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The impact of environmental management practices in KwaZulu Natal, South Africa

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A research article submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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DECLARATION

I, Zolisa Madikizela, declare that this research article is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the Graduate School of Business Administration, University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Zolisa Madikizela

Signed at: Athlone Park, Amanzimtoti, KwaZulu Natal, South Africa

On the 27 day of March 2022

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AECI	African Explosives and Chemical Industries
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
ECOC	Environmental Code of Conduct
KZN	KwaZulu Natal
NGO	Non-Governmental Organisation
NPO	Non-Profit Organisation
NEMA	National Environmental Management Act
NEMBA	National Environmental Management Biodiversity Act
NEMPAA	National Environmental Management Protected Areas Act
NEMQA	National Environmental Management Quality Act
NEMWA	National Environmental Management Waste Act
SDG	Sustainable development Goals
SEMA	Specific Environmental Management Acts
TBL	Triple Bottom Line
UIC	Umbogintwini Industrial Complex
UN	United Nations
6Rs	Redesign, Recycle, Reuse, Remanufacturing, Reduce, Recover

ABSTRACT

The research study appraises the effectiveness of the environmental management practices deployed at the Umbogintwini Industrial Complex (UIC) to manage historic and present environmental pollution that is the result of industrial activities over the past 100 years. The study was conducted at the African Explosives and Chemical Industries (AECI) site in the UIC located approximately 25 kilometres (km) south of Durban in KwaZulu Natal (KZN). In the UIC, AECI, its subsidiaries, and other businesses leasing property inside the UIC (tenants) have manufactured, stored, and supplied a wide range of industrial chemicals since 1907.

The study uses a qualitative case study research methodology and explores the views of internal stakeholder i.e. AECI employees and external stakeholders' i.e. tenants and other stakeholders regarding the effectiveness of environmental management practices deployed on site. A total of 25 participants were interviewed for this study. The interviews were done in person and some Via Teams Meetings. The theoretical and conceptual lenses that the study used include the concept of sustainability, green manufacturing, resource-based view theory and institutional theory.

The overall findings of this study revealed that AECI personnel, Consultants and Regulators that are involved in the implementation of environmental management practices are aware of the environmental management practices and strongly committed to implement the practices, while the NPOs and communities around the site are wanting in environmental awareness. The study also shows that AECI's environmental practices are not sufficiently recorded, making it harder to track and improve on them in the long run. As a result, the study proposes that the AECI should build a secure digital data management system that will aid in the keeping of records, the analysis of data, the creation of follow-up schedules, and the flagging of non-compliance, among other things. Moreover, the findings of this study support the value of sustainable development and green manufacturing as a means of investigating how environmental management practices can be implemented effectively in South Africa's industrial complexes as this is the key finding that distinguishes the UIC.

Furthermore, this study recommends that future studies assess the environmental management techniques used at other industrial complexes in South Africa or other

developing countries to assess the sustainability of the current plans, relating them to green manufacturing in order to stimulate continuous development.

Keywords: **Environmental Management, Internal and External Stakeholders, Sustainability Green Manufacturing**

1. INTRODUCTION

The purpose of this research study is to appraise the effectiveness of the environmental management practices deployed at the Umbogintwini Industrial Complex (UIC) to manage historic and present environmental pollution that is the result of industrial activities over the past 100 years. The study was conducted at the AECI site in the UIC, located approximately 25 kilometres (km) south of Durban in KwaZulu Natal (KZN). The study is structured as follows; the background to the study, problem statement, aim of the study, research objectives and questions as well as the significance of the study and organisation of sections. Principal and subsidiary sources were used in the study. In the next section the background to the study is provided.

1.1. Background to the problem

The World Commission on Environment and Growth (the Brundtland Commission) was founded in 1983 in response to a global outcry in the 1970s and 1980s over the negative effects of development on the environment. Its goal was to provide a "global agenda for change". The Commission concluded that it was impossible to separate economic and social development issues from environmental issues, as a result the term "sustainable development" was created (Fuggle & Rabie, 2009). Environmental sustainability is linked to economic and social sustainability, according to a number pf studies (Fuggle & Rabie, 2009; Sajan, Shalij, Ramesh & Biju, 2017).

The Environmental Conservation Act 73 of 1989 was the first comprehensive environmental management legislation in South Africa. It aimed to provide for the effective conservation and controlled use of the environment, as well as for things ancillary thereto (Humby, 2015). The National Environmental Management Act (NEMA) 107 of 1998 followed, with the goal of promoting cooperative environmental governance by establishing principles for environmental decision-making, institutions to promote cooperative governance, and procedures to coordinate environmental functions performed by state organs (Papu-Zamxaka, Harpham & Mathee, 2010; Marais, Retief &Sandham, 2014).

There are specific environmental management Acts (SEMAs) under this umbrella Act that deal with specific aspects of the environment, such as air (Air Quality Act, 2004

(NEMQA), biodiversity (Biodiversity Act, 2004 (NEMBA)), coasts, protected areas (Protected Areas Act, 2003 (NEMPAA)), waste (Waste Act, 2008 (NEMWA), and there have been numerous amendments of the act since its inception (Marais, Retief & Sandham, 2014).

To combat environmental impact issues, organisations use skills and strategies to monitor and manage the environmental impact of their operations on the natural environment because of growing concern about environmental pollution. These environmental management practices improve a firm's environmental performance by reducing the negative consequences of its activities on the environment and the surrounding communities (Montabon, Sroufe & Narasimhan, 2006); (Ulubeyli, 2013). In the UIC, AECI, its subsidiaries, and other businesses leasing property inside the UIC (tenants) have manufactured, stored, and supplied a wide range of industrial chemicals since 1907.

While the initial plant was built in a rural location at the time, subsequent urbanisation has resulted in the creation of formal and informal settlements surrounding the site. Significant negative environmental impacts with respect to air, noise, soil, surface water, and groundwater arose in earlier years when environmental management understanding was not as developed. The UIC as it is now (despite best practices of the time being implemented), poses complex challenges for AECI, consultants and regulators to remediate. This, together with changes in the surrounding land use throughout time, impacted the site's risk profile, resulting in several efforts being made by AECI and on-site enterprises to restrict and regulate the operations' impacts on the environment.

Since 1995, AECI has been working to determine the type and degree of past contamination, as well as mitigate pollution that may result from current complex activities, in collaboration with several government Ministries and other Interested and Affected Parties. The goal was to identify and assess any potential environmental and human health concerns, as well as what could be done practically to mitigate these risks. The AECI has had to find and apply best practices in the environmental field, including effective stakeholder involvement. The communities surrounding the UIC, Conservation Non-profit Organisations (NPO), Non-Governmental Organisations (NGOs),the firms that operate within the site (tenants), and the necessary local and

national regulatory bodies are the key stakeholders (Department of Fisheries, Forestry and Environmental (DFFE), Department of Water and Sanitation (DWS)).

Transparency, monitoring the impact, adopting impact remediation procedures and plans, having forums with communities and regulators, and keeping affected parties informed as needed by regulators have all enabled AECI to handle the environmental challenges. To minimize recurrences of environmental concerns and to gradually deal with historic ones, AECI has environmental management practices in place, such as an environmental code of conduct (ECOC) for all enterprises working inside AECI, stakeholder forums, benthic surveys (for the marine outfalls), surface and groundwater monitoring, air quality monitoring among others. The Department of Forestry, Fisheries and Environment (DFFE) and other regulatory organisations, such as the Department of Water and Sanitation (DWS), have granted AECI several permissions and licenses in compliance with NEMA. Furthermore, AECI has spent millions of rands on remediation initiatives and monitoring programs for compliance and duty of care objectives. Even though millions have been invested, the success of integrating environmental management techniques in the UIC is still uncertain, and it's not obvious whether the stakeholders are aware of what AECI has accomplished over the years.

1.2. Problem Statement

Environmental management is a complicated topic with a wide range of complex and nuanced consequences on humans and the environment. In accordance with the dual concept of the significance of the environment to human wellbeing and of human wellbeing in environmental management, recognising the problem and including stakeholders in management initiatives has been recognized as a critical step in ensuring win-win outcomes (Arda, Bayraktar & Tatoglu, 2018). There are approximately 116 tenants that occupy the AECI site. The AECI site is divided into three sections. These are industrial (47 500m2), commercial (11 130m2), and land (460 875m2).

Since historical and current environmental challenges exist, AECI has implemented environmental practices to remediate contaminants and prevent environmental risks. As the landowner, AECI is legally responsible for enforcing environmental policies on the sites that are mandated by the NEMA Act and other best practices, such as the

ISO environmental management systems (Papu-Zamxaka, Harpham & Mathee, 2010; Humby, 2015). Environmental management practices such as environmental compliance and auditing programs, pollution control, and natural resource conservation improve firms' competitive operational performance as well as the overall environment performance (Famiyeh, Adaku, Amoako-Gyampah, Asante-Darko & Amoatey, 2018)

However, AECI faces a number of obstacles in implementing environmental management practices, including but not limited to financial costs of implementing projects, changing regulations, difficulties in enforcing environmental practices on tenants, communication within the organisation, gaining buy-in from the surrounding communities, and, most importantly, evaluating the effectiveness of environmental management practices that are being implemented and those that have been implemented in the past.

