, only one company in the FIS group reported quantitative data for water re-used or recycled. This company's IR detailed the recycling of grey water and rainwater by facilities on the premises. Interestingly, the integrated report stated an approximate save of 12.5 million litres of water in the 2016-2017 financial year, through leak management and grey water projects that covered approximately eight buildings.

Not a single company in this sample reported qualitative or quantitative measures relating to water quality and pollutants affecting water quality. The FIS group and NRU group discussed the importance of water quality and water quality control in their integrated report, however these discussions were not linked to resource decoupling but rather related to various social and environmental issues in South Africa. Moreover, IRs from the FIS group specifically highlighted the importance of associating themselves with projects that do not impact water quality, due to the scarcity of clean water in South Africa. There were no further discussions or measures relating to water quality in this sample.

A considerable number of companies throughout the sample reported increases in GHG emissions when compared to previous years, however this was most evident in the SP (43%) and

NRU (43%) groups, despite not showing statistical significance ($F_2 = 11.59$ and 1.36 ; $p_{NRU} = 0.139$, $p_{SP} = 0.139$). Very few companies in these two groups left GHG emission undisclosed, and coincidentally, these groups also showed the highest percentages of IRs to report reductions in total GHG emissions, a further 43% of each group (Figure 4; Appendix 2).

Finally, the FIS group was the only economic group to present a considerable percentage of companies to report reductions in tonnage waste sent to landfills and incinerators, however not statistically significant ($F_2 = 11.59$ and 1.36 ; $= 0.407$). Throughout the sample, there was a serious lack of waste management and waste disposal discussions (Figure 4; Appendix 2).

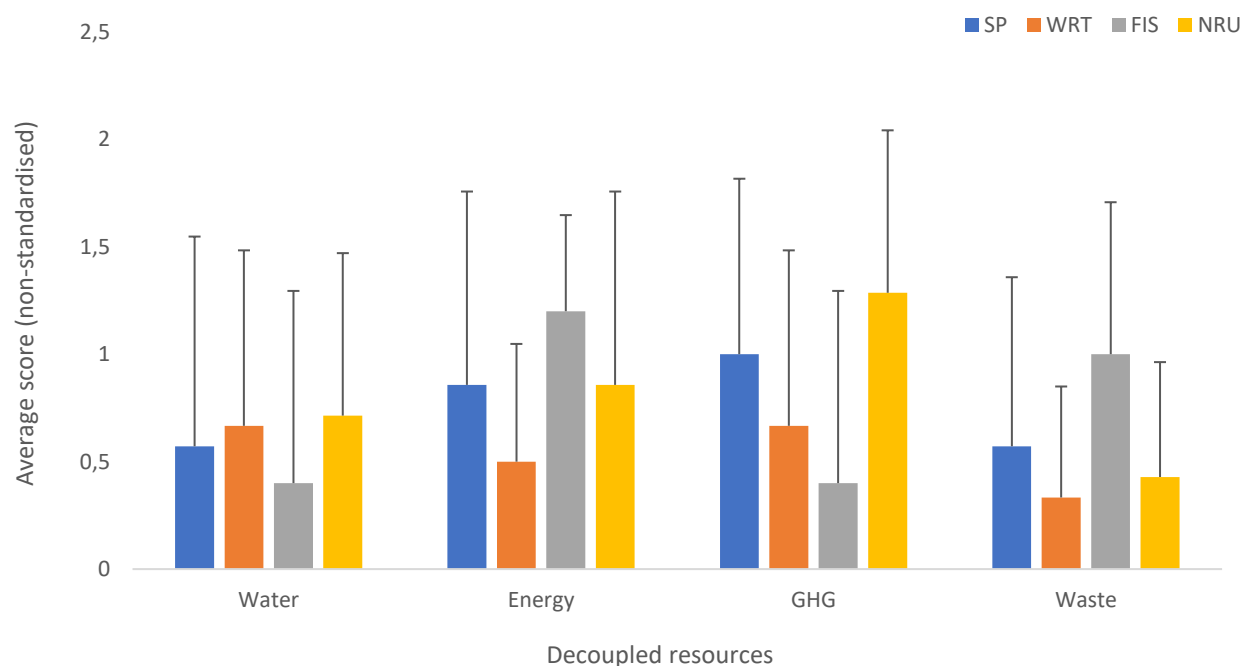


Figure 4: The non-standardised average scores received by the SP (service provision), WRT (wholesale and retail trade), FIS (financial and investment sector) and NRU (natural resource utilisation) economic groups for the indicators in the resource decoupling principle, with corresponding standard deviation bars.

4.1.3. Collaborative Governance Principle - an approach to engagement and relationships that encourages the development of social aspects of an industries social ecological system in a multi-faceted way, for example co-learning and co-involvement in the preservation and growth of the social ecological system (CSIR and PwC, 2016 page 5).

A large majority of companies, irrespective of economic group, have an understanding of stakeholder engagement and the importance thereof. These findings did not yield any statistical

trends, however the patterns that emerged are relevant in a qualitative sense. The service provision group performed marginally better than the other groups in conveying the contribution of stakeholders to corporate governance (*Indicator: 6.1.1 - The governance component of the IR discusses the contribution of stakeholders towards the governance of the organisation*), while also being the only group to outline specific stakeholder roles in governance ($F_2 = 17.72$ and 0.88 ; $p = 0.241$; Figure 5). Most of the sampled companies, regardless of economic group, identified their stakeholders, material issues raised by various stakeholder groups and how these issues were addressed by the company. Commonly, this was done in a section of the IRs specifically designated to stakeholder information.

Stakeholder engagement and nurturing were discussed in detail by a large majority of the selected companies (Figure 5; Appendix 2). Each company had their own reiteration of the importance of stakeholder engagement and the methods they use to conduct effective stakeholder engagements, however this principle focused more on the nurturing or allowing of stakeholder capital growth, facilitated by the companies. While not statistically significant, a considerable percentage of organisations across all groups focused on the engagement with stakeholders rather than stakeholder nurturing. The WRT group was the only group in which companies outlined their nurturing methods ($F_2 = 17.72$ and 0.88 ; $p = 0.78$).

All of the IRs presented the companies' values in detail, however the connection between these values and other sections of the IRs was lacking. Over 80% of the companies in the WRT group presented their values and often an additional ethics narrative with continued reference to these values and ethics throughout the IR, thus performing marginally better in this indicator (*Indicator 6.2.1 - There is evidence in the IR that the company values are been disseminated throughout the organisation and are being practiced by leadership and employees*) (Figure 5; Appendix 2). These IRs were also found to report their company's values and ethics more consistently when compared to the IRs from other groups ($sd_{WRT} = 0.41$; Figure 5).

It was found that companies that reported beyond the GRI guidelines favoured reporting their financial contributions to social components of the SES rather than environmental components of the same system. Despite not being statistically significant, more organisations in the FIS group reported on KPIs that addressed social and environmental value creation and thus, performed marginally better for this indicator (*Indicator 6.2.2 - KPI's that address social and environmental value creation external to the organisation*) ($F_2 = 17.72$ and 0.88 ; $p=0.22$; Figure 5). Interestingly, none of the companies in the NRU economic group reported their financial contribution to social

stewardships as quantitative data but rather reported their financial contribution to environmental stewardships.

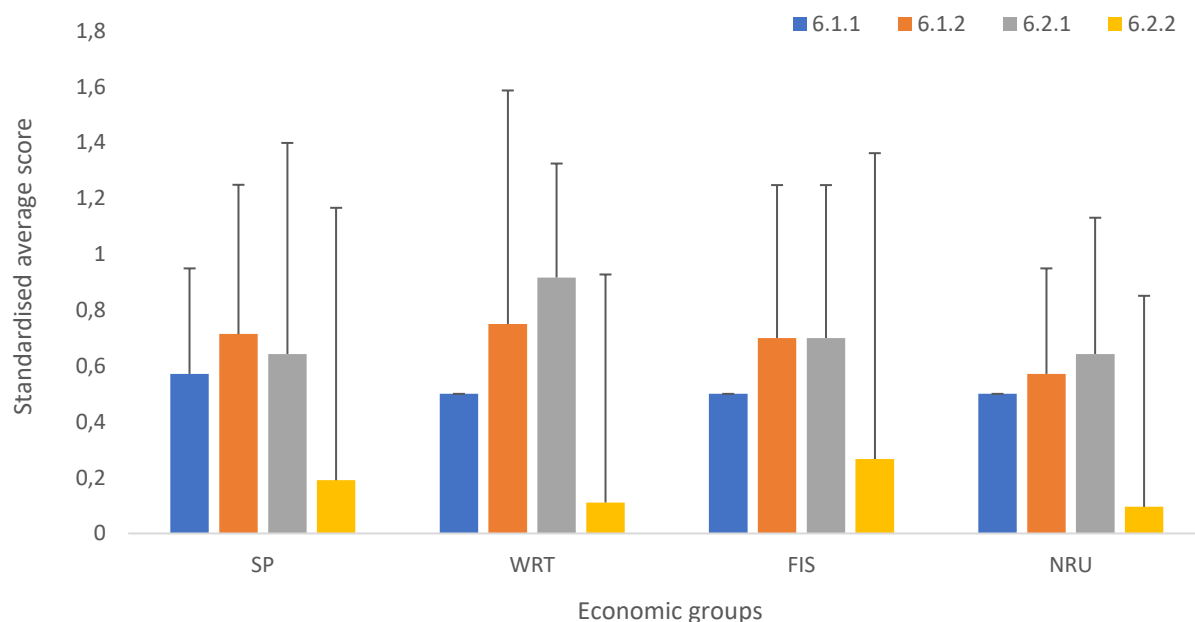


Figure 5: The standardised average scores (AVG. score / No. of criteria in indicator) received by the SP (service provision), WRT (wholesale and retail trade), FIS (financial and investment sector) and NRU (natural resource utilisation) economic groups for the indicators in the collaborative governance principle with corresponding standard deviation bars.

4.1.4. Innovation and Foresight Principle - the coupling of important business innovations with the proactive direction of these innovations in a direction that facilitates zero-negative impact and/or one-planet thinking, inclusive of a research and development element towards the social ecological system (CSIR and PwC, 2016 page 5).

On average, most of the companies in this study did not mention any financial or structural provisions made towards facilitating creativity and innovation in the context of reduced environmental or social impacts (*Indicator 7.1.1 - The IR reports financial and/or structural provisions to promote and facilitate creativity and innovation towards the development of new products and /or services that create value but with significant reduction in environmental and/or social impact*). A small, non-significant number of companies from the WRT and NRU groups described products or services that were responsible for reducing their environmental or social

impacts, most commonly innovation in waste management and energy efficiencies (Figure 6; Appendix 2).

A very small number of the companies (two organisations) highlighted opportunities for employees as a result of successful innovation and impact reduction (*indicator 7.1.2 - The IR discusses/highlights employee opportunities or reward for innovation and creative problem solving in the development of new business models, systems, product and/or services with lowest to zero negative impact*). A considerable percentage of companies across all groups discussed a link between the company's recent innovation and impact reduction strategy, however very few linked the opportunities available to employees in light of innovation and impact reduction. This is evident in the low average scores and corresponding high standard deviations received across all the economic groups (Figure 6).