1.3. Aim of the Study

The goal of this research is to assess the effectiveness of environmental management practices and strategies utilised at the AECI Umbogintwini site to address historical and current environmental pollution challenges.

1.4. Objectives of the Study

This study is guided by the following objectives:

- To identify the existing environmental management practices;
- To identify the benefits and challenges experienced by AECI and its stakeholders in implementing the environmental management practices;
- To investigate the people's views on the effectiveness of the existing environmental management practices process

1.5. Research Questions

The study is guided by the following questions:

i. What are the environmental management practices in place?

ii. What are the accomplishments and challenges that AECI has had in the implementation of environmental management practices?

iii. What are the perceptions of the stakeholders about the environmental management practices in the site? What are their recommendations?

iv. What are the lessons learnt and areas of improvement in implementing environmental management practices at the AECI site?

1.6. Delimitations and assumptions of the study

This study encompassed contributions from the following:

- Internal stakeholders – AECI employees from various departments and management
- External stakeholders - The communities surrounding the Umbogintwini Industrial Complex, Conservation Non-profit Organisations (NPO), Non-Governmental Organisations (NGOs),the firms that operate within the site (tenants), and the necessary local and national regulatory bodies are the key stakeholders (Department of Fisheries, Forestry and Environmental, Department of Water and Sanitation).

This study focuses on the effectiveness of implementing environmental management practices at a specific industrial complex. The findings may not be fully generalizable or prescriptive as one case study was used. The challenges of implementing environmental management practices are diverse and unlikely to be fully addressed through research on one complex.

The research was conducted within the limitations of available time and funds. While acknowledging that analysing more than one case would yield more generalized results, one case was selected to ensure intensive analysis thus attempting to maximize internal and conclusion validity of the case study research findings.

1.7. Significance of the Study

Several research on the adoption of environmental management techniques and the performance of large organisations have found considerable acceptance of various

approaches among the large corporations evaluated (Theyel, (2000); Theyel & Hofmann, 2015). These studies reveal varying levels of environmental management practice adoption and large company performance in specific industrial sectors, as well as the significance of applying environmental management practices to managers, regulators, and the public, all of which warrant more examination (Theyel & Hofmann, 2015).

The outcomes of this research study have far-reaching repercussions for AECI, as well as any companies or tenants that operate in the UIC, regulators, and the surrounding communities, since they will aid AECI site management in identifying and better understanding the processes that could lead to the industrial complex's effective implementation of environmental management practices. The findings of this study support the value of sustainable development and green manufacturing as a means of investigating how environmental management practices can be implemented effectively in South African industrial complexes. Furthermore, this study encourages other industrial complexes to improve their environmental management practices.

1.8. Organisation of Sections

Section 1: Introduction and background

Section one focuses on the outline of the background to the problem, the problem statement, aim of the study, objectives of the study, research questions, and the significance of the study.

Section 2: Literature review

A survey of the literature on environmental management practices is presented in the second section. The topic was researched using both primary and secondary sources. The history of environmental management practices, the impact of applying environmental management practices on individuals engaged, the problems, and mitigation techniques are all included in the literature study. The literature study focused on a broad evaluation of relevant materials, including the most recent articles, journals, and important books on the topic, as well as monographs and dissertations published both domestically and globally. Various frameworks are also evaluated in this section.

Section 3: Research methodology

The third component focuses on research design and methodology. The research philosophy, research design, research approach, study population, sampling, data collecting, data analysis, study trustworthiness, study limitations, bias elimination, and ethical considerations are all discussed in this section .

Section 4: Findings of the Study

In this Section, the findings of the study are discussed. The Section includes research questions, presentation and analysis

Section 5: Discussion, Conclusions and Recommendations

Section five serves as a synthesis of the whole study. This Section comprises findings from the literature review, findings from the primary research, and findings from research questions, conclusions and recommendations for future research.

2. LITERATURE REVIEW

According to the statistics in the literature and anecdotal experiences of organisations, environmental management strategies are growing more popular because of the publishing of voluntary and international environmental standards (Montabon, Sroufe & Narasimhan, 2006; Giunipero, Hooker & Denslow, 2012; Peters & Romi, 2013). This section looks at the theories that are applicable to the study, various definitions of environmental management practices, what motivates businesses to deploy them, benefits and challenges of doing so.

2.1. Theoretical Framework

Theoretical frameworks are characterised as a motivation for selecting theories linking them to a research problem; a set of concepts and aspects of theories that assist in establishing coherence in research and giving direction to research (Jabareen, 2008, Lester, 2005).The lenses that the study is looked at are the concept of sustainability and green manufacturing, resource-based view theory and institutional theory.

The Concept of Sustainability and Green manufacturing

The term "sustainability" can be defined in a number of ways, but the most prevalent interpretation is that it refers to human progress on the planet. On behalf of the United Nations General Assembly, Brundtland (1987) was the first to define the concept of sustainable development. According to the Commission, sustainable development is defined as the development that meets current needs while not risking future generations' ability to meet their own needs (Brundtland, 1987; UN, 2020).

The United Nations General Assembly established the Sustainable Development Goals (SDGs) in 2015. They are a set of 17 global goals and are part of UN General Assembly Resolution 70/1, titled "2030 Agenda" (UN, 2020) The Sustainable Development Goals (SDGs) are a set of broad ecological, social and economic development goals with their own set of objectives. Because all of the SDGs overlap, working on associated causes will be the key to properly addressing concerns. The Sustainable Development Goals (SDGs) are a step toward making the world a more sustainable, safer, and healthier place to live in (UN, 2020).

The sustainability concept is summarised using the triple bottom line (TBL) or three pillars model (Paulraj, Chen &Blome, 2017). Elkington (1997) created the phrase “triple-bottom-line" (TBL) to define the three pillars of sustainability: economic, environmental, and social equity. The TBL is depicted schematically in Figure 1 below, along with the interdependence of the three pillars. Managers must undertake sustainability audits additional to standard economic bottom line reporting to examine the impact of social and environmental bottom lines, with the purpose of better understanding the entire spectrum of value-added and the problems that businesses confront (Baumgartner & Ebner, 2010; Paulraj, Chen &Blome, 2017).

According to the authors, Ho and Taylor (2007), all stakeholders should be concerned about social, environmental as well as financial performance. The absence of ecologically friendly and socially viable production is justified by economic efficiency, but it cannot be considered sustainable, as shown in Figure 1.

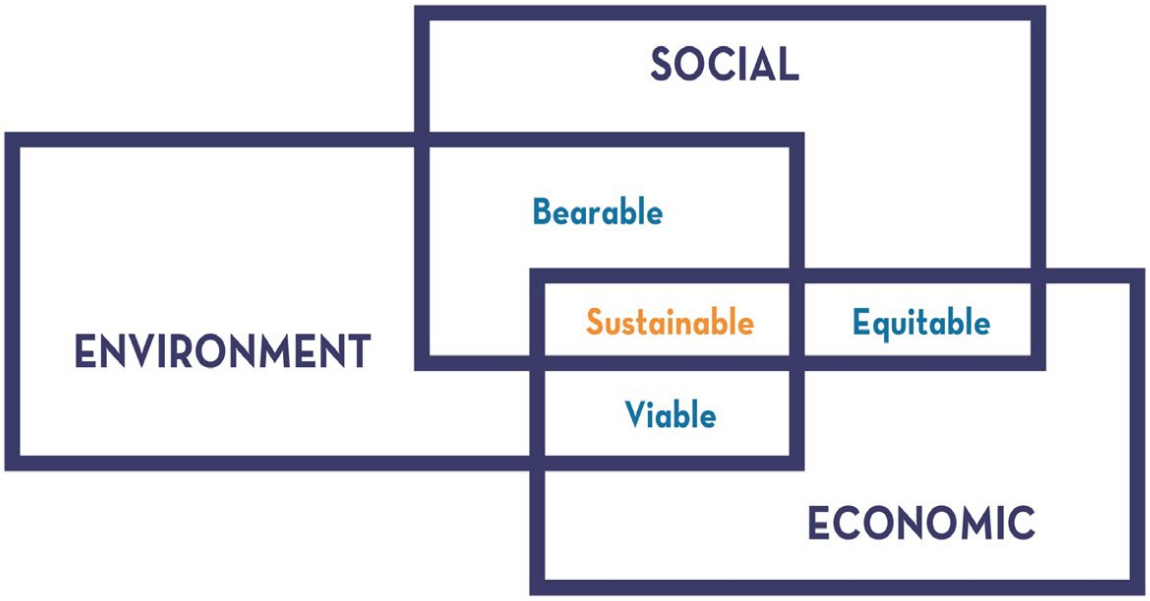

Figure 1: The triple bottom line framework. 3 Pillars of Sustainability (Paulraj, Chen and Blome, 2017).

It must be noted that performance measurement structures are usually intended to be needs-driven (by stakeholders), audit-driven (by institutions), or model-driven (by the organisation's theoretical model) (Horton, Koh &Guang 2016). Performance measurement must be produced regardless of a company's strategy to ensure that

traders' and clients' performance goals and outlooks are in line with the business's overall goals and objectives (Hassini, Surti & Searcy, 2012).

Moldavska and Welo (2017) define green production as "any manufacturing technique that does not harm the environment during any of its travel phases". Green product design, environmentally friendly raw material utilisation, packaging, distribution, and product end-of-life reuse are all included. Green manufacturing helps to halt the depletion of natural resources and reduces waste (Woo, Kim, Chung & Rho, 2016). Green manufacturing can be defined as the use of environmentally friendly and high-efficiency materials in manufacturing to reduce negative environmental impact. (Ghazilla, Sakundarini, Abdul-Rashid, Ayub, Olugu, & Musa, 2015). It covers important manufacturing topics such as following environmental laws and regulations, conserving natural resources, managing dangerous substances, and waste management (Zhu & Sarkis, 2004).

Green manufacturing focuses on component reuse and part reduction, as well as the 3Rs, regulatory compliance, waste management, conservation, environmental protection, pollution control, and other industrial concerns (Jawahir, Rouch, Dillon, Joshi, Venkatachalam &Jaafar, 2006).Hazardous gas emissions and excessive energy consumption represent a company's poor environmental performance, whereas following the 3Rs reduces costs by developing goods and processes that use less material, allowing material to be reused in its original form and therefore improving resource efficiency (Thanki, Govindan & Thakkar, 2016).

By utilising efficient raw materials, a properly created and adequate green manufacturing system reduces operative costs, labour, and energy consumption while adding value to a product (Rehman, Seth & Shrivastava, 2016). There are numerous opportunities to improve an organisation's efficiency through these practices, as well as environmental protection, which has an impact on financial advantages (Roy, Stark, Tracht, Takata & Mori, 2016). For companies facing competitive, governmental, and community challenges, balancing economic and environmental performance green manufacturing and the sustainability have become critical (Bai, Sarkis & Dou, 2015; Woo, Kim, Chung & Rho, 2016). As a result, putting it in place aids businesses in becoming acutely aware of their obligation to safeguard the natural environment by re-engineering operational systems to comply with severe environmental regulations.

The "6Rs" of green manufacturing are: redesign, recycle, and reuse, remanufacturing, reduce, and recover (Rehman, Seth, Shrivastava, 2016; Al-Juoori, Singh, Abu Mansor, Kakar, Zulfiqar, & Pitchy, 2021).

Green manufacturing goes beyond only producing "quality products"; it also ensures that businesses satisfy product quality standards and that their operational activities are safe for workers and the environment by utilising appropriate resources and eco-friendly technologies (Wibowo, Handayani & Mustikasari, 2018). An effective green manufacturing strategy considers the life cycle of products from a triple bottom line perspective (Sezen & Cankaya, 2013). Green manufacturing, invariably, aids businesses in creating a harmonious environment and striking a balance between commerce and the environment. Green manufacturing can also produce incredible outcomes if it is effectively incorporated into all company's functional departments (Wibowo, Handayani & Mustikasari, 2018).

In conclusion, green manufacturing is a concept and a technique that focuses on the integration of economic, environmental, and social elements within the manufacturing process. In essence, green manufacturing paradigm can be defined as a manufacturing process that incorporates social, environmental, and economic factors into the manufacturing process to produce and extend the life cycle of a product through the use of technology that is safe for stakeholders and wastes minimal resources, without compromising the needs of future generations.

Resource-based View Theory

One of the theoretical lenses through which the study is examined is the resource-based view of organisations (RBV). Organisations, according to Wernerfelt (1984), should be assessed based on their assets. These resources can contribute to long-term competitive advantage if they are Valued, Rare, Inimitable, and Non-substitutable (the "VRIN" attributes) (Barney, 1991). Resources are considered “valuable” if they aid the firm advance its efficiency and proficiency; “Rare” or scarce if they can offer a competitive advantage; “Inimitable” if they are hard to replica by other firms due to factors such as inimitability or complexity; and “Non-substitutable” if there are no strategically comparable resources (Armstrong & Shimizu, 2007; Nason & Wiklund, 2015).

The resource-based view of organisations has piqued the interest of industry and economics researchers, as evidenced by the number of review articles written about it (Armstrong & Shimizu, 2007; Nason & Wiklund, 2015). This theoretical domain would be best suited to explaining the impact of practices on performance and environmental management because it is based on the RBV's basic idea of providing a descriptive principle of performance variances related to resources.

The natural environment was incorporated into the RBV, leading to the development of the firm's natural resource-based view (NRBV) (Hart, 1995; Hart & Dowell, 2010).According to the study of NRBV, there is a positive association between multifaceted environmental capabilities and structural performance of the organisations (Aragón-Correa & Sharma, 2003). The VRIN attributes (valuable, rare, inimitable, and non-substitutable) of a resource being uncommon and unique are to be considered most essential inside the NRBV (Vachon & Klassen, 2008). Klassen and Whybark (1999), found that contamination prevention expertise enabled the creation of capabilities that were challenging for other industry players to replicate, and Christmann (2000) and Hart and Dowell (2010), who studied the impact of environmental management on cost benefit, are two previous studies that utilised the NRBV.

Institutional Theory

Institutional theory identifies factors that promote the permanence and legitimacy of organisational practices such as culture, social environment, regulation and policy, customs and economic motives, while recognising the importance of resources. It provides a theoretical viewpoint that can be investigated (Brunton, Eweje & Taskin, 2010). Institutional theory customarily puts groups and organisations in their position by complying with the institutional environment. It deals with ways to better ensure legitimacy (Scott, 2008). According to Jennings and Zandbergen, (1995); Hoffman and Jennings, (2015), institutional theory including external social, political and economic impacts seek to adopt or justify organisational practices in the eyes of other stakeholders (Brunton, Eweje & Taskin, 2010).

Ball and Craig (2010) use Institutional Theory to describe how changes in societal ideals, technology improvements, and regulations affect decisions about 'green'

sustainable activities and environmental management (Hoffman & Jennings, 2015; Fowler & Hope, 2007; Tate, Ellram & Kirchoff, 2010). Delmas and Toffel (2004), for example, use Institutional Theory to investigate in what way various structural tactics influence the acceptance of environmental management methods. Isomorphism in organisational tactics, structures, and processes is described by Institutional Theory as three types of drivers. Coercive, normative, and mimetic drivers are all present (DiMaggio & Powell, 1983). Influences from individuals in positions of power, such as those in the dairy supply chain, can be coercive. Environmental management and, as a result, sustainability requires coercive forces (Kilbourne & Polonsky., 2005).

Normative drivers guarantee that companies follow the rules in order to be seen as taking part in legal activities (Sarkis, Zhu, & Lai 2011). Ball and Craig (2010) found that normative pressures push businesses to be more ecologically conscious, and they maintain that institutional investigation is required to better comprehend novel social guidelines (such as principled ideals and environmental philosophy) and organisational reactions to conservational problems. Normative forces are influenced by a societal obligation to comply, which is based on social requirement or what a corporation or individual should be undertaking (March & Olsen, 1989). Mimetic isomorphic drives emerge when companies try to imitate successful industry competitors' actions in order to copy their road to success and hence legitimacy (Aerts, Cormier. & Magnan, 2006; Sarkis, Zhu, & Lai 2011)

Summary

The existing sustainability and green manufacturing frameworks emphasis on resource areas (emissions-focused carbon systems, fuel efficient technologies, and contamination mass reduction), but they do not include the company's prolonged borders or the stakeholders involved (Roy, Stark, Tracht, Takata & Mori, 2016). As a result, because it brings together many stakeholder viewpoints on the same challenge, a fixed resource agenda would not automatically work. As a result, this research’s performance measurement for green manufacturing is comprehensive, taking into account the following theoretical lenses: From the aforementioned theories and notions, we can deduce the following:

A) The resource standpoint (normative-peer pressure): Noting the practicalities of sustainable development in a manufacturing environment. The majority of manufacturers place a premium on this feature because it assists them in meeting a variety of green/sustainable agendas and objectives.

B) Stakeholder standpoint (peer-normative pressure) in a sustainable and green manufacturing system, essential stakeholders' requirements must be satisfied. This starts with mining firms that extract rare earth material and ends with providers who focus on advanced material manufacturing/development for industrial complexes that create and store a variety of products (e.g., additive-manufacturing).

C) Institutional theory (regulatory pressure): In this theoretical lens, regulations are considered, as well as determining which regulations to satisfy and which to pursue. What counts as sustainable performance is determined by the manufacturers' indices. Mismatches occur and different certifications are issued if they do not follow or have their upstream supply chain linked to an adequate set of measures, resulting in inconsistency in sustainability outcomes. The institutional theory lens captures this regulatory pressure seamlessly.

According to the studies, companies that want to achieve green manufacturing should connect their major suppliers to the proper institutional structures. As a result, if the three intents (resource, stakeholder, and institutional) aren't aligned, stakeholders may make unrealistic requests given the company's resource capabilities. Manufacturers may appear to be extremely sustainable in terms of resources in such circumstances, but not so much in terms of supply strategies that could lead to disasters. This paper proposes an approach that combines institutional theoretical perspectives with green manufacturing to:

(1) Build on existing research that uses a resource-based theoretical lens to explain cost-effective sustainable selections and environmental behaviours by examining the influence of institutional pressure on sustainable material choices and practices implemented by businesses. (2) Concepts of green manufacturing and institutional theory. (3) Combine a resource standpoint with a stakeholder and institutional methodology to gain a deeper insights on green manufacturing.