All sampled economic groups showed some form of progression towards transformative, one-planet thinking. The WRT and FIS groups showed the greatest progression with a small number of organisations reporting evidence of transformative, one-planet thinking in their strategy and product design, however this finding was not statistically significant ($F_2 = 6.48$ and 1.02 ; $p = 0.762$; Figure 6; Appendix 2). A considerable percentage of the companies narratively discussed concepts that resembled one-planet thinking, however an equal percentage of companies did not present any evidence to support their transformative narratives.

Finally, most of the sampled organisations (95%) did not provide evidence for value created through products or services with zero negative impact. A number of organisations, limited to the WRT and FIS groups, provided a narrative description of new products and services that were aimed at reducing environmental impacts. These products and services would indirectly increase value creation; however, this link was not presented in the IRs (FY:2016 - 17). As observed for the previous indicator, none of the IRs scored the maximum possible score of two and as a result both of these indicators (and the innovation and foresight principle as a whole) were found to be inadequately addressed (FY: 2016 -17) (*Indicator 7.2.1 - Existence and evidence of use, of processes and working conditions that facilitate transformative, evolutionary, one-planet thinking in product and services design and development and Indicator 7.2.2 - Shareholder and societal value created through new products and services with zero negative impact*).

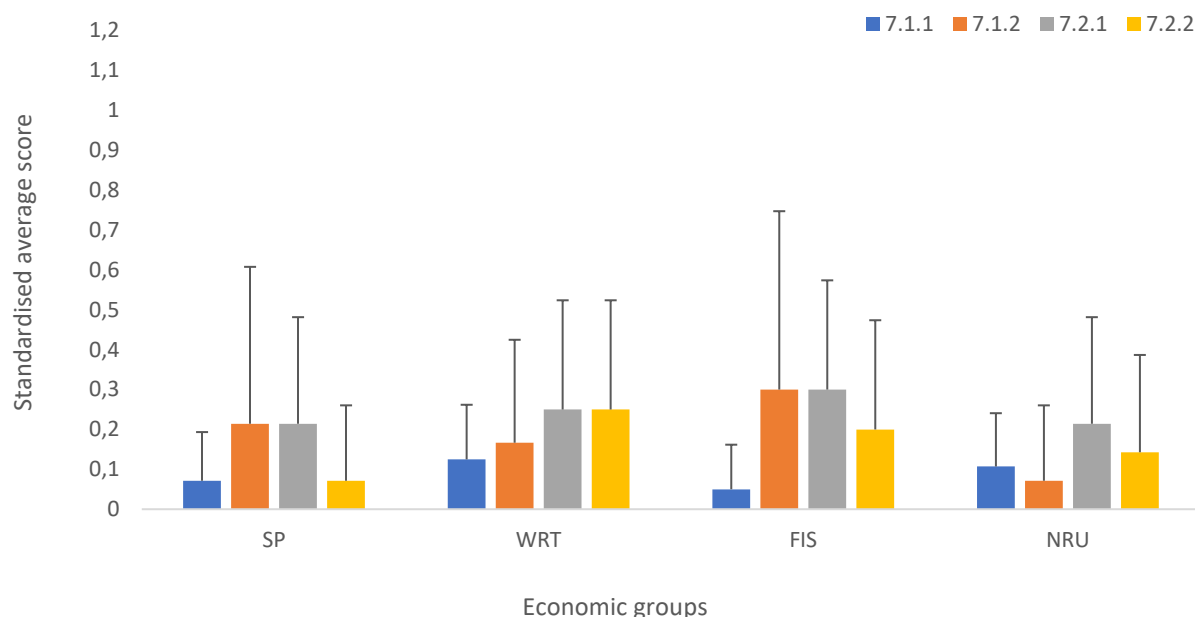


Figure 6: The standardised average scores (AVG. score / No. of criteria in indicator) received by the SP (service provision), WRT (wholesale and retail trade), FIS (financial and investment sector) and NRU (natural resource utilisation) economic groups for the indicators in the innovation and foresight principle with corresponding standard deviation bars.

4.2. Impact Category Analysis

Key abbreviations: Natural resource utilisation economic group (NRU), Wholesale and retail trade economic group (WRT), Service provision economic group (SP), Financial and investment economic group (FIS), Key performance indicators (KPIs), Integrated reports (IRs).

Companies in the direct impact category performed marginally better than those in the indirect impact category with regards to water, energy, GHG emissions and waste measures. Significantly more companies (40%) in the direct impact category reported reductions in water usage and dependency measures ($F_2 = 10.14$ and 1.36 ; $p = 0.021$). 60% of companies in the indirect impact category reported quantitative reductions in energy usage whereas, only 7% of companies in the direct impact category reported reductions in energy usage (Figure 7).

Overall, companies in the direct impact category performed marginally better throughout the systems principle. Approximately 70% of all the sampled IRs did not report on shared social

ecological system resources whatsoever. A considerable percentage of IRs across both impact categories (25%) did not provide adequate accountability for their company's impacts and influences to the social ecological system. Correlation tests found significant positive correlations between the systems principle and the other principles of social ecological systems resilience.

Stakeholder information included in the governance section of the IR aided in understanding the governance roles of stakeholders alongside other governance actors, however integrated reports with specific stakeholder sections were more comprehensive in their reporting of stakeholders and their roles. Integrated reports from companies in the direct impact category were found to integrate company values and ethics throughout their IRs better than those in the indirect impact category. There was limited to no linkage between KPIs and the sampled companies' financial contribution to factors improving resilience and overall, the innovation and foresight principle was found to be the most inadequately addressed principle in this study (Figure 7 and Appendix 3).

4.2.1. Resource Decoupling Principle

Fewer companies in the direct impact category left water, energy, GHG emissions and waste measures undisclosed when compared to companies in the indirect impact category. A small percentage of companies (20%) in the indirect impact category reported water usage increases while the remaining companies in this group left water dependency undisclosed (Figure 7; Appendix 3). In contrast, significantly more companies (40%) in the direct impact category reported reductions in water dependency ($F_2 = 10.14$ and 1.36 ; $p = 0.021$).

A large percentage of companies (60%) in the indirect impact category reported reductions in energy usage when compared to previous years and only 7% of companies in the direct impact category reported quantitative reductions in energy usage (Figure 7). A large percentage of companies in the direct impact category reported reductions in GHG emission (60%), with a small percentage of these companies presenting brief waste information narratives (14%), these same narratives were lacking in the IRs of companies in the indirect impact category, while only 20% of this impact category reported reductions in GHG emissions (Figure 7; Appendix 3). Interestingly, the sampled companies in both impact categories either reported a reduction in tonnage of CO₂ emitted compared to previous years or did not quantitatively disclose tonnage of CO₂ emitted. That is to say that none of the companies reported quantitative increases in tonnage of CO₂ emitted.

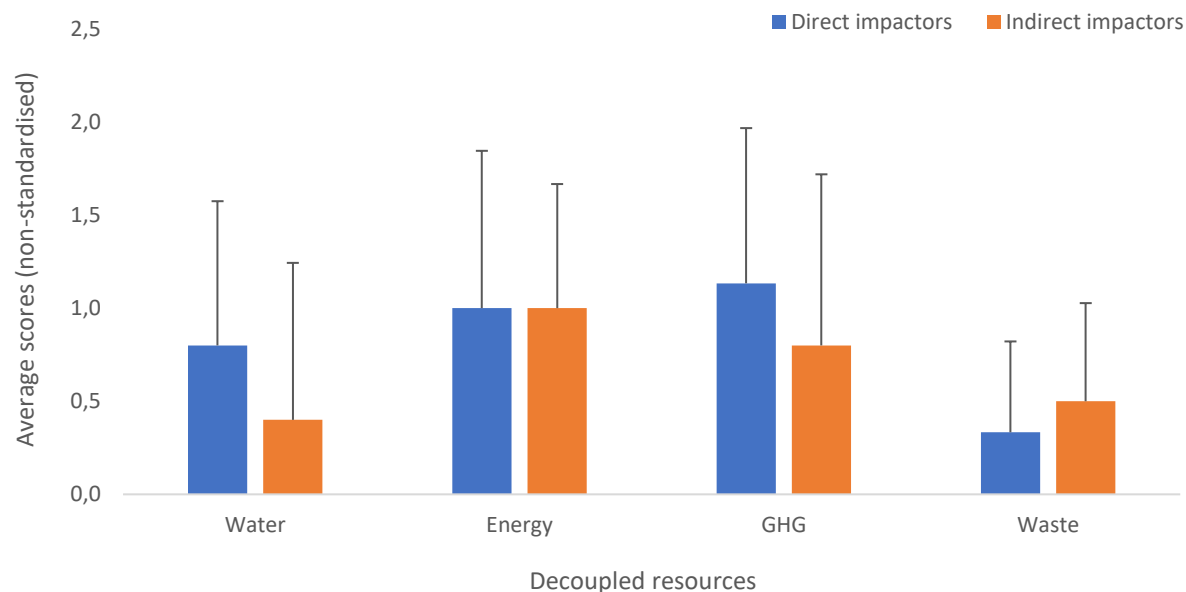


Figure 7: The non-standardised average scores received by the direct and indirect impact categories for the indicators in the resource decoupling principle with corresponding standard deviation bars.

4.2.2 Systems Principle

Overall, companies in the direct impact category performed marginally better throughout the systems principle compared to the companies in the indirect impact category, despite not showing statistical significance (Figure 8; Appendix 3). However, the IR scores received by companies in the direct impact category showed far more variation than the IR scores received by companies in the indirect impact category, despite these companies performing marginally better than those in the indirect impact category. While not a significant finding, approximately 70% of the IRs from both impact categories did not report on shared SES resources whatsoever (*Indicator 1.2.1 - The IR documented shared resources with other users and describes the implications of this relationship on their organisation, as well as their management approach for optimising such circumstances*) ($F_2 = 15.34$ and 1.61 ; $p = 0.715$; Figure 8).

A high percentage of IRs across both impact categories did not provide adequate accountability for their company's impacts and influences to the social ecological system ($F_2 = 15.34$ and 1.61 ; $p = 0.775$) (*Indicator 1.2.2 - The IR documents accountability for the organisations direct and indirect impacts on the dynamics of the social ecological system*). This trend was not statistically significant, however this trend was more evident in IRs from companies in the direct impact

category (Figure 8; Appendix 3), while the remaining IRs from this group accounted for their impacts and influences via KPIs, specifically performance indicators outlined by the GRI.

Spearman ranked correlation tests found significant positive correlations between the systems principle and the other principles of social ecological systems resilience, namely resource decoupling ($r_4 = 0.42$; $p < 0.05$), collaborative governance ($r_4 = 0.43$; $p < 0.05$) and innovation and foresight ($r_4 = 0.69$; $p < 0.05$). However, there were no significant predictors of the system principle found in the direct or indirect categories.