2.2. What are environmental management practices?

Environmental management practices are viewed from a variety of angles. According to Shrivastave and Hart (1995), environmental management provides an overall system view for dealing with environmental challenges. Environmental management practices, according to Yang, Han, Zhou, and Yuan (2015), are a set of organisational actions aiming at resource efficiency and a clean environment, ranging from raw material inputs through operational processes. Environmental management strategies are defined by Hajmohamed, Vachon, Klassen, and Gavronski (2013) as "the level of resources invested in undertakings and know-how development that led to pollution reduction at the source," which includes the use of environmental administration structures such as ISO14001 and other reusing and waste decrease initiatives.

Environmental assessments, overall quality management, pollution control plans, employee environmental training, supplier or contractor environmental standards, and employee award programs for environmental proposals and engagements are examples of environmental management techniques (Theyel, 2000; Yang, Han, Zhou & Yuan, 2015).

According to academic definitions of environmental management practices, these practices are steps that an organisation must do to reduce environmental pollution generated by its operations.

2.3. Motivation for organisations to implement environment management practices

Since the ISO 14001 standard was published in 1996, several industry supply chains have been under greater pressure to address environmental performance through the use of environmental management systems (Montabon, Sroufe & Narasimhan, 2007). Due to the escalating costs of environmental options and regulatory compliance, selecting meaningful and effective instruments for monitoring environmental performance is particularly critical (Montabon, Sroufe & Narasimhan, 2007), many firms ask themselves, "What's in it for me?" and then use various environmental management approaches based on their replies. Hart and Ahuja (1996) classified environmental reasons according to their potential to reduce pollution and avoid contamination. "Noncompliance," "compliance," "compliance-plus," "economic and

natural environment excellence," and "leading edge" are the five incentives for applying environmental management methods, according to Roome (1992). Environmental management approaches are classified into two categories by Zhu, Sarkis, and Lai (2012): internal environmental management and external environmental management, which refers to dealing with environmental concerns that affect both internal and external stakeholders. Additionally, relational incentives, according to Singh, Jain, and Sharma (2014), have a favourable impact on the comprehensiveness of recognized environmental management practices because firms see their image, compliance, and prevention of environmental incidents as significant reasons for implementing policies.

According to the findings of the studies mentioned above, there are three types of motivation for applying environmental management practices: (1) Environmental Compliance: If an organisation complies with environmental requirements mandated by local governments, it can avoid penalties (Klassen & Whybark, 1999; Singh, Jain & Sharma, 2015). (2) Economic interests: Environmental management approaches raise sales, provide a “first-mover” advantage, improve product excellence, and produce revenue through recycling. (3) Competitive advantage: Environmental management methods are one of the strategic choices for attaining a competitive advantage, according to strategic management theory. The negative impact of competitors who have already embraced environmental management can be reduced by developing a green image through environmental management (Zhu, Sarkis, & Lai, 2012; Singh, Jain & Sharma, 2015).

Institutional pressures, in addition to the above-mentioned general arguments, are a direct rationale for using environmental management strategies, according to a study by Wan, Chan, and Huang (2017). The interaction of external institutional forces, internal resource profiles, and environmental commitment all have different effects on the links between institutional pressures and environmental management practices, as well as the interaction of external institutional forces, internal resource profiles, and environmental commitment (Wan, Chan & Huang, 2017).

Based on the foregoing, scholars argue that the motivations for implementing environmental management practices vary by firm, even though the end goal is the same: to create a cleaner environment, and those institutional pressures, such as

internal resource profiles and external pressures (such as NGOs, regulatory compliance, and so on), motivate organisations to implement environmental management practices.

2.4. Challenges in implementing environmental management practices

Small firms, while not a homogeneous group, exhibit significantly distinct behavioural features in terms of deploying environmental management practices than larger businesses, according to the research (Walker & Redmond 2014). Small businesses, in contrast to major corporations, face a potentially considerable challenge in terms of environmental management investments since they typically fail to comprehend the economic benefits of such operations (Revell & Blackburn 2007). Environmental initiatives' costs and advantages for a small business can be difficult to predict, and initial investments may surpass economic rewards that will not be realised for a long time (Reinhardt, 1998; Bemmer et al, 2011). Several studies have revealed that environmental management practices necessitate a significant amount of financing environmental practices, personnel environmental training, and proper equipment provide for more than 20% of some organisations' overall revenue (Marrow & Rondinelli, 2002; Barve & Muduli, 2013).

There are policies that require businesses to reduce pollution at the source, which necessitates changing their production technology and organisation, ignore the possibility that businesses are already looking for new ways to improve energy efficiency, water conservation, and other factors as part of their corporate competitiveness strategies (Barve & Muduli, 2013). Due to increased expectations for green consumption, ISO standards are gradually proving to be a critical marketing tool in the industrial sector, even as top management strongly advises that devotion is one of the greatest barriers to implementing environmental management practices (Chowdhury Prajogo, & Jayaram, 2018).

Top management is still hesitant to apply these practices since it entails a significant amount of documentation labour, and a substantial non-compliance discovered during the environmental auditing process could result in public uproar or even legal action (Darnall, Rigling Gallagher, Andrews, & Amaral, 2000; Barve & Muduli, 2013). Employee duties, responsibilities, and authority are not clearly defined or conveyed to

all organisational members, leading in employee misunderstanding about their jobs and low motivation to safeguard the environment (Barve & Muduli, 2013, Ullah, 2017)

Low literacy and a lack of media attention in developing countries compound poor environmental understanding among politicians, citizens, and bureaucrats (Delgado-Serrano, Del, Mistry, Matzdorf, & Leclerc, 2017). Many firms make the mistake of implementing environmental management methods immediately following an initial environmental diagnostic, rather than rigorously evaluating objectives, policies, activities and conducting numerous environmental assessments (Barve and Muduli, 2013). Environmental preservation and enhancement are hampered by administrative delays, poor training, and a lack of cross-departmental collaboration throughout implementation. Another element that leads to the difficulty to develop an adequate workplace culture is a short-term concentration (Ullah, 2017).

Several studies have investigated the adoption of environmental management practices among large firms and found universal acceptance (Andrews, & Amaral, 2000; Barve & Muduli, 2013). These studies, which indicate varying levels of adoption of environmental practices in specific industrial sectors and with respect to firm size and age, reveal the importance of applying environmental management practices for managers, regulators, and the general public (Theyel & Hofmann, 2015). In the existing environmental management literature, only a few studies have looked at how an organisation's environmental commitment and resource characteristics influence its environmental management practices (Delgado-Serrano, Mistry, Matzdorf, & Leclerc, 2017). There is little study on the overall effectiveness of environmental management strategies used in developing nations to solve environmental challenges. The case study method of the qualitative research approach was deemed most suitable for exploring the views of internal stakeholder - AECI employees and external stakeholders' i.e. Tenants and other stakeholders.

2.5. Benefits of implementing environmental management practices

Some organisations change their manufacturing structures by altering sourcing supplies, methods, and supply channels when environmental practices, customer and supplier relations reveal inadequacies, inferring a relation between an organisation's environmental practices and its produce and development innovation performance

(Theyel & Hofmann, 2015). Past lean manufacturing experiences are positively related to environmental management practices, according to the findings of the Yang, Hong, and Modi (2011) study, while environmental management practices alone are inversely related to market and financial performance. Improved environmental performance, on the other hand, significantly mitigates the negative effects of environmental management practices on market and financial performance (Yang et al, 2011).

As a result, organisations monitor environmental performance to assess the influence of environmental management strategies on other business performance outcomes (Melnyk et al., 2003, Yang et al, 2011, Zhu et al, 2012). Improved economic and environmental sustainable performance has direct and indirect effects on social performance, according to Sajan, Shalij, Ramesh, and Biju (2017), because ineffective waste management and environmental management can lead to a slew of social and public health issues, whereas reduced air emissions, waste, and energy consumption result in significant societal benefits.

According to Reed (2008) and Sarkis, Zhu, and Lai (2010), stakeholder participation in the development and implementation of environmental management practices can improve the quality of environmental decisions. It does so by considering more comprehensive information inputs demonstrating the relationship between the organisation and the communities in which it operates.

According to Pineiro-Chousa, Vizcaíno-González, López-Cabarcos and Romero-Castro (2017) Environmental management practices can be used as a specific tool for reputational risk hedging. Environmental management has an impact on corporate reputation and customer satisfaction. Environmental management practices can improve corporate environmental performance when effectively communicated to society directly by the organisation or indirectly through the media (Reed, 2008).

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

The previous part conveyed an overview of the literature on how to apply environmental management principles in businesses. The aim of this section is to discuss the scientific collection and analysis of data. This allowed for the provision of relevant information to assess the effectiveness of environmental management practices implemented at AECI Umbogintwini. Section 3 thus presents the specifics of the research methodology that I used to conduct the study. It also presents the research questions, paradigm, design, approach, and methodology, which includes the population, sampling and instruments of collecting and analysing the data. The section will also discuss the validity of the research and the ethical considerations that were applied to the study.