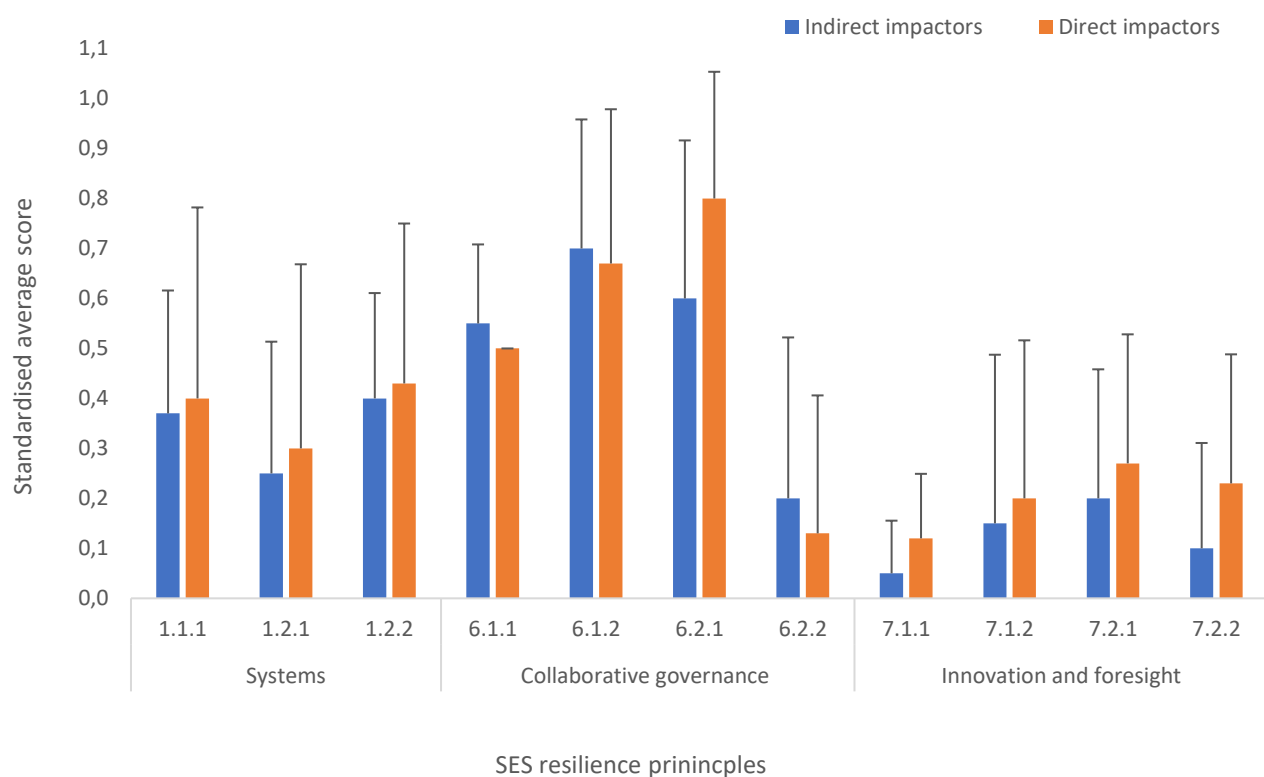


Figure 8: The standardised average scores (AVG. score / No. of criteria in indicator) received by direct and indirect impact categories for the indicators in the systems, collaborative governance and innovation and foresight principle with corresponding standard deviation bars

4.2.3. Collaborative Governance Principle

As noted in the economic group analysis, stakeholders are an important part of doing business in South Africa. Both impact categories clearly identified who their stakeholder groups were and what roles these groups played in their business. However, this information was presented in a stakeholder-specific section of the integrated reports rather than in the governance section. IRs from companies in the direct impact category performed marginally better than those in the indirect impact category, by reporting the contribution of stakeholders to business governance in the governance section of their integrated report (scoring the maximum possible score of two for this indicator; Figure 8 and Appendix 3). Variation across the collaborative governance principle was found to be similar for both impact categories, except for indicator 6.1.1 (*Indicator 6.1.1 - Presentation of stakeholder information in the governance section of the IR*) due to IRs from companies in the direct impact category that showed no variation in their scores received. In this case, all the companies in the direct impact category outlined stakeholder information in specific stakeholder related sections of their IRs (FY: 2016; Figure 8). The inclusion of stakeholder information in the governance section of the IR aided in understanding the governance roles of stakeholders alongside other governance actors, however integrated reports with specific stakeholder sections were more comprehensive in their reporting of stakeholders and their roles.

Approximately 86% of companies in the direct impact category reported information regarding stakeholder nurturing. As mentioned in the economic group analysis, information regarding stakeholder nurturing was very limited, not absent. The primary focus of the stakeholder sections of the IR (regardless of nurturing narratives) was to report detailed information pertaining to stakeholder engagement, namely stakeholder issues, stakeholder engagement methods and the outcomes of these engagements (Figure 8 and Appendix 3).

Integrated reports from companies in the direct impact category were found to integrate company values and ethics throughout their IRs better than those in the indirect impact category, despite this result not being statistically significant ($F_2 = 19.37$ and 2.18 ; $p = 0.09$; Figure 8). Approximately 60% of direct impactors strategically presented their values and continuously referring back to these values and ethics throughout their IRs. In contrast, a far smaller percentage (14%) of companies in the indirect impact category reported strategically on their values and ethics with additional references to these throughout the document.

Finally, there was limited to no linkage between KPIs and the sampled companies' financial contribution to factors improving resilience as reported in the IRs of FY: 2016 (Figure 8). As

reflected in the economic group analysis, the reporting of financial contributions towards social ecological resilience improvement (as quantitative data) was limited to the social aspects of the IRs' social ecological system, namely social stewardship. The financial contributions of the selected companies to improving environmental aspects of these social ecological system was very limited and discussed by only one organisation in the direct impact category. The improvements of environmental aspects came in the form of standard GRI-outlined KPIs, such as GHG emissions, water and energy KPIs (Figure 7).

4.2.4. Innovation and Foresight Principle

The innovation and foresight principle was found to be the most inadequately addressed principle in this study. The very low average scores relative to the other principles as well as the high standard deviations reflected in the principle's indicators are the results of the majority of IRs from both impact categories scoring zero for these indicators, with the exception of three IRs scoring above zero (Figure 8; Appendix 3). Most IRs, irrespective of impact category, did not portray any specific provisions that would promote a low-impact product or service design (Figure 8). There was hardly any mention of new products and/or services and no mention of new products and/or services that significantly reduced environment or social impacts. Moreover, the small number of IRs that did in fact report on products and/or services such as these represented a very small proportion of their impact category (a single IR in each group) and thus these did not necessarily represent trends in the whole sample adequately.

Although companies across both impact categories discussed detailed training provisions, these provisions were not motivated as an incentive for innovation/creativity, nor were they motivated by social or environmental impact reduction or zero-negative impacts, as stipulated by the indicator (*indicator 7.1.2 - The IR discusses/highlights employee opportunities or reward for innovation and creative problem solving in the development of new business models, systems, product and/or services with lowest to zero negative impact*). Almost half of the companies in both impact categories mentioned the fact that innovation is often directed at new technologies and efficiencies. Thus, employees gain indirect rewards or benefits from these in the form of improved working conditions and improved employee engagement.

The majority of the IRs in this study did not present evidence of transformative, one-planet thinking, however a small (non-significant) percentage (14%) of IRs across both impact categories showed progression towards a transformative, one-planet strategy and product design as these

IRs were more socially and environmentally inclined ($F_2 = 7.22$ and 1.11 ; $p = 0.53$; Figure 8). Although quantitative evidence of social and ecological system awareness was not presented, these companies showed an understanding of their greater social and ecological systems. For example, a minority of selected IRs included climate change and extreme weather events as operational risks, and provided narratives discussing research centres and specific focus groups focused on better innovation. There was a very small number of IRs across both impact categories that reported evidence of transformative, one-planet thinking, however these IRs reported year-to-year updates on their understanding and reported a proactive attitude towards climate change as a corporate risk (Figure 8). Furthermore, several IRs also provided a brief information section specifically discussing the concept of climate change as well as climate change as an operational and strategic risk.

Due to the inadequacy of innovation and foresight information presented in this sample of IRs, many of the noted trends were not statistically significant. Approximately half of the IRs from the direct impact category and a slightly smaller proportion of IRs from the indirect impact category described various products, services and partnerships that were beneficial for both the business and the greater social ecological system (Figure 8). However, based on the criteria for indicator 7.2.2 (*Indicator 7.2.2 - Employee rewards for zero negative impact innovation*), these benefits were not considered as these benefits do not arise out of zero-negative impacts. Many companies across both impact categories described partnerships with local communities, institutions and other external companies, aimed at reducing the social and/or ecological impact of their operations. However, the link between the partnerships and the value created for shareholders was lacking, instead the focus was drawn to the non-financial value created for society, which often included skills development and improved infrastructure in community areas. These partnerships were not deemed zero-impact and were often motivated as a reaction mechanism to existing impacts.

Chapter 5: Discussion

Key abbreviations: Natural resource utilisation economic group (NRU), Wholesale and retail trade economic group (WRT), Service provision economic group (SP), Financial and investment economic group (FIS), Key performance indicators (KPIs), Integrated reports (IRs)

The previous half-century has showcased a variety of tools aimed at adding economic, social and ecological value without the uncontrolled degradation of key resources. A growing body of literature suggests that understanding our surrounding social ecological systems and the resilience that one or more system actors may gain by nurturing the health of those systems may promote an approach to sustainability, founded in complexity theory and ecosystem dynamics, that creates value at both a large and small scale (see Tainter, 2006; Wells, 2012; Peter and Swilling, 2014). This study set out to understand the current state of social ecological resilience in 25 of the top 100 companies listed on the Johannesburg Stock Exchange. The integrated reports of these companies were used to assess this current state.

5.1. Systems Principle – “A big picture approach to value creation which shows an understanding of the interconnected relationships between the six corporate capitals, coupled with evidence of this understanding in business models” (CSIR and PwC, 2016 page 5).

The systems principle defines an organisation as a functional system actor that is subject to the complexity and the interactions that occur within that system (CSIR and PwC, 2016; Haywood, 2016). Understanding a business’ social ecological system and the resilience that may be gained by strengthening system components is a novel concept, with only minor corporate implementation thus far (Peter and Swilling, 2014; Haywood, 2016), a trend also observed in this study’s sample of 25 companies. Despite the novelty of social ecological resilience, the strength of current reporting standard practises may provide a possible explanation for the reluctance to adopt this concept. Gromley *et al.* (2011) and the Institute for Risk Management (2016) highlight current trends that strongly promote social and environmental impact reduction and business risk reduction rather than considering the business as a member of a social ecological system as in this study. Anderson and Anderson (2009) highlight a similar notion when specifically reviewing risk management in the insurance industry. These trends highlighted by Anderson and Anderson (2009), Gromley *et al.* (2011) and the Institute for Risk Management (2016) included impact and

risk management strategies as ‘checklist exercises’ rather than protective approaches suited for specific businesses or their risks. Should risk management not progress towards social ecological risk management, current practises may limit the flexibility of an organisation to manoeuvre within their social ecological system. Limitations like these will reduce the resilience of system actors, subsequently stressing the connections between them (Bushman and Landsman, 2010; Adams, 2013). Many authors agree that continued inflexibility in social ecological system manoeuvrability may result in businesses that are less resilient to external uncertainties (Folke *et al.*, 2002; Adams, 2013; Haywood, 2016).