3.2. The research design

Panday and Pandey (2015) define research design as a framework or plan for a study that is used as a guide in gathering and analysing data. As a result, the goal of research design is to ensure that meaningful data is collected with the least amount of exertion, period, and finance possible. Examples of research designs include causal-comparative research, correlational research, explanatory research, descriptive research, and case studies (Fraenkel, Wallen & Hyun, 2012).In this study the researcher used a case study research design to explore the effectiveness of environmental management practices at AECI Umbogintwini.

Case study research is defined by Burns, Grove and Gray (2011) as research conducted to gain new insights, discover new ideas and for increasing knowledge of the phenomenon. The primary goal of exploratory research is to define the boundaries of the environment in which the issues, opportunities, or situations of interest are likely to exist, as well as to identify the key factors or variables that may be present and relevant to the investigation (Burns, Grove & Gray, 2011). The implementation path of UICs environmental management practices and perceptions of various stakeholders is investigated in this study.

3.3. Research philosophy

Research philosophy refers to research paradigms incorporating the fundamental philosophical concepts and values about the nature of reality and the scientific pursuit of knowledge. The concept “paradigm” is defined as the assembling of presumptions or expectations about elementary facets of a phenomenon that culminate in a perspective of existence (Nieuwenhuis, 2009, cited in Maree, 2016). According to this definition a paradigm refers to beliefs of people about the world. According to Nieuwenhuis (2009, cited in Maree, 2016), a philosophy addresses certain beliefs about the nature of reality.

The adoption of environmental management methods was investigated using a qualitative phenomenological philosophy in this study. A phenomenological philosophy clarifies all significant concerns that humans face (McMillan & Schumacher, 2010). I bracket or set aside all pre- rulings and acquired data on how people make sense of a certain experience when I used this ideology. I employed phenomenological philosophy in this study since it aids in gaining a deeper understanding.

3.4. Research approach

There are three main types of research approaches, namely quantitative, qualitative and mixed methods approach (Creswell, 2014). I employed a qualitative research approach in this study. A qualitative approach is a method of examining and analysing the challenges and problems that people face in their everyday lives in order to present a clear and relevant image of how the problems should be solved in words (Creswell, 2014). The term ‘qualitative', according to Denzin and Lincoln (2017), refers to a process in which human experiences are emphasized on clarifications that are not related to testing or measurement in terms of capacity, size, strength, or the number of times it occurs.

Qualitative researchers emphasise the experiences of a group of people, an interpersonal relationship that involves physical and emotional intimacy between the researcher and what is researched as well as all the challenges of conducting the research (Denzin & Lincoln, 2017).

Qualitative researchers believe in different realities and are dedicated to gaining a better knowledge of the situation or issues that are investigated and are devoted to the acknowledgement of the views of the Participants of the study (Speziale and Carpenter, 2014). The qualitative approach is normally related to phenomenology because it is related to subjectivity allowing for the existence of heterogeneous experiences (Denzin & Lincoln, 2017). The major purpose of deploying a qualitative approach in this research is that I was able to conduct the study in a manner that is able to reduce the interruption of the natural context of the aspect under investigation, namely the environmental management practices journey. The qualitative research method was also considered ideal since it allowed participants to participate to the study in writing or through oral presentations (Brynard, Hanekom & Brynard, 2014).The qualitative research approach was therefore deemed most suitable for exploring the views of internal stakeholder - AECI employees and external stakeholders' i.e. Tenants and other stakeholders.

3.5. Target population of the study

The population of a study is the entire group of individuals or set of items and actions about whom the researcher is collecting data and drawing conclusions (Van Rensburg, 2010). The population of a study can also refer to all of the people or things that are being investigated (Rahi, 2017). Furthermore, a study's population is a group of items, events, or people who share a common trait that I was interested in researching (Brynard, Hanekom & Brynard, 2014).To gather participants that are key to the research topic, I obtained permission to go through the AECI stakeholder database where all the interested and affected parties are documented by the organisation, permission letter is included in the supplementary files.

Based on the available information in the AECI database, the relevant population of this study are internal stakeholders: Environmental division personnel as well as AECI wide personnel. I selected six personnel that are inclusive business unit heads and employees. The reason for the selection is because I wanted to get views and perspective of both employees and management to ensure that the views captured are not biased.

External stakeholders identified were from regulatory authorities, Environmental Conservation Non-Profit Organisations (NPOs), Environmental Consultants and Community focus groups. The regulatory bodies focus on various aspects of the environment i.e., water and sanitation, energy, waste, air, noise, environmental health, soil, and groundwater. The selected regulatory bodies have issued AECI with permits or authorisations with conditions to operate and AECI engages with them on a regular basis as stipulated in the permit or authorisation documentation. These regulatory bodies are provincial and national and six (6) personnel were selected for interviews.

AECI has approximately 116 tenants that vary in size of operations and manufacturing processes. I went through the tenant registry and identified tenants that have been in operation for more than 10 years in the complex, tenants whose operations had an impact on the environment when compared to the rest and small business enterprises. Four (4) tenants were selected from the tenants' registry using the criteria mentioned above. One of the selected tenants has been in operation since the inception of the complex which is more than 100 years. The rationale for the tenant selection was to ensure I gain a feel of how tenants perceive environmental management practices on site and ensure that bias is eliminated and that the outcome and recommendations can be useful to all tenants.

Local environmental conservation Non-Profit Organisations play a critical role in environmental management as they are perceived as a conduit between businesses and communities (Iwu, Kapondoro, Twum-Darko &Tengeh, 2015). Two (2) NPOs were interviewed in this study and the reason for their selection is because they both have projects in both neighbouring communities (Ezimbokodweni and Athlone Park) and therefore they have a good understanding of the dynamics in communities and the Site.

Because of the nature of the environmental impact on site, various environmental consultants are appointed by AECI and tenants to assess and offer recommendations for environmental issues. Four environmental consultants were selected and the criteria for their selection is based on their specialisation and the environmental issues on site. The selected environmental consultants are specialists in soil and ground water, air quality, noise, waste management. The selected environmental consultants

have offered these services to the site and they have institutional knowledge that dates back 27 years.

AECI has a community liaison department that is dedicated to the issues of the neighbouring communities and the community liaison department identified a need for community focus groups so that it will be easier to communicate information to the community. Two (2) community focus group leaders were interviewed, one from each of the neighbouring communities. In summary, 25 participants were interviewed; 6 AECI employees, 6 Regulators, 4 Environmental Consultants, 4 Tenants, 2 NPOs, 1 environmental justice organisation and 2 Community Focus Group Leaders

3.6. Sampling

A sample is a group of persons chosen from the general population to participate in a study. Researchers select samples to get a clear picture of the identified population (Creswell, 2013). Babbie, (2014), identifies two categories of sampling, namely; probability sampling and non-probability sampling. Any category of sampling that selects the participants randomly, from a list of names in the population, is probability sampling (Babbie, 2014). The four types of probability sampling processes include systematic random sampling, simple random sampling, cluster random sampling, multistage sampling, and stratified sampling (Babbie, 2014). In non-probability sampling on the other hand, the researcher does not select the Participants randomly, but Participants are selected for a particular purpose (Babbie, 2014).

Convenience sampling, snowball sampling, and purposive sampling are the three types of non-probability sampling. Purposive sampling will be utilized to pick the study's Participants, taking into account the study's aim and objectives. Purposeful sampling was used to choose the qualitative sample for the investigation. Purposive sampling uses the notion of selecting instances with a specific goal in mind to select the sample (Schutte & Steyn, 2015). Purposive sampling adhered to the rule of identifying each Participant for a certain reason or role (Schultze, 2002; Schutte & Steyn, 2015). This study used purposeful sampling because it allowed the researcher to select participants depending on their involvement in the investigation (Babbie, 2014).

The sample of this study will consist of 6 employees of AECI (Environmental department, various AECI Business Unit representatives), 4 AECI Tenants, 6 regulatory personnel, 4 environmental consultants, 2 community focus groups leaders and 2 local NPOs who were interviewed through individual interviews

3.7. Data collection

Interviews, participant observation, focus group discussion, narratives, and case histories are all used to acquire data related to the research sub-problems (Creswell, 2014). Individual interviews were used to collect data for this project. An interview is a type of data collection in which the researcher asks the participants questions (Creswell, 2014). In this study, an interview was selected since it enabled the provision of more specific information and the development of an amicable relationships with the participants, allowing for the collection of more data. Structured and unstructured interviews are the two most common forms of interviews. In structured interviews, the questions, their order and wording, and their sequence are fixed and similar for each participant, whereas in unstructured interviews, the interviewer does not adhere to a tight format and covers as much territory as possible with the participant on a given issue (Creswell, 2013). In this study, an unstructured interview was employed to allow participants to contribute more information.

3.8. Data analysis

I analysed the data to determine what information is conventional and unusual, detect dissimilarity, correlation, and other regular configurations in the data, and lastly answer to the research questions (Creswell, 2014). To analyse the data acquired by the interviews, I applied the "Thematic Method of Data Analysis". The Thematic Method is the method for identifying, analysing and reporting patterns within data (Babbie, 2014). Data was gathered through qualitative means via interviews with the participants. After which, the researcher listened to the interviews on the recorded meeting, the data were transcribed and then coded.

According to Cohen and Manion (2011), coding refers to the provision of a distinctive name to a particular group of data to distinguish it from the other collected data. Starting with the first question, the researcher read the raw data extracted from the interviews several times. I then analysed and interpreted the data based on the

participants' perspectives, using the information gleaned from the transcripts. The researcher grouped together all the responses from the interview transcriptions in accordance with the questions in the interview schedule. I arranged the codes into categories and subcategories, which will be utilised as the main topics of data analysis. All the relevant responses to a theme are summarised.

I followed the same procedure to analyse and interpret all the research. According to Theron (2019) coding does not constitute the totality of data analysis, but it is a method to organise the data so that underlying messages portrayed by the data may become clearer to the researcher.

3.9. Measures to be adopted to ensure trustworthiness of the study

According to (Creswell, 2014), assessing the accuracy of research data, explaining the study's generalizability, and providing methods for duplicating a study are all considered scientific proof in scholarly research. The study's trustworthiness is defined as the degree of agreement between the accounts of events and the reality of the world (McMillan & Schumacher, 2014).Researchers utilize a variety of criteria to determine whether a study is reliable. I utilised the following procedures to assure the reliability of qualitative data in this study.

a) Transferability

The term "transferability" refers to the ability to generalise or transfer qualitative results to various contexts or settings (Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). Transferability is the primary responsibility of the person doing the generalising in qualitative research (Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). In this study, I promoted transferability of the study by performing a thorough function of clarifying the research context and the assumptions that are central to this study.

b) Dependability

The effectiveness of the study's dependability was ensured, confirming the research's quality. The term "reliability" relates to the data's consistency (Moon et al., 2016). Dependability ensures that the research findings are always consistent and

repeatable, as evaluated by the standard to which this study will be held (Moon et al., 2016). By applying an effective and reliable technique of data collecting, data analysis, and data presentation, I assured that the study was reliable.

c) Conformability

The term Conformability is described as the degree to which the results or findings can be corroborated or confirmed by other people (Moon, Brewer, Januchowski-Hartley, Adams, & Blackman, 2016). Conformability is based on the acceptance that there is no research which is objective. There are several strategies that contribute to enhancing conformability. I implemented various procedures for checking and rechecking the data throughout the study. At the end of the study I conducted a data audit that examines the data collection and analysis procedures and makes judgments about the potential for bias or distortion.

d) Credibility

The term "credibility" refers to the degree of agreement between the world's reality and the explanations for happenings (McMillan and Schumacher, 2014). From the perspective of the study Participant, the credibility criteria are intended to ensure that qualitative research findings are credible or trustworthy (McMillan & Schumacher, 2014). Researchers utilise a variety of criteria to determine whether or not a study is credible. In order to ensure the study's legitimacy, I employed the following methods:

I. Spending extensive time in the field (prolonged engagement)

This entailed staying in the field with the participants until data was saturated (McMillan & Schumacher, 2014). In this manner I gained an in-depth understanding of the phenomenon as well as specific aspects of participants such as their views, cultures and experiences. Spending a lot of time in the field allowed me to establish trust and rapport with the participants, which is crucial when collecting valuable data (McMillan & Schumacher, 2014).

II. Heterogeneous sample

A heterogeneous sample was used to assure the study's trustworthiness. A heterogeneous sample is one that has a different composition than the rest of the

sample (Creswell, 2014). Male and female participants, as well as younger and older participants, made up the diverse sample in this study.

III. Recording of data

The study's legitimacy was also maintained by recording the interview. A recording app was used to provide accurate and complete records of data (McMillan and Schumacher, 2014) for in person interviews and Teams meetings were recorded for online interviews.

IV. Participant review or member checks

Participants verify each other through casual interactions in informal situations, which is known as member checking (McMillan & Schumacher, 2014). According to Schutte and Steyn (2015), the single most important provision that can be implemented to improve the credibility of a study is member checks. During the interviews and at the conclusion of the data collection techniques in this study, the accuracy of the data was confirmed "on the spot". Participants were requested to read any dialogue transcripts in which they have taken part. The focus of this study was on whether the informants believed their comments accurately reflected their intentions.

3.10. Limitations of the Study

The study's limitations are those aspects of the design or methodology that impacted or influenced the interpretation of the research findings (Creswell, 2014). They are the limitations on generalizability, application to practice, and/or value of findings that are a result of the methods employed to establish internal and external validity and/or the basic design of the study (Creswell, 2014). During the design of this study, one anticipated limitation in the design of the study was the sample size of the study. Due to lack of time the sample of this study was limited to 25 Participants. The researcher believes that limiting the sample of the study to 25 Participants only, reduced the generalizability of the investigation outcomes. Despite this constraint, I am of the opinion that the outcomes of this research will aid AECI management and other stakeholders in putting in place appropriate environmental management procedures on site.

3.11. Elimination of bias

In qualitative research, bias affects the validity and reliability of findings (Finch, 2017; Sarniak, 2015; Jonsen, Maznevski, & Schneider, 2010). In this study, I ensured that the research remained objective throughout the study. The following methods were used to eliminate biases in the study:

a) Use of gender-neutral words

An impartial qualitative research project respects the dignity of the research Participants, observes fundamental principles of ethics and takes all the variables into account (Finch, 2017). In this study I avoided using words which are gender related. Only neutral words were used by the researcher.

b) Unless it's absolutely necessary, avoid identifying persons by race or ethnicity.

Assumptions about motivations and influences that are based on our cultural lens on the spectrum of ethnocentricity create a culture bias (Sarniak, 2015). I also avoided bias by ensuring that the participants and other people were not identified by race or ethnic group. I minimised bias by moving toward cultural relativism by showing unconditional positive regard and being cognizant of their own cultural assumptions.

c) Avoiding language that suggests evaluation or reinforces stereotypes

According to Johnson, Freeman and Pauker, (2012), many people use the concept “stereotypes” to predict the behaviour of the people and their competences and the fact that stereotypes are implemented by a society. Stereotypes are therefore general perceptions, images and messages about differences between people. In other words, stereotypes create judgements, assumptions and generalisations about the skills, interests, behaviour, personality and appearance of the people. In this study the researcher avoided stereotyping by treating all the participants of the study equally and without discrimination.

d) Making assumptions about various age groups

Classifying people according to their age groups also leads to bias in qualitative research (Johnson, Freeman & Pauker, 2012). If the elderly is more intelligent than

younger people is regarded as biases because there are many young people who are also intelligent (Johnson, Freeman & Pauker, 2012). In this study, I avoided classifying people's views according to the age groups.

3.12. Ethical considerations

The concept research ethics refers to the beliefs of what is morally right or wrong (McMillan and Schumacher, 2010). In other words, research ethics are concerned with the values and morals of the people who will participate in the study. Ethical clearance certificate for this study was provided by the Wits Business School in November 2021 and the protocol number is WBS/BA0701863j/662. The researcher followed the following ethical guidelines in this study:

a) Ensuring Participants have given informed consent

According to Babbie (2014), all researchers should ensure that there is informed consent of all the Participants. To guarantee informed consent of participating in the study, I convened a meeting with all potential study participants to discuss the entire research project and offered them comprehensive information on all parts of the study. I explained to the participants the study's goal and importance, as well as the benefits of participating. I also informed the Participants that the research is aimed at improving environmental management practices at AECI. The Participants who were willing to participate in the study completed consent forms.

b) Ensuring no harm comes to Participants

I ensured the safety of all study participants in this investigation. Participants were assured that the research will not injure them physically or mentally, nor will it have any immediate negative implications. The participants were also assured that the study will not provide any information that could embarrass the participants and that no participant would be exposed to danger during the study (Creswell, 2014).

c) Confidentiality and anonymity must be maintained.

I guaranteed that the participants' privacy will be protected during this study. The names of all the participants as well as their workplaces were not revealed in the study.

The participants were informed that no person who was not part of the study would see the interview transcripts (McMillan and Schumacher, 2010).

Section 3 of this study provided a detailed description and analysis of the research design and methodology. This section included the aim of the study, research design, and sampling method, collection of data, analysis of data, ethical considerations of the study, trustworthiness and credibility and the limitations of the study. The presentation, analysis and interpretation of the research findings are provided in the next section.

4. FINDINGS

4.1. Introduction

The purpose of this section is to analyse the data collected by means of individual interviews. In this section all the data is based on the research questions of the study.