There is evidence that many businesses are tackling the concept of promoting value through nurturing the health of their greater social ecological system (Linnenluecke and Griffiths, 2010; Abdallah *et al.*, 2012; Griggs, 2012; Wells, 2012; Adams, 2013; Lee *et al.*, 2013; Global Reporting Initiative, 2014; Gosling, 2017; Integrated Reporting Committee of South Africa, 2017). I found similar trends as the IRs assessed in my study showed evidence of social ecological system recognition and, therefore, the integration of systems thinking in some form. However, my study found that the scale of social ecological system recognition or integration of systems thinking varied greatly and that the majority of systems thinking communicated in the IRs was centred on company performances, specifically KPIs. Key performance indicators are inherently linked to a business’ value creation process. Greiwe and Schönbohm (2011) in Germany and Steyn (2014) in South Africa suggested that a KPI approach was effective in conveying specific, “committed” information such as impacts and changes in resource usage based on business operations. Similarly, in my study companies in the same economic groups or impact category shared similarities in the resources needed or products and services delivered, however these companies’ core business operations and management techniques still differ. My study and others by Senge and Sterman (1992), Villiers *et al.* (2014) and Thelwell (2018) suggest that a KPI-centred approach to sustainability and sustainable development is lacking. These authors, myself included, found that KPI-centred approaches limit creativity in problem solving and may have a similar effect on approaches to sustainable development and resource use. The relationship between KPIs and the value creation process may be the leading cause of the inconsistent scale of system thinking reflected in the sampled IRs (Culp, 2002; Villiers *et al.*, 2014; Thelwell, 2018). The financial and investment economic group (FIS) and indirect impact category performed above average and showed the least variation in their recognition of the social ecological system. However, this group is not necessarily more resilient to uncertainties than the other groups, but the operations associated with the FIS economic group or indirect impact category are less likely to lead to large-scale environmental or social impacts. Often reporting on

standard GRI-type indicators (e.g. energy, water usage or carbon emissions) suggests adequate compliance. Such indicators are reported on more consistently than indicators that are unique to a business' value creation (e.g. e-waste from a technology company; Allinson *et al.*, 2013; Department of Environmental Affairs, 2013). As a result, the scale of systems thinking in this group of businesses was more consistent.

Wheeler and Elkington (2001), Villiers *et al.* (2014) Marr (2018) and Thelwell (2018) along with the Institute of Risk Management (2016) link current reporting pressures and overall reporting fatigue to a KPI approach and this link may limit the manner in which companies view their social ecological system and the connections within those systems. KPI-centred approaches leave very little room for manoeuvrability around company or even sector specific challenges. My study, along with many other studies, allude to an intense focus on individual connections within a system (e.g. stakeholder engagement or resource usage) and a limited understanding of the more complex nature of these factors relative to the greater social ecological system. A recent study by Higgins, Stubbs and Love (2014) investigated the current paradigm of integrated reporting through the narratives of the employees of organisations pressured to publish said IRs. Higgins *et al.* (2014) identified two fundamental narratives regarding integrated reporting: (1) integrated reporting as a means of meeting pre-set expectations, and (2) integrated reporting is a storytelling exercise. More importantly, in the current paradigm of integrated reporting, these two narratives were found to create a contrasting approach to conveying information. This means that attempting to engage with integrated reporting is a frustrating, never-ending contradiction (Higgins *et al.*, 2014). In this study's sample, I found evidence that supports these finding by Higgins *et al.* (2014). Collectively, these studies suggest that even if integrated reporting is approached as a strictly KPI-based exercise, meeting expectations is still challenging, which leaves very little room for the flexibility to adopt a systemic, strategic approach.

I found further evidence of the restrictive nature of the current reporting paradigm and the associated pressures in the accountability of organisations for their impacts and influences. Sustainability and specifically natural and social resource impact management have been a part of best practice since the 1990s and one would expect that 25 years later companies would be committed to full transparency in this regard (Anderson and Anderson, 2009; Allinson *et al.*, 2013; Department of Environmental Affairs, 2013; James, 2014; The Global Reporting Initiative, 2014; Haywood, 2016). However, impact reporting and the transparency are not a primary focus of integrated reporting, therefore a more detailed approach specifically targeting these discussions in more relevant reports, namely sustainability and environmental reports, would provide a better

insight into this phenomenon. Nevertheless, my study along with earlier studies by Wheeler and Elkington (2001) and later work by the Institute of Risk Management (2016) and Thelwell (2018) link the absence of impact discussions and strategic acknowledgement with the already established pressures and limitations of the current reporting paradigm, further emphasising reporting fatigue, as detailed above.

Contrary to this negative outlook, some IRs reflected the drive of some organisations to reach outside of what is required, however, the motivation behind this may be specifically to improve the reputation of the organisation (Hoffman, 2013). According to Murry (2004) and Hoffman (2013), there may be a significant correlation between organisations that emphasised strategic impact narratives in their IRs and whether or not these same companies have recently been involved in practices that would be deemed highly impactful or reputation-damaging. Murray (2004) in South Africa and Hoffman (2013) in the United States of America discuss the additional, “hidden” perks of improving a business’ public reputation. These “hidden” perks are based on systems thinking and are simply secondary or tertiary indirect benefits gained from a business’ behaviour. Despite the fact that my sample’s motivation for systems thinking may not have been to improve the resilience of their social ecological system, the fact that a degree of systems thinking is present strengthens system connections within an organisation’s social ecological system, thus promoting a more resilient system, thus illustrating the hidden perks concepts introduced by Murry (2004) and Hoffman (2013) (Folke *et al.*, 2002; Griggs, 2012; The Global Reporting Initiative, 2014).

Despite these global and local challenges regarding integrated reporting, studies involving South African companies show interesting trends in navigating these challenges in light of stakeholder engagement. While shared social ecological system resources were only mentioned in a small number of IRs, 98% of the companies in this study published substantial, detailed stakeholder information and engagement sections in their IR. These sections were stand-alone sections and often provided great detail, arguably far more detail than required for adequate compliance. My study, along with studies by Higgins, Stubbs and Love (2014), Marr (2018) and many others support the notion that areas of integrated reporting that are not restricted by KPIs for adequate compliance, such as the interactions between companies and their stakeholders in South African business specifically, may find it easier to move beyond minimum compliance. I found evidence of a link between the increased flexibility of IR requirements and a possible shift in the IR paradigm to the point where IRs are able to address concepts such as social ecological systems resilience freely and with reduced reporting pressure and fatigue. To establish a more comprehensive,

inclusive reporting nature, authors independently agree that a KPI approach should be supplemented (in equal parts) with strategic foresight and a degree of flexibility. In reality, a KPI based approach (as seen throughout this study's sample) will not promote a resilient social ecological system due to the failure of this approach to strengthen the connections with the social ecological system.

5.2. Resource Decoupling Principle – “This principle embraces the decoupling of negative environmental impacts in an absolute nature, i.e. reducing usage or emissions per annum, and not the relative decoupling of negative impacts, i.e. reducing usage or emissions per unit business commodity” (CSIR and PwC, 2016 page 5).

This principle emphasises some of the most relevant emergent natural resource concerns in South Africa, namely water and energy usage, water contaminating pollutants, water recycling initiatives, GHG emissions and waste sent to landfills or incinerators. The resource decoupling principle is an important element of social ecological resilience in both South and Southern Africa due to the scarcity and bad quality of drinkable water. Fluctuating climatic conditions and a difficult three-year drought have resulted in public water restrictions throughout the country and complete inaccessibility throughout the greater Cape region (Department of Environmental Affairs, 2013; Colvin *et al.*, 2016). Similarly, the state of energy production and energy delivery in South Africa leaves something to be desired, with over 65% of households experiencing regular energy disruptions and approximately 15% of South African households living without access to electricity (StatsSA, 2016).

Despite the pressures on South African water availability and energy production, the information presented in the sampled companies' IRs did not appear to address these concerns adequately. There is ample evidence of similar trends found throughout South Africa as well as globally when broadly speaking of water and energy usage reporting. The Market Intelligence Report (2017) published by GreenCape and then later reviewed by Brohnkost *et al.*, (2017) presents such evidence and recommendations that may ease some of the pressures associated with water usage reporting. As discussed by Brown *et al.* (2006), Cato (2009) and Griggs (2012), a leading explanation for global inadequacies in water and energy usage reporting is the tendency of reporting paradigms to become tailored to specific businesses, business types or business operations. Allinson *et al.* (2013) and James (2014) evaluated the tendency of information presented in annual reports to become tailored to specific business operations. I found evidence that is similar to the findings of the above mentioned authors which suggest that information

regarding resource usage (water and energy in this study), governance information or shareholder discussions, and the manner in which this information is reported may become specific to a business, business type or business operation. This trend was reported across studies investigating different businesses and different sectors. This may explain the inconsistent nature of resource usage reporting in this study's IRs for FY: 2016, many of which are published by leading organisations in their respective sectors and would be the most likely companies to reflect unique integrated reports. In addition, evidence presented by Cato (2009), Griggs (2012) and Allinson *et al.* (2013) suggests that some businesses (such as those in the financial and investment group or indirect impact category of this study) do not have consistent (year-on-year), large-scale impact or resource dependencies to report and may find it more difficult to report such events consistently year-on-year. Studies by Brown *et al.* (2006), Griggs (2009) and James (2014) allude to the idea that the lack of consistent, large-scale events to report coupled with the ever-changing baseline of minimum compliance (in the annual reporting paradigm) may result in inconsistent reporting tendencies. These tendencies arise as organisations attempt to report information that will maintain their minimum compliance with little regard for the genuine relevance to said business (Brown *et al.*, 2006; Cato, 2009; Griggs, 2012; Allinson *et al.*, 2013; James 2014). These same studies suggest that businesses (such as those in the natural resource utilisation group or direct impact category of this study) that utilise natural resources like water and energy in everyday business operations may focus their efforts on reporting their day-to-day resource use consistently, rather than focusing solely on minimum compliance and the ever-changing nature thereof. By doing so, the abundant use of these key resources and the consistent reporting thereof appears to improve the quality of the annual reports of these businesses.

An alternative explanation may be that the ever-increasing pressure to reduce water and energy usage may prompt organisations to leave this information undisclosed rather than report a usage increase. Many businesses in my study did not disclose quantitative increases or decreases in water and/or energy usage, however companies that did report these measures often reported an increase when compared to the usage of previous years, suggesting that on average far more companies have increased their usage compared to companies that have decreased their usage. This is a prevalent phenomenon in South African municipalities, for example. In a recent report published by Businesstech (2017), a staggering 79% of the 132 South African municipalities did not keep complete water usage records adequately. If this trend holds, companies that did not disclose relevant information would likely follow a similar trajectory. Murray (2004), Anderson and Anderson (2009), Hoffman (2013) and Price Waterhouse Coopers (2018) found similar trends in studies involving South African, American and global companies and these suggest that the

negative public perception of businesses is a key driver of undisclosed resource usage figures in corporate reporting. In summary (see page 38 for more details), the public's perception of these businesses as "bad citizens" due to their dependence on natural resources may place additional pressure on these businesses to report resource usage decreases, and as a result these organisations may leave information undisclosed rather than reporting resource usage increases. Undisclosed resource information may be more publically beneficial for these businesses (Murray, 2004; Anderson and Anderson, 2009; Hoffman, 2013). My study also found that companies deemed as bad environmental citizens by Murry 2004 and Hoffman (2013), such as the natural resource utilisation group, were more likely to performed better than other groups.

According to the Department of Environmental Affairs (2013), organisations operating in South Africa have refined their operating procedures to improve water and energy efficiencies, initiate water stewardships, energy saving and recycling initiatives. While the presence of water, energy and other stewardships was abundant, only one organisation in the sample reported quantitative measures of water reused or recycled. Once again, this finding is counterintuitive to the current social and environmental issues facing South Africa, however we cannot assume that the limited information presented in the IRs suggests that no recycling initiatives are in place. The Global Recycling Situation, a literature intensive study published by Bruggend (2010), suggests that the state of water recycled globally is improving, however, the importance, economic benefit and fundamental drivers behind this improvement are underemphasised in many industries. I found a lack of positive social ecological system influences reported in the IRs, and the lack of reporting on matters like recycling may be explained by the lack of motivation to report these positive influences (Bruggend, 2010). One apparent critique of the current integrated reporting paradigm is the argument made by de Villiers *et al.* (2014) who motivated the opinion that integrated reporting as it is, is simply too focused on reporting the negative aspects of doing business, as well as focusing its reporting effort on the repercussions and implications thereof. One must take into account the origin of integrated reporting and the fundamental function of these reports - to convey publicly the shortcoming of the financial year and the methods of rectifying those shortcomings in the following years. Only recently has integrated reporting begun to focus on value creation and with this, recent IRs have begun to report on other positive aspects of doing business to increase the value created. Despite what integrated reporting was in the past, better incentives should be targeted at companies who report both positive and negative aspects of doing business, in order to create a more holistic business-reporting mentality (Griggs, 2012; Villiers *et al.*, 2014). A study by GreenCape (2016) found that positive motivations may be linked to the significant number of South African businesses that are currently engaging in alternative

water strategies in the Cape region (Colvin *et al.*, 2016; Siebrits and Fundikwa, 2017). The argument linking positive motivations to a better reporting mentality is further supported by the substantial number of organisations in this study that reported qualitative aspects of water recycling methods without quantitative measures, suggesting that there is a significant degree of pressure to report on recycling in the IR, however not sufficient pressure to actually measure and report quantitative measures relating to recycling. This illustrates a fine line between reporting mandatory information to ensure IR compliance and reporting information that may not be required but could set a company apart from competitors and better their value creation. However, unless substantial pressure to report the latter come into effect (better incentives argument), organisation will almost always fall back on what is mandatory due to the pressure to comply.

While inadequacies in water and energy performances and the reporting thereof may be partially explained as an effect of unique business pressures and a lack of positive motivations to report beyond minimum compliance, GHG emission figures were expected to be unique to particular industries. The natural resource utilisation and financial and investment groups were expected to report on GHG measures more consistently due to the consistent nature of their day-to-day business, as presented by Griggs (2012) and James (2014). This was true for the natural resource utilisation group, however a staggering number of companies in the financial and investment group did not disclose any quantitative measures for GHG emissions. My findings align with recent findings by the Carbon Disclosure Project's (CPD) Climate Change report for Southern Africa (2016) which states that, since the initiatives conception in 2007, there have been a significant number of GHG-related improvements throughout the South African economy. However, there are signs that this trend is slowing and that companies in both the public and private sectors should consider new means of maintaining and intensifying their GHG disclosure and specifically reduction efforts (Carbon Disclosure Project, 2016). Furthermore, of the 11 companies (in their own sample) congratulated by the CDP for achieving A-list status, only one fell into the financial and investment group, while eight fell into the natural resource utilisation sector, a trend similarly reflected in this study (Carbon Disclosure Project, 2016).

Relative resource decoupling or relative impact decoupling (resource usage/impact reduction per unit business commodity) appeared to be a common trend in my study's sampled IRs and work published by the authors mentioned prior. Allinson *et al.* (2013) and Villers *et al.* (2014) reviewed similar trends in many studies focusing on the concept of resource decoupling. However, relative decoupling (also known as resource efficiencies) differs greatly from the intent of this principle to assess the complete decoupling (resource usage/impact reduction per annum). Evidence

presented by these authors, myself included, agree that in order to promote greater or improved business resilience in social ecological systems, companies should focus their efforts not only on reductions, perhaps not at all on reductions, but rather on decoupling their business' growth from increased resource dependency (Griggs, 2012; Department of Environmental Affairs, 2013; Haywood *et al.*, 2010; Haywood, 2016; Siebrits and Fundikwa, 2017). Authors such as Steffen *et al.* (2015) and Ward *et al.* (2017) highlight complete resource decoupling as a significant challenge simply because the coupling of natural resource usage and production waste with increased business growth founded the current business paradigm. This linkage would not allow such decoupling without significant change to the paradigm itself. Ward *et al.* (2017) refer to this as the decoupling delusion; given the earth's fixed resource limits, as laid out by the planetary boundaries model (Steffen *et al.*, 2015), and the absolute dependency of mankind on natural resource utilisation (Biermann, 2012), resource decoupling is a misinterpretation of substitution, financialisation and cost-redistribution (Ward *et al.*, 2017). Furthermore, Ward *et al.* (2017) illustrate this delusion in the 'Economic report to the President' (2015), a 600-page report in which the American president at the time confirmed that the American energy sector had been successfully decoupled from fossil fuels thanks to renewable energies, simply because the sector grew by 10% while GHG emissions reduced by 9.5%. Ward *et al.* (2017) outline that this report and others like it that show evidence of resource decoupling are based on insufficient data and objectively these trends are explained by unreported substitutions, financialisation and cost-redistributions within the sector, a trend observed in this study's economic groups (Anderson and Anderson, 2009; Griggs, 2012; Allinson *et al.*, 2013; Villiers *et al.*, 2014; Ward *et al.*, 2017). For example, energy production was decoupled from whale oil, yet fossil fuels simply replaced whale oil, and this cannot be referred to as growth decoupled from resource dependency (Ward *et al.*, 2017).

Arguments by Ward *et al.* (2017) may only consider the primary resource being utilised, however, there will always be a secondary or tertiary resource that will then become an economic growth limiting resource, such as the whale oil vs fossil fuel example (Behrens-III *et al.*, 1972; Gibbs, 2012; Ward *et al.*, 2017). In the 1990s, the South African forestry and paper industries attempted to tackle the decoupling of the paper and milling sectors from the use of trees in naturally occurring plantations. This was surprisingly easy to accomplish as businesses in these sectors shifted their focus to harvesting trees solely from their own plantations, thus growth in the paper and milling markets was decoupled from naturally occurring forests, with some exceptions. However, while the growth of the sector was decoupled for naturally occurring forests, the availability of free land to cultivate plantations quickly became the secondary, growth limiting resource. This example

clearly outlines the substitution factors at play discussed by Ward *et al.* (2017), but more importantly, this example conveys the idea that social ecological resilience can be brought about and indeed improved by means of a combination of old and new methods, the combination of sustainable resource management as set out by the Department of Forestry's and sustainable forest management in the 1970s and the idea of relative resource decoupling. While the paper industry leaves much to be desired in light of social ecological resilience, specifically with regards to damaging pest control, focusing on resource use and resource dependency (Villiers *et al.*, 2014), these industries may be able to offer significant insights into resource decoupling and improving social ecological resilience.

5.3. Collaborative Governance Principle - "The collaborative governance principle assesses an approach to engagement and relationships that encourages the development of social aspects of an industry social ecological system in a multi-faceted way, for example co-learning and co-involvement in the preservation and growth of the social ecological system" (CSIR and PwC, 2016 page 5).

It was clear in the economic group and impact category analysis that stakeholders, stakeholder engagement and their satisfaction are important aspects of doing business in South Africa - regardless of economic group, diversity of business operations or impact category. This finding was not surprising given the increasing socio-economic pressures facing businesses operating in South Africa today, to show a transformative approach to redistribute wealth as well as to include all the necessary people potentially affected by a business' operations (Creamer, 2018; Price Waterhouse Coopers, 2018). Over the past five years, this increasing transformative pressure has extended to include not only a transformative business strategy in the business itself but also transformative associations with compliant suppliers and other business associates (Gibbon *et al.*, 2008; Vachon and Mao, 2008). It is then understandable that companies in the SP (service provision) group were found to be the current leaders in dealing with this transformative pressure by being the only group to have scored the maximum possible score for indicators relating to stakeholders, their engagement and subsequent satisfaction. In addition, the performance of the SP group was only marginally better than the other groups as all sampled companies comprehensively described (1) who their stakeholders were, (2) their unique engagement methods, (3.1) what these stakeholders deemed material issues, and (3.2) how these issues were dealt with by the company. The pressure to show an adequate degree of transformation has

perpetuated throughout South African society, not only stock exchange listed businesses. Work by Nadioo (2015) which specifically investigated transformative management remedies in the South African education system, noted similar trends and highlighted the immense transformative pressure throughout South Africa.

The direct impact category (exclusively) outlined this same information in the governance section of their IRs and given a larger sample, there may be a significant correlation between the direct impact category and the reporting of stakeholder information in the governance section of their IRs. My study, along with studies by Jolibert and Wesselink (2012) and Villiers *et al.* (2014) suggest that presenting comprehensive stakeholder information in the governance or leadership sections of IRs is beneficial in understanding the governance roles of stakeholders alongside other governance actors, namely the integration of stakeholder materiality into management. Despite this benefit, integrated reports with specific stakeholder sections were more comprehensive in their reporting of stakeholder information and stakeholder roles when compared to integrated reports which included similar stakeholder information in the governance sections of the IR. This trend was also noted in the literature published by Jolibert and Wesselink (2012) with regards to the importance of stakeholders in biodiversity management.

In light of the importance of stakeholders in South African business, company values were presented throughout the IRs and of these values, there was almost always a social or societal element; for example, 'stakeholders' / 'the company's people' / 'our communities' – these examples collectively included shareholders and stakeholders. There appeared to be a significant trend in the WRT group where the IRs outlined the companies' values, followed by an ethics narrative. The narrative often tied the business' primary operation to the companies' values outlined in the background of the IRs. There was very little variation in the information presented by this group, further supporting the consistency of company values and ethics presented throughout the WRT group as a whole. My findings follow a similar trend to that of Manetti (2011) who assessed the quality of stakeholder approaches in a global context using both intensive literature reviews as well as sustainability report analyses. Furthermore, values and ethics along with stakeholder materiality are core concepts in the application of stakeholder theory from a management perspective as laid out by Freeman *et al.* (2014) as well as from a stakeholder perspective discussed by Costa and Menichini (2013).

In addition, pressures described by Murry (2004) and Hoffman (2013) may be at play as these companies also formed part of the direct impact category and as a result, the same "bad reputation" pressures that drove the NRU group to show significantly fewer increases in their

resource usage, may also pressure these same companies to report values and ethics significantly better than the indirect impact category. Hoffman (2013) conceptualised a framework to assess the public's perceptions of the coal mining industry in Kentucky, USA, and given that coal constitutes almost a quarter of South Africa's mineral trade, Hoffman's (2013) findings may provide some insights for the South African public. The public tends to perceive this particular industry as dirty, dangerous and highly impactful (Hoffman, 2013; James, 2014), thus supporting the idea that public perceptions may pressure companies to report resource usages more transparently, as well as pressure these same companies to ensure better working conditions through social and environmental values and ethics.