4.2. Presentation of Findings

This section presents the data collected from *internal stakeholders*: AECI personnel from various departments (6) and *external stakeholders*: local and national regulators (6), AECI tenants (4), local environmental conservation NPOs (2), environmental consultants (4), community focus groups from the neighbouring communities (2) and environmental justice organisation (1). In this section, the data collected by means of individual interviews are presented based on their analysis and interpretation. The qualitative data was analysed using the theme technique of qualitative data analysis. Section 3 describes the data analysis. Participants 1 to 25 are referred to as participants in this research report. This corresponds with the ethical principles mentioned in the study, which state that the names of all participants, as well as their places of employment, would not be released. The descriptions of the participants' feelings and thoughts are presented in a narrative format in this section, with evidence primarily in the form of quotes from the interview transcripts. This is in line with McMillan and Schumacher's (2010) assertion that this detailed approach is necessary to obtain a complete understanding of the setting to accurately reflect on the complexities of human behaviour. After qualitative data analysis, the findings were categorized into the following five main themes:

- Knowledge of existing environmental management practices in the UIC
- Benefits of environmental management practices deployed at the UIC
- Challenges that UIC has had in the implementation of environmental management practices
- Areas of improvement

Existing environmental management practices in the UIC

Environmental inspections, overall quality management, pollution control plans, employee environmental training, supplier or contractor environmental standards, and

employee reward programs for environmental proposals and engagements in the communities where businesses operate are all examples of environmental management practices, as described in section 2. Air quality, surface water, waste, energy, soil, and groundwater are just a few of the environmental management strategies used by AECI. This subject focuses on the first research question necessitated a knowledge of current environmental management strategies.

Questions were posed to the AECI management and personnel from several departments (Participants 1-6) to assess their knowledge and understanding of current environmental practices. Based on the interviews, management and staff are aware of existing environmental management techniques, even some which predate the ones that are now in place. Environmental management practices at AECI include an environmental code of conduct (ECOC) for all AECI enterprises, stakeholder forums, benthic survey (for marine outfalls), surface and groundwater monitoring, air quality monitoring, and Business Unit Initiatives like process redesign to use gas instead of coal to fire on-site boilers and using green substitutes instead of traditionally toxic ingredients. Participant 5 mentioned that AECI had a green gauge program that was launched in 2010 and focused on energy, waste, remediation, water, and carbon emissions. Previously, AECI business units had implemented environmental efforts in their respective units, such as waste segregation, water conservation notices on faucets among others.

The regulators who were interviewed (Participants 7-12) are aware of environmental management methods that affect their department. They credit the information to regular engagements held by AECI to keep regulators and other stakeholders informed about site activity, as well as routine reports needed by permission or authorization conditions. Environmental consultants (Participants 13-16), on the other hand, are only familiar with environmental management techniques in their field because they are the ones who conduct assessments and provide recommendations for AECI.

The tenants interviewed for this study (Participants 17-20) are quite educated about environmental management techniques on site, and they even have their own initiatives in addition to what AECI included in the lease agreements. The Environmental Conservation NPO (Participants 21-22), on the other hand, is aware of

the interventions that are reported to the communities as well as the programs that AECI runs with the NPOs. Stream and ocean clean-up projects, community agricultural activities, and training are just a few examples. It can be determined from the NPOs contacted for this study that they are aware of environmental management practices in and around the site, but that the level of onsite environmental management activities is restricted.

Both the community focus group leaders (Participants 23-24) were interviewed and answered questions on their awareness of environmental management strategies applied on site, and both are aware of environmental challenges or issues. The AECI property is situated between two settlements, Ezimbokodweni (Township) and Athlone Park, as previously stated in the introduction (Suburb). The leader of the township community's community focus group (Participant 23) is aware of AECI's air quality environmental management techniques. However, because attendance at meetings has been an issue, the participant was unsure if the information was reaching the general community. The participant also stated that his function is more of an information sharing than a decision-making one.

Meanwhile, the leader of the community focus group from the suburb community (Participant 24) stated some awareness of the current environmental management practices in place, particularly the marine outfall where treated effluent is discharged to the ocean and the annual groundwater and surface water monitoring program. Because community members have discussions in their community groups and attend stakeholder forums and Permit Advisory Forum (PAF) meetings hosted by AECI for respective operational permits, the participant was confident that community members were aware of the above mentioned environmental management practices. Participant 25, a member of a South Durban-based environmental justice organisation, stated that the organisation was aware of AECI's environmental interventions. The answer mentioned the PAF meetings, where interested and affected parties were kept up to date on the status of the treated effluent pipeline.

Benefits of environmental management practices

Questions about the benefits of implemented environmental practices were posed to AECI management and staff from several departments (Participants 1-6). Participants

1-6, based on interviews, acknowledged the benefits of a cleaner workplace and a sense of pride when knowing that the company they work for cares about the environment. Participant 1 brought up the reputational risk of AECI being perceived as a responsible organisation, which AECI would like to maintain because it affects the company's brand and sales.

Participant 2 mentioned the environmental code of conduct, which ensures that tenants follow sound environmental management practices, and how this initiative has helped to reduce current and future incidents because tenants are fully aware of their responsibilities and the consequences of failing to follow the procedures. Participant 3 went on to explain that it's easier to pull the initiatives and show the auditor the initiatives when it comes to auditing. It also allows AECI to manage the site's contaminated history and address possible concerns in a long-term, sustainable manner. The policies enable AECI to actively engage with tenants and monitor their operations to ensure that they are environmentally conscious

Participant 6 emphasized the good response from stakeholder interactions, stating that the community is embracing AECI as one with the community, as seen by the community's role in defending the industrial complex from culprits during the Durban Civil Unrests in July 2021. The community, according to the participant, is AECI's operating license. When asked about the benefits of deploying environmental management practices known to regulatory stakeholders (Participants 7-12), the unanimous response was that these practices make their work easier, which aids in environmental protection and improves their key performance indicators as departments.

Environmental consultants (Participants 13-16) stated that practices and consultants are seeing an improvement in terms of site awareness of procedures, which leads to a decrease in environmental incidents and how they are handled if they are handled in a more mature manner than before the implementation of environmental practices.

Tenants (Participants 17-20) stated that the policies enable AECI to actively communicate with tenants and monitor tenants to ensure that they are operating responsibly. These procedures aid in identifying problems and working with tenants to remedy them. The systems also inform tenants about AECI's requirements.

One of the benefits that may be attributed to the environmental practices and initiatives adopted by AECI, according to the NPOs, is an increase in community awareness about the environment. AECI's involvement in empowering communities to ensure river health and community uplifting initiatives, where AECI trained community members about alien vegetation, springs, the impacts of reporting sewer leakages, community capacity building on surface water management, and shallow seepage around dwellings, is one of the examples given by tone of the NPOs.

Challenges of deploying environmental management practices

The obstacles that AECI management and personnel from several departments (Participants 1-6) experience in implementing environmental standards were questioned. Based on the interviews, management and personnel have faced several problems over their time with the company. The biggest issue raised by AECI personnel is a lack of buy-in and sense of ownership among section or department bosses, which filters down to the workers on the ground. AECI is unable to fully profit from this challenge. The second issue raised by AECI staff is that environmental management techniques are not being implemented, which leads to fantastic initiatives being parked and forgotten because there is no follow-up after they are launched.

The historic endeavours are not well documented, which leads to re-inventing the wheel when earlier employees have already put in the effort. Staff and funding are always restricted, which is one of the primary problems because the business is in the business of making money, and environmental initiatives are rather costly, so securing approval for these projects may be exhausting.

Because there are so few environmentally qualified specialists, the organisational structure appears to hinder effective resourcing. AECI also has had to deal with constantly changing environmental legislation as well as regulatory employee turnover, which results in institutional expertise being lost.

It is probable that not all renters are aware of their complete obligations, and the amount to which tenants can face consequences or pressure if they fail to meet system standards varies.

Regulators interviewed (Participants 7-12) agreed that inadequate resources and personnel turnover was a concern for them because they are under tremendous pressure to service huge districts. They haven't come across any issues that are unique to AECI, though. Similarly, environmental consultants (Participants 13-16) believe that regulatory compliance on paper can sometimes be achieved without addressing all relevant concerns, which may reduce the incentive to continually update and improve processes. Many of the clean-up procedures necessitate a large financial outlay. Some tenants may take advantage of the "grey area" where it is difficult to distinguish between legacy contamination issues and continuing contamination concerns. However, Participant 25 was concerned that the results and findings of the studies and assessments do not reach the most vulnerable, and that communities should be involved in the planning stages of these environmental initiatives and interventions to create awareness and a sense of ease for the communities, and that they will now see themselves as part of the solution.

Areas of improvement

There is potential for development in terms of applying critical thinking outside of prescribed management processes to uncover any concerns that may not be handled quickly by the existing management systems and practices. It is possible that tenants' comprehension of AECI regulations, as well as the expectations and requirements put on them as responsible operators within the UIC, could be improved. Some monitoring procedures should be enhanced to go beyond regulatory compliance and focus more on environmental effect reduction. More visibility, planned follow-ups on initiatives, and environmental awareness training for employees, according to AECI employees, would help with implementation and ensure that it is a win-win situation for AECI and its stakeholders

The environmental justice organisation asked for raw data and statistics to be made available to the public for further examination. People need to know what's in their water, according to the participant, and data/information should be shared/available to the community. During the planning stage, the mentioned communities should be considered.