The financial contributions reported in the IR were more likely to be towards social components of the social ecological system rather than the environmental components. Often sampled companies only reported performance indicators that ensured minimum compliance, however the companies that went beyond this compliance favoured social components. While this was the trend for the service providers, wholesale and retail traders and financial and investment groups, the natural resource utilisation group indicated the opposite. There was a brief mention of the financial contributions to social components of the NRU's SES, while the majority reported contributions to environmental components of the social ecological system. Only companies in the NRU (natural resource utilisation) group reported financial contributions, as a quantitative measure, to aspects such as improving the quality of local agriculture and more interestingly, the use of ecosystem components in the re-uptake of precious minerals. Rascio and Navari-Izzo (2011) found similar trends and offer a more detailed outline of some of these types of contributions, specifically in the mineral extraction sector. In each of the cases presented, the reporting of financial contributions to either social or environmental components of the social ecological system was presented in the form of social or environmental stewardships, without any reference to the improvement of social ecological resilience or even company resilience. Published work by Murray (2004) in South Africa and Hoffman (2013) in the USA have yielded similar trends, specifically in organisations intrinsically linked to direct environmental degradation. Businesses such as these may favour environmental stewardships to offset their direct ecological degradation and thus questionable environmental reputations within the public (Murray, 2004; Hoffman, 2013).

While stakeholders, stakeholder engagement, stakeholder inclusion and stakeholder material issues were addressed comprehensively, the nurturing of these same stakeholders was not. Only a handful of IRs that defined nurturing as described by this indicator, specifically companies in

the wholesale and retail trade and indirect impact category. These IRs primarily discussed better company-stakeholder relationships, for example establishing a network for future labour, and secondly stakeholder capital growth, both in a private capacity as well as in invested company shares. Some of these went further to describe stakeholder nurturing as a business practice with deliverable results in either a six- or twelve-month period. The lack of stakeholder nurturing and subsequently low scores received in the indicator targeting stakeholder nurturing (6.2.2) may be linked to the shortcoming of integrated reporting mentioned by Villiers *et al.* (2014) in their critique of the current IR paradigm. Stakeholder nurturing, defined as nurturing stakeholder capital growth, was introduced in the realm of integrated reporting by the Human Science Research Council (HSRC) in 2012 as a secondary principle in the Stakeholder Relations Strategy (2012). Thus, detailed nurturing of stakeholder capital growth may not yet be considered as relevant information pertaining to integrated reporting, however, this is very likely to change over the next few years with the HSRC driving stakeholder inclusion in all aspects of South African business, discussed in the Stakeholder Relations Strategy (2012) (HSRC, 2012).

The collaborative governance principle may be the best representation of systems thinking integrated into management in my study. As mentioned earlier, organisations in South Africa are under increased pressure to show genuine transformation with regards to wealth redistribution and the inclusion of previously disadvantaged groups in the realm of employment equity (South African Department of Labour, 2015). The importance of collaborative governance and the additional reporting effort companies put into this section of their IRs illustrates that businesses act as social crucibles, providing a platform for a variety of groups to interact with one another and these interactions contribute toward social ecological resilience. The contribution towards social ecological resilience brought about by these interactions (at an organisational level and a broader systems level), was apparent in my sample of 25 IRs as well as in the samples of many of the authors mentioned in this section. Literature presented by Walker *et al.* (2002), Haywood *et al.* (2010) and Jolibert and Wesselink (2012) along with evidence from my study supports the notion that the inclusion of (1) stakeholders' material issues, (2) the commitment of the organisations to address these material issues, (3) the inclusion of stakeholders in company governance and (4) communicating these in the organisations' annual reports may directly improve the business' resilience in its operating social ecological system. But more importantly, the inclusion of these will have ramifications in towards contributing to the resilience of the greater social ecological system in which companies operate, inclusive of more than one company and more than one stakeholder group (Walker *et al.*, 2002; Haywood *et al.*, 2010; Jolibert and Wesselink, 2012).

Over the past decade, work done by multiple scholars and practitioners affiliated to the Resilience Alliance (RA) have concluded similar findings, and as a result one group of authors, Walker *et al.* (2002) and Walker *et al.* (2006) have developed a participatory-based framework that promotes social ecological resilience management and management techniques. Unlike the framework developed by the CSIR and PwC (2016) and then adopted for this study, the RA framework assesses four principles that are all based on stakeholder participation. Stakeholders of the social ecological system or regional social ecological system (business management included) are consulted according to the four principals and then the data are analysed. These analyses offer insights into approaches that increase the understanding of the social ecological system (from all stakeholder perspectives) and to offer implementation insight (from a management perspective) (Walker *et al.*, 2002; Walker *et al.*, 2006). One concept of the Walker *et al.* (2004; 2006) framework addresses this study's earlier recommendation that an additional indicator that focuses on "systems attitude" should be added to the systems principle (Walker *et al.*, 2002; Walker *et al.*, 2006; Shin *et al.*, 2012). While the RA has found results that supported the trends in this study, specifically regarding the importance of stakeholders in the global industry and the importance of a systemic approach, the authors concluded that research is needed in understanding the rules that govern social ecological systems, as well as making the understanding of social ecological systems applicable for developing countries (Walker *et al.*, 2002; Walker *et al.*, 2006; Ostrom, 2009; Loring, 2016).

5.4. Innovation and Foresight Principle – "This principle was designed to stretch the creative and proactive future thinking of a business's people beyond what may be deemed best practise and towards considerations of a systemic view of social ecological resilience" (CSIR and PwC, 2016 page 5).

Unfortunately, the innovation and foresight principle was the least represented principle in the sampled integrated reports. To a minor extent, all integrated reports covered structural and/or financial provisions that promoted innovation of new products or services, but this is a fundamental characteristic of integrated reports and growing businesses around the world. Very few of these same IRs outlined provisions that promoted innovation of products or services designed to specifically reduce environmental and/or social impacts. The natural resource utilisation and wholesale and retail trade groups, exclusive to the direct impact category, reported provisions that would indirectly reduce their environmental impacts, specifically in the

management of waste production and energy efficiencies. The motivation behind these provisions was mostly to better the company's public reputation as these companies have high natural resource requirements and are highly impactful businesses. This is relevant to the work done by Murray (2004) in South Africa and Hoffman (2013) in the USA who specifically observed businesses in the mineral extraction industry. While the IRs themselves did not link financial or structural provisions to the business's social ecological system, according to authors such as Ostrom (2009), Haywood (2016) and Loring (2016), the social ecological system and its current state of resilience exists whether the system is acknowledged or not. Therefore, regardless of the motivation behind the provisions, the fact that the provisions were made facilitates an improved state of social ecological resilience (Ostrom, 2009; Haywood, 2016; Loring, 2016). Ostrom (2009), Haywood (2016) and Loring (2016) noted that financial and structural provisions, regardless of motivation (most commonly motivated by the public reputation (Loring, 2016), lead to a more reasonable use of shared resources. Furthermore, the improved public perception of these companies because of their actions may strengthen social and ecological partnerships between industry and social ecological system actors (Hoffman, 2013; Loring, 2016).

Waste management was repeatedly discussed as an area that warranted provisions for impact reductive innovation, however, often quantitative waste management measures were lacking in the IRs. Critiques of the IR paradigm (notably by Allinson *et al.*, 2013 and Villiers *et al.*, 2014) often attribute these findings, similar to my own, to the limitations of monitoring systems, such as limited waste monitoring and measuring systems or a lack of understanding and experience in the employee(s) responsible for the measuring and monitoring. Often the IRs highlighted qualitative accounts of the company's waste and the importance of comprehensive waste management systems, yet did not present quantitative figures. This discrepancy may be a result of the unseen pressures facing companies to report specific KPIs, such as waste management, regardless of the company's classification as high or low waste emitters. Villiers *et al.* (2014) highlight a similar trend in the reporting of resource usage by market leading organisations. The Global Reporting Initiative (2014) along with other national guidelines and frameworks, emphasise the importance of waste management and this emphasis may lead to the reporting of qualitative narratives without the quantitative measures, simply to satisfy these pressures. For example, I found that companies like those in the indirect impact category may not emit enough waste to warrant initiating detailed monitoring systems (The Global Reporting Initiative, 2014; Villiers *et al.*, 2014). While not strictly labelled as social ecological systems literature, the Porter hypothesis highlights an inherent link between innovation and flexible environmental legislation, thus increasing business productivity (Porter and van de Linde, 1995; Ambec *et al.*, 2013).

In a 20-year-anniversary review of the Porter hypothesis, Ambec *et al.* (2013) noted that badly designed environmental legislation may not only hinder innovation, but also act to drive innovation in very specific directions. Often these directions are not constructively relevant to a specific type of industry (Ambec *et al.*, 2013). The IRs in my study showed a definite desire to report on specific measures, namely waste and climate change-related measures, without the quantitative data to support these qualitative narratives. This trade-off between qualitative and quantitative data, coupled with the fact that many fundamental frameworks and guidelines used to develop these IRs emphasise the importance of waste and climate change, may possibly indicate the same limiting and directional nature of innovation as per the Porter hypothesis. Ambec *et al.* (2013) conclude that the fundamental principles that describe the Porter hypothesis have only strengthened over the past 20 years, i.e. well-designed environmental legislation will promote innovation through reduced impacts and thus increase business productivity and competitiveness. Furthermore, empirical data presented by Ambec *et al.* (2013) over these past 20 years suggest that the traditional view that strict environmental legislation will force impact reduction and promote innovation is somewhat unsupported. The Porter hypothesis supports my study's notion that social ecological resilience would not be strengthened by focusing on specific, strict environmental legislation and the resultant directional nature of innovation. In the 1990s, Van Beers and Van Den Bergh (1997) reviewed the impact of strict environmental regulations on global trade flows and concluded a similar notion to the Porter hypothesis and together with my study there is evidence that emphasis should be focused on a broader, less strict or rigid reporting paradigm which applies the concepts of social ecological resilience. Together, social ecological systems thinking and the Porter hypothesis may theoretically afford businesses the flexibility to report on business specific measures that will promote a better understanding of their social ecological system, thus dramatically improving the comprehensiveness of published IRs in light of social ecological resilience (Porter and van de Linde, 1995; Van Beers and Van Den Bergh., 1997; Ambec *et al.*, 2013).

Overall, environmental concerns were the driving force of innovation in my study's sample with minor emphasis on innovation driven by social concerns. Of these concerns, innovation was mostly focused on past environmental impacts as well as known, future impacts and the risk associated with these impacts. There was very little link between impact reductive innovation and employee opportunities, which did not align with the often overly detailed stakeholder and stakeholder engagement sections of the IRs of FY: 2016. The detailed stakeholder information sections of the sampled IRs were motivated by predominantly socio-political factors, followed secondly by factors of good business practises (outlined by the King Code on Corporate

Governance, Labour Relations and Employment Equity acts of 1995 and 1998 respectively). As a result, information that does not align with these legislations, such as the opportunities employees derive from impact reductive innovation, may not have been implemented in industry for a sufficient amount of time and as a result we have yet to see noticeable benefits. Once these benefits are apparent, opportunities employees derive from impact reductive innovation may filter into legislation guidelines (Culp, 2002; South African Department of Labour, 2015). van der Merwe (2016) along with the findings of my study suggests that, in a South African context, impact reductive innovation and employee enrichment by means of impact reductive innovation are relatively new concepts and are not a part of business best practice yet. Evidence from my study and others, such as Culp (2002) and van der Merwe (2016) suggests that industries that attempt to engage with new concepts like employee enrichment via impact reductive innovation are display a proactive attitude of individual companies and their employees towards an improved state of business.

The final two indicators in the innovation and foresight principle (7.2.1 - evidence of transformative, 'one-planet' thinking and 7.2.2 – value created through products and services with zero negative impact) were the least represented of all indicators in my study. There was evidence of specific social transformation in line with the Employment Equity Act and processes that facilitate wealth redistribution, however in line with the holistic idea of one-planet thinking, as laid out by Moore and Rees (2013), very few IRs conveyed the necessary information. There was a minor mention of movement towards a more transformative approach in a few of the sampled IRs, however these were often unique to the company itself and not the economic group or impact category. Furthermore, these narratives, when present, were presented in disjointed sections or as side notes in the IRs, without any link between the information promoting a transformative approach (one-planet thinking) and the rest of the IR.

Based on the planetary boundaries framework by Rockström *et al.*, (2009) and Steffen *et al.*, (2015), the concept of one-planet thinking attempts to link systems thinking, the sustainable development goals and resource decoupling to promote an economy that shows efficiency and fairness in their resource usage (Muñoz & Gladek, 2017). Work by Moore and Rees (2013) and the "One-Planet Thinking Report" by Muñoz and Gladek (2017) offer some detailed background into the planetary boundaries model as well as application and implementation methodologies to implement the concepts of one-planet thinking. Furthermore, these application and implementation methodologies are based on the claim that there is a significant amount of business interest to invest in mechanisms that promote the integration of the Planetary

Boundaries Model and concepts relating to one-planet thinking. This claim was made by initiatives such as the Science-Based Target initiative, the Natural Capital Protocol and the Global Reporting Initiative (Muñoz & Gladek, 2017). In addition to these initiatives, there is also interest from certification groups that promote responsible production, namely Roundtables on responsible or sustainable palm oil and soy as well as councils for environmental stewardships, namely the Forest and Marine stewardship councils (Moore and Rees, 2013; Muñoz & Gladek, 2017). Of these initiatives listed by Muñoz and Gladek (2017) as investors in one-planet thinking and the social ecological resilience that the concepts of one-planet thinking promotes, only the Global Reporting Initiative was specifically named to be influential in the development of the sampled IRs. The IRs in my study emphasised social and environmental stewardships, in the recourse decoupling principle; this aligns somewhat with the responsible productions stewardships listed by Muñoz and Gladek (2017). Evidence from my study as well as from studies by Moore and Rees (2013) and Muñoz and Gladek (2017) that assessed one-planet thinking in industry, suggests that while the concepts of one-planet thinking are not apparent in industry as of 2017, there is a noteworthy degree of one-planet thinking concepts in the guidelines and frameworks that govern these reports. It may only be a matter of time and relaxed constraints on integrated reporting before concepts like the planetary boundaries model and one-planet thinking are integrated into every-day industry.

The current state of social ecological resilience reflected in my study's sample can be described as a transitional state, whereby many principles of social ecological resilience are considered by companies listed on the JSE, while other principles are completely absent. Assessing the IRs of 25 JSE listed companies has also provided insights into the current state of systems thinking reflected in South African business. These insights highlight the strict reporting pressures faced by South African businesses today from a private and public perspective, while also highlighting a potential link between the rigidity, inflexibility or "strictness" of integrated reporting requirements and lowered social ecological resilience. In addition, given the four principles of social ecological systems resilience assessed in this study, innovation and foresight with regards to impact was found to be the most inadequately addressed area in terms of information presented in IRs of FY: 2016 - 17. This finding may shed light on a potential area of dramatic improvement moving forward. The principles developed by the CSIR and PWC (2016) yielded both expected and unexpected results given our current understanding of sustainability and highlighted areas of strengths and weaknesses with regards to social ecological resilience reflected in IRs (FY: 2016 – 17). The social ecological resilience principles (CSIR and PWC, 2016) were an effective tool in assessing the IR of FY: 2016 – 17 and using these principles in conjunction with business

managers may be an effective way to dramatically improve the current state of social ecological resilience reflected in South African business. This tool may be more effective if we consider separating the Systems principle from the others and using this principle as an overarching principle that includes aspects of the remaining six principles to assess the true systems thinking reflected by the tool user. As it stands, the systems principle is too simply satisfied by any number of systemic approaches and instead should be focused on the true recognition of the social ecological system both in theoretical understanding as well as everyday business. Furthermore, the findings of this study support an additional system principle criterion that specifically assesses the attitude of a business towards its social ecological systems. This is due to the premeditative attitude needed to engage with the systems principle fully. Further social ecological resilience research is needed to establish the potential link between the rigidity of reporting requirements and a lowered state of social ecological resilience.

Chapter 6: Conclusion

The uncertainty of the world we live in today is increasing and for organisations to survive, let alone continue generating profits, a more complex, systematic approach to business as usual is needed. A number of companies listed on the JSE are poised to tackle this uncertainty and a fair number of those are currently engaged with the concept of improving the resilience of their greater social ecological systems. The IRs of FY: 2016 – 17 reflected a considerable degree of social ecological resilience, however my study identified a handful of strengths and weaknesses when using the social ecological resilience principles (CSIR and PWC, 2016) to assess the current state of social ecological resilience in South African business. While also outlining areas of social ecological resilience concern as well as some of the challenges facing social ecological resilience thinking reflected in the sampled IRs.

6.1 Limitations, future research and recommendations

My study limited the seven principles of social ecological resilience (CSIR and PwC, 2016) to four fundamental principles based on their relevance to South African business and their coverage of the three main spheres of sustainability as described by Passet (1979), Elkington (2004) and James (2014). These principles were developed with a systems approach but exist in a somewhat isolated manner and as a result, each principle can be assessed in its individual entirety without undermining the trends observed.

Moving forward, it is recommended to include the other three principles of social ecological resilience which would contribute towards a more holistic 'current state' of social ecological resilience as well as a larger, 'bigger picture' perspective of social ecological resilience in South African business today. While four principles of social ecological resilience illustrate significant trends, the principles are limited and including the other three principles would shed better light on the trends found. Furthermore, while the assessment of only IRs creates uniformity in the data collected, interviews with individuals from the sampled companies would bolster the study and provide additional social ecological resilience related information not presented in the IRs. Finally, IRs are published annually, and King IV was published in 2017; as a result, upon completion of this study the IRs assessed will be out of date and the latest IRs will follow a different governance guideline framework.

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Appendix 1

Four resilience principles and indicators adapted from *The Resilience Roadmap*, developed by the CSIR and PwC (Council for Scientific and Industrial Research; PricewaterhouseCoopers, 2016).

System Principle Indicator 1.1.1: The IR references the notion of the organisation as part of a broader (social-ecological) system

Would need to show cognition of their external environment, how the external environment influences their business and how they influence the external environment. We ideally want to see evidence of this in their organisational strategy as it infers that it is instrumental in their business function.... Are they specifically referencing the external environment in their strategy and business model?

(0): External environment is not integrated in to the business strategy or the performance of the organisation

(1): The performance section discusses initiative in which the organisation is involved or contributing towards that creates value to the external environment from which they draw direct and indirect input. i.e. they have stewardships that are influencing the environment beyond the boundaries of their immediate operates.

(2): The strategy component of the report specifically makes mention of how the external environment has a significant role to play in their value creation. But the return value to the environment is not discussed.

(3): In the strategy component and performance section of the report the organisation discusses how the external environment (social and ecological components that directly and indirectly influence or affect the organisation) influence their value creation and the way they do business and how they in turn create value for the external environment. i.e. so, they basically highlight a two-way relationship, they take from the system but in turn give back to the system.

System Principle Indicator 1.2.1. The IR documented shared resources with other users and describes the implications of this relationship on their organisation, as well as their management approach for optimising such circumstances.

(0): There is no mention of shared social or ecological shared resources with any other users within the system in which they exist.

(1): While challenges to natural and social resource is not discussed in the strategy section and they do not discuss the sharing of resources with other users, they do discuss management approaches or initiatives that address the conservation/stewardship of a natural or social resource that is commonly shared by this organisation and other organisation within the system that it operates (i.e. water stewardship programmes). Programmes such as these benefit the systems and all the users of the resource.

(2): The strategy component specifically highlights the sharing of natural or social resources (i.e. they mention this as a challenge to the organisation) and specifies how they address this in their strategy, performance, and/ or governance section of the report.

System Principle Indicator 1.2.2. The IR documents accountability for the organisations direct and indirect impacts on the dynamics of the social ecological system by monitoring and reporting on leading key performance indicators that avoid negative impacts and adding emphasis how such activities have created value for the organisation/society (system).

(0): The IR reports highlights no accountability to the social and ecological system upon which it operates.

(1): In the performance section, they specifically have indicators that address their impact on the social and ecological components of their systems and how they have reduced or improved their impact, but they fail to significantly highlight how such activities contribute towards the value creation of the organisation.

(2): The IR in either the strategy or performance section highlight KPI's that show their accountability not just of their immediate group (i.e. head office) but of their entire operation...i.e. their direct and indirect impacts and report on this and the emphasis how these activities contribute towards value creation.

Resource Decoupling Principle Indicator 3.1.1 *Performance indicators relating to water and energy USE are presented in the IR*

(0): neither indicators in the IR

(1): There only performance indicators for either water or energy in the IR (state which one)

(2): There are performance indicators for water and energy in the IR

Resource Decoupling Principle Indicator 3.1.2. Performance indicator in IR: Has there been a water use per annum reduction (reduction against previous year)

Options: NO (0) or YES (1)

If Yes – provide insight

Resource Decoupling Principle Indicator 3.1.3. Performance indicator in IR: Has there been an increase in the percentage of water re-used or recycled (and increase against previous year)

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Resource Decoupling Principle Indicator 3.1.4. Performance indicator in IR: Has there been an energy use per annum reduction against previous year?

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Resource Decoupling Principle Indicator 3.1.5. Performance indicator in IR: Has there been a renewable energy use increase as a % of total increase against previous year)

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Resource Decoupling Principle Indicator 3.2.1. *Performance indicators relating to waste (pollution and emissions) are presented in the IR*

(0): neither are present in the IR

(1): only pollution or emission indicators presented in IR

(2): pollution and waste indicators presented in the IR

Resource Decoupling Principle Indicator 3.2.2. Performance indicator in IR: Has there been a GHG emissions per annum reduction in tonnes CO₂ e reduction against previous year

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Resource Decoupling Principle Indicator 3.2.3. Performance indicator in IR: Has there been a reduction in pollutions specific to water quality (tonnes per annum) (reduction against previous year)

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Resource Decoupling Principle Indicator 3.2.5. Has there been a waste disposal (landfill and incineration) reduction in tonnes per annum has declined since the previous year / % of waste that is re-used/ recycled has increased since the previous year / Number of recycling facilities has increased since the previous year.