Summary of Findings

The findings of the study undertaken at the AECI site that assesses the effectiveness of environmental management practices deployed to address environmental pollution at the site indicate that AECI employees, consultants, tenants and regulators are well aware of the environmental management practices deployed on site. On the other hand, NPOs and community focus group leaders are only aware of a few of the environmental practices. The findings also indicate that awareness of environmental management practices deployed is low in AECI communities more especially among the low income ones. AECI has environmental management practices in place, such as an environmental code of conduct (ECOC) for all enterprises working inside AECI, stakeholder forums, benthic survey (for the marine outfalls), surface and groundwater monitoring, air quality monitoring and Business Unit Initiatives such as the process redesign to use gas instead of coal to fire boilers on site, using green substitutes instead of traditionally toxic ingredients

According to AECI employees and management, the benefits of the environmental management practices deployed enable AECI to manage the contamination legacy associated with the site and address potential risks in a sustainable manner and a good reputation or company brand, good standing when the organisation is being audited, good relationship with regulators as they are included in the planning phase this in turn ensures compliance and therefore avoiding fines that maybe posed due to non-compliance. The other benefit mentioned by AECI employees is that because of the deployment of the environmental management practices the relationship between AECI and its neighbouring communities has strengthened, and this was evident during the July 2021 Civil Unrest in KwaZulu Natal.

The regulatory stakeholders mentioned that the benefit of these interventions assist them in protecting the environment. Environmental consultants mentioned that they were seeing an improvement in terms of the site awareness of the procedures which had led to a decrease in environmental incidents. The tenants mentioned that these practices assist in highlighting issues and engaging with AECI to get them resolved. The systems also convey AECI’s expectations to the tenants. Increased environmental awareness in the neighbouring communities is one of the benefits highlighted by NPOs and Community focus group leaders.

The challenge of financing the environmental initiatives was mentioned by AECI employees as well as the buy in within organisation. The poor implementation or partial implementation remains a challenge as follow ups after the launch poor. AECI also faces a challenge of forever changing environmental regulations and the regulatory staff turnover which ends up leading to loss of institutional knowledge and this was acknowledged by the regulatory stakeholders. The interviews indicated that the areas of improvement apply critical thinking outside of the prescribed management practices to identify any issues which may not be immediately addressed by the existing management systems and practices that are in place. There may be room to improve the tenants understanding of AECI requirements, and expectations and requirements placed on them as responsible operators within the UIC. Some of the monitoring practices could potentially be improved to move beyond regulatory compliance, to focus more on reducing environmental impact.

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1. Discussion

The findings of the study indicate that the knowledge of the existing environmental management practices is split; where the implementers AECI, consultants and regulators have a good understanding of these practices while NPOs and community focus group leaders are only aware of a few environmental practices. There is room to improve the tenants understanding of AECI requirements, and expectations and requirements placed on them as responsible operators within the UIC. Lack of environmental awareness is not uncommon as the literature revealed that one of the challenges in emerging countries low literacy and a lack of media attention in developing countries compound poor environmental understanding among politicians, citizens, and bureaucrats ((Delgado-Serrano, Mistry, Matzdorf, & Leclerc, 2017).

There are studies that indicate unpredictable levels of implementation of environmental practices in particular industrial segments and with respect to firm size and age, reveal the importance of applying environmental management practices for managers, regulators, and the general public (Theyel & Hofmann, 2015). To overcome the misalignment, a resource perspective must be combined with a stakeholder and institutional method to offer a more comprehensive knowledge of green manufacturing and environmental management techniques.

The motivation for the implementation of environmental management practices from AECI point of view are mainly driven by the need to manage the contamination legacy associated with the site and address potential risks in a sustainable manner. Environmental Compliance is the primary driver in this instance because if an organisation complies with environmental requirements mandated by local governments, it can avoid penalties (Klassen and Whybark, 1999; Singh, Jain & Sharma, 2015). The management of reputation risk was also highlighted as one of the motivations and benefits for implementing environmental management practices in the site.

AECI has moved from a coal fired boiler station to a biogas one and this has set them apart from their competitors. Moreover, AECI is embarking on substituting harmful chemicals with environmentally friendly substitutes. Environmental management

approaches can raise sales, create a “first-mover” advantage, improve social reputation, and improve product quality, as well as produce cash through recycling, according to the literature assessment. A well-designed green manufacturing system, as well as efficient raw material consumption, minimizes operational costs, labour, and energy, and adds value to a product. There are several potential to increase an organisation's efficiency through these practices, as well as environmental protection that effects financial rewards (Roy, Stark, Tracht, Takata & Mori, 2016).

For businesses facing competitive, governmental, and community challenges, balancing economic and environmental performance has become increasingly important (Bai, Sarkis & Dou, 2015; Woo, Kim, Chung & Rho, 2016).

The findings of the study indicate that AECI is reaping those benefits even though AECI employees feel that more can be done as there is still a gap in management buy-in and the financial burden of implementing these initiatives is still costly. The literature review highlighted that Environmental preservation and enhancement are hampered by administrative delays, poor training, and a lack of cross-departmental collaboration throughout implementation and that another element that leads to the difficulty to develop an adequate workplace culture is a short-term concentration. (Ullah, 2017).

Organisation’s performance measurement systems are often built to be “needs-led” (stakeholder needs), “audit-led” (institutional needs), or “model-led” (organisation's mandated theoretical model) according to the concept of sustainability (Beer and Micheli, 2017; Koh et al., 2016) and this approach requires the organisations to implement a fully integrated system so that none of the three pillars are left out and therefore creating a win-win solution that will be suitable for the organisation, environment and the society. This can be archived by creating an inclusive platform that will consist of the regulators, AECI, Tenants, Communities and NPOs through the projects life cycle of the proposed environmental management practice or initiative. The concept of Green Manufacturing also assists in terms of coming up with innovative and cost-effective environmental management practices

The other challenge of financing the environmental initiatives was mentioned by AECI employees as well as the buy in within organisation. The poor implementation or partial

implementation remains a challenge as follow ups after the launch poor. AECI also faces a challenge of forever changing environmental regulations and the regulatory staff turnover which ends up leading to loss of institutional knowledge and this was acknowledged by the regulatory stakeholders. The interviews also indicated that the areas of improvement apply critical thinking outside of the prescribed management practices to identify any issues which may not be immediately addressed by the existing management systems and practices that are in place. Institutional pressures, in addition to the above-mentioned general arguments, are a direct rationale for using environmental management strategies, according to a study by Wan, Chan, and Huang (2017). The interaction of external institutional forces, internal resource profiles, and environmental commitment all have different effects on the links between institutional pressures and environmental management practices, as well as the interaction of external institutional forces, internal resource profiles, and environmental commitment (Wan et al, 2017).

Some of the monitoring practices could potentially be improved to move beyond regulatory compliance, to focus more on reducing environmental impact and look into green manufacturing and there increasing competitive advantage for AECI. According to strategic management theory, environmental management approaches are one of the strategic choices for gaining a competitive advantage. The negative impact of competitors who have already embraced environmental management can be reduced by developing a green image through environmental management (Zhu et al, 2012; Singh et al, 2015).

5.2. Conclusion

The purpose of this study was to assess the effectiveness of AECI's environmental management methods and strategies to solve historical and current environmental pollution challenges. All the major findings presented in section 4 and discussed in section 5 corresponded with the research aims and investigation questions of the study. The overall outcomes of this study revealed that AECI personnel, Consultants and Regulators that are involved in the implementation of environmental management practices are aware of the environmental management practices and strongly committed to implement the practices, while the NPOs and communities around the site seem to be lacking when it comes to detailed awareness. The other challenge of

financing the environmental initiatives was mentioned by AECI employees as well as the buy in within organisation. Effective workshops and training is belied to be able to create awareness and educate all relevant stakeholders internal and external. The poor implementation or partial implementation remains a challenge as follow ups after the launch poor. Providing a more complete understanding of green manufacturing and environmental management methods necessary to overcome the misalignment by bridging the resource viewpoint with a stakeholder and institutional approach. However, all internal and external stakeholders perceive the environmental management practices deployed by AECI as effective even though more can still be done.

5.3. Recommendations

Conducting effective workshops/ training sessions

The findings indicate that awareness of environmental management practices deployed is low in AECI communities more especially the low-income ones. To combat this challenge it is recommended that AECI conducts environmental awareness that will be facilitated by AECIs Environmental Management Team and Operations Team as they are fully aware of these practices and this will assist the community members as the examples used will be real life examples that are related to the site as opposed to getting a supplier who will generalise information shared. This will also allow the communities to ask questions that directly or indirectly impact them.

The awareness training can also be incorporated to AECIs integrated system for Human Resources and be offered as a compulsory training to do online or attend as this will assist new employees/tenants/regulators/consultants, employees from various departments and AECIs Tenants and suppliers.

Centralised digital data management system

One of the finding of the study was that AECI environmental practices aren't sufficiently recorded, making it harder to track and improve on them in the long run. As a result, it is proposed that AECI build a secure digital data management system that will aid in the keeping of records, the analysis of data, the creation of follow-up schedules, and the flagging of non-compliance, among other things.

Future Studies

It is recommended that future studies should assess the environmental management techniques used at other industrial complexes in South Africa or other developing countries to assess the sustainability of the current plans, relating them to green manufacturing in order to stimulate continuous development.

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