Options: NO (0) or YES (1)

If Yes – provide insight

Indicate if result was in IR or SR

Corporate Governance Principle Indicator: 6.1.1. The governance component of the IR discusses the contribution of stakeholders towards the governance of the organisation.

(0): No mention of the role of stakeholders in shaping organisational governance

(1): While not discussed in the governance section but rather a section relating to stakeholders, the IR highlights that stakeholders have a role to play in the governance of the organisation; they highlight who they are and the role that they play.

(2): The governance component specifically highlights that stakeholders have a specific role to play in the governance of the organisation, they are highlighting who they are and what their contribution is towards governance.

Corporate Governance Principle Indicator 6.1.2. Evidence in the IR that the organisation initiates, grows and nurtures networks and clusters with other organisations and stakeholders, for co-learning, sharing of resources and collective innovation for sustainability.

(0): No evidence about how stakeholder's engagements contribute to co-learning and growth of the organisation

(1): There is limited to no focus on stakeholder nurturing but they do highlight how stakeholder engagements have facilitated growth in the organisation.

(2): Within the IR when they discuss their stakeholders they specifically mention what they do to nurture relationships, they highlight the value and shared learning that these engagements make to the organisation and society in general

Corporate Governance Principle Indicator 6.2.1. There is evidence in the IR that the company values are been disseminated throughout the organisation and are being practiced by leadership and employees.

(0): There are no organisational values presented in the IR

(1): the organisation presents their values in the IR but there is no connection or indication in the report how these values disseminate throughout the organisation

(2): the organisation presents their values and ethics in the strategy section of the IR and further refer to these values in the performance and or governance sections of the IR

Corporate Governance Principle Indicator 6.2.2. Performance metrics (i.e. KPI's) are linked to achievements in terms of collaboration and system resilience improvements (i.e. KPI's that address social and environmental value creation external to the organisation)

(0): KPI are standard GRI type indicators in terms of social and environmental accountability and do not reflect contribution to building systems resilience

(1): the KPI shows financial contribution to environmental stewardship

(2): the KPI show financial contribution to societal upliftment

(3): the KPI show financial contributions to societal upliftment and environmental stewardships.

Innovation and Foresight Principle Indicator 7.1.1: The IR reports financial and/or structural provisions to promote and facilitate creativity and innovation towards the development of new products and /or services that create value but with significant reduction in environmental and/or social impact

(0): there is no evidence to show that they support new product development that is less harmful to the environment or better for society

(1): They do not mention what financial or structural provision they provide but they do highlight products/services that contribute to a reduced impact on the environment

(2): the IR only provides information about the structural provision that supports creativity and innovation in the organisation towards reducing their impacts

(3): the IR only provides information about the financial provision that the organisation provides towards creativity and innovation that see the organisation reducing their impacts

(4): the IR specifically highlights financial and structural provisions for innovation and creativity leading to new products or services which they identify, and for which have reduced impact

Innovation and Foresight Principle Indicator 7.1.2. The IR discusses/highlights employee opportunities or reward (such as training and systems incentives) for innovation and creative problem solving in the development of new business models, systems, product and/or services with lowest to zero negative impact

(0): there is no discussion as to how the employees or the organisation is rewarded for innovation.

(1): the IR highlights how innovation has reduced their impact and improved value creation which is in turn rewarded to their employees

(2): the IR specifically highlight opportunities/rewards that their employees received for successful innovation that reduce their impact or improve their efficiency

Innovation and Foresight Principle Indicator 7.2.1. Existence and evidence of use, of processes and working conditions that facilitate transformative, evolutionary, one-planet thinking in product and services design and development.

(0): No evidence of one planet thinking in their strategy or product design

(1): Evidence of progression towards transformational, one planet thinking

(2): Evidence of transformative, one planet thinking in strategy and product design

Innovation and Foresight Principle Indicator 7.2.2. Shareholder and societal value created through new products and services with zero negative impact.

(0): No evidence of how products and services that a reduced environmental impact has create value for shareholders and society

(1): The IR only describes their (new) products and services and it is clear from the description that the value created is positive to their shareholders and society

2139 **(2):** IR specifically describes the value created to their shareholder and society in general through
 2140 new products and services that have reduced impacts

Appendix 2

The average indicators scores and standard deviations for all four resilience principles, received by companies grouped according to their economic group, including the indicator score ranges as well as both the minimum and maximum scores achieved by companies in each economic group (min < avg. score $\pm$ SD < max).

Principle and indicator description		Score range	Service providers	Wholesale and retail trade	Financial and investment services	Natural resource utilisation
Systems Principle	1.1.1: Recognition of the social ecological system	0	0 < <u>1.29</u> < 3	0 < <u>0.67</u> < 2	1 < <u>1.4</u> < 2	0 < <u>1.14</u> < 3
		1				
		2				
		3				
	1.2.1: Shared social ecological resources	0	0 < <u>0.57</u> < 1	0 < <u>0.67</u> < 2	0 < <u>0.60</u> < 2	0 < <u>0.29</u> < 1
		1				
		2				
	1.2.2: Social ecological accountability	0	0 < <u>0.86</u> < 2	0 < <u>0.67</u> < 2	0 < <u>1.00</u> < 1	0 < <u>0.86</u> < 1
		1				
		2				
Resource Decoupling	Water	0 - und	0 < <u>0.57</u> < 2	0 < <u>0.67</u> < 2	0 < <u>0.40</u> < 2	0 < <u>0.71</u> < 2
		1 - red				
		2 - inc				
	Energy	0 - und	0 < <u>0.89</u> < 2	0 < <u>0.50</u> < 1	1 < <u>1.20</u> < 2	0 < <u>0.86</u> < 2
		1 - red				
		2 - inc				
	GHG	0 - und	0 < <u>1.00</u> < 2	0 < <u>0.67</u> < 2	0 < <u>0.40</u> < 2	0 < <u>1.29</u> < 2
		1 - red				
		2 - inc				
	Landfill	0 - und	0 < <u>0.58</u> < 2	0 < <u>0.33</u> < 1	2 < <u>1.00</u> < 2	0 < <u>0.43</u> < 1
		1 - red				
		2 - inc				
Collabrative Governance	6.1.1: Stakeholder contribution towards governance	0	1 < <u>1.14</u> < 2	1 < <u>1.00</u> < 1	1 < <u>1.00</u> < 1	1 < <u>1.00</u> < 1
		1				
		2				
	6.1.2: Network nurturing	0	2 < <u>1.43</u> < 2	0 < <u>1.50</u> < 2	1 < <u>1.40</u> < 2	1 < <u>1.14</u> < 2
		1				
		2				
	6.2.1: Values and ethics are disseminated	0	0 < <u>1.23</u> < 2	1 < <u>1.83</u> < 2	1 < <u>1.40</u> < 2	1 < <u>1.29</u> < 2
		1				
		2				
	6.2.2: Collaboration and system improvements	0	0 < <u>0.57</u> < 2	0 < <u>0.33</u> < 2	0 < <u>0.80</u> < 2	0 < <u>0.29</u> < 2
		1				
		2				
		3				
Innovation and foresight	7.1.1: Provision to promote creativity and innovation	0	0 < <u>0.28</u> < 1	0 < <u>0.49</u> < 2	0 < <u>0.20</u> < 1	0 < <u>0.43</u> < 1
		1				
		2				
		3				
	7.1.2: Employee opportunities linked to creative innovation	0	0 < <u>0.43</u> < 2	0 < <u>0.33</u> < 1	0 < <u>0.6</u> < 2	0 < <u>0.14</u> < 1
		1				
		2				
	7.2.1: Promotion of transformative, one-planet thinking	0	0 < <u>0.45</u> < 1	0 < <u>0.50</u> < 1	0 < <u>0.60</u> < 1	0 < <u>0.43</u> < 1
		1				
		2				
	7.2.2: Tran stakeholder value created through zero-impact products	0	0 < <u>0.14</u> < 1	0 < <u>0.50</u> < 1	0 < <u>0.40</u> < 1	0 < <u>08</u> < 1
		1				
		2				

Appendix 3

The average indicators scores and standard deviations for all four resilience principles, received by companies in the direct and indirect impact category, including the indicator score ranges as well as both the minimum and maximum scores achieved by companies in each economic group (min < avg. score $\pm$ SD < max).

Principle and indicator description		Score range	Direct	Indirect
Systems Principle	1.1.1: Recognition of the social ecological system	0	$0 < 1.2 \pm 1.14 < 3$	$0 < 1.1 \pm 0.74 < 2$
		1		
		2		
		3		
	1.2.1: Shared social ecological resources	0	$0 < 0.6 \pm 0.74 < 2$	$0 < 0.5 \pm 0.53 < 1$
		1		
		2		
	1.2.2: Social ecological accountability	0	$0 < 0.9 \pm 0.64 < 2$	$0 < 0.8 \pm 0.42 < 1$
		1		
		2		
Resource Decoupling Principle	Water	Undisclosed	$0 < 0.8 \pm 0.78 < 2$	$0 < 0.4 \pm 0.84 < 2$
		Reduction		
		Increase		
	Energy	Undisclosed	$0 < 1 \pm 0.85 < 2$	$0 < 1 \pm 0.67 < 2$
		Reduction		
		Increase		
	GHG	Undisclosed	$0 < 1.1 \pm 0.83 < 2$	$0 < 0.8 \pm 0.91 < 2$
		Reduction		
		Increase		
	Landfill	Undisclosed	$0 < 0.3 \pm 0.48 < 2$	$0 < 0.5 \pm 0.52 < 2$
		Reduction		
Collaborative Governance	6.1.1: Stakeholder contribution towards governance	0	$1 < 1.0 \pm 0 < 1$	$1 < 1.1 \pm 0.31 < 2$
		1		
		2		
	6.1.2: Network nurturing	0	$0 < 1.3 \pm 0.61 < 2$	$1 < 1.4 \pm 0.50 < 2$
		1		
		2		
	6.2.1: Values and ethics are disseminated	0	$1 < 1.6 \pm 0.51 < 2$	$0 < 1.2 \pm 0.36 < 2$
		1		
		2		
	6.2.2: Collaboration and system improvements	0	$0 < 0.4 \pm 0.83 < 2$	$0 < 0.6 \pm 0.96 < 2$
		1		
		2		
		3		
Innovation and foresight	7.1.1: Provision to promote creativity and innovation	0	$0 < 0.5 \pm 0.51 < 2$	$0 < 0.2 \pm 0.43 < 2$
		1		
		2		
		3		
	7.1.2: Employee opportunities linked to creative innovation	0	$1 < 0.4 \pm 0.63 < 2$	$1 < 0.3 \pm 0.67 < 2$
		1		
		2		
		2		
	7.2.1: Promotion of transformative, one-planet thinking	0	$1 < 0.5 \pm 0.51 < 2$	$1 < 0.4 \pm 0.51 < 2$
		1		
		2		
		2		
	7.2.2: Trans- stakeholder value created through zero-impact products	0	$1 < 0.5 \pm 0.51 < 2$	$1 < 0.2 \pm 0.42 < 2$
		1		
		2		