

UNIVERSITY OF KWAZULU-NATAL

**An Exploratory Study of Sustainability Initiatives: A Case of UKZN Campus
Management Services**

By

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DECLARATION

I Comilla Laban declare that:

- (i) The research reported in this dissertation, except where otherwise indicated, is my original research.
- (ii) This dissertation has not been submitted for any degree or examination at any other university.
- (iii) This dissertation does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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Signature:



Date: 23 January 2020

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Thank You
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LIST OF ACRONYMS AND ABBREVIATIONS

AASHE	Association for the Advancement of Sustainability in Higher Education
AAU	Association of African Universities
CMS	Campus Management Services
GDP	Gross Domestic Product
CSAF	Campus Sustainability Assessment Framework
GUNI	Global University Network for Innovation
IAU	International Association of Universities
ISO	International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
NWU	North West University
NRF	National Research Foundation
STARS	Sustainability Tracking Assessment and Rating System Indicator
UKZN	University of KwaZulu-Natal
UiTM	University of Marai
UWC	University of Western Cape
UNESCO	United Nations Education, Scientific and Cultural Organization
USA	United States of America
WWF-SA	World Wide Fund – South Africa

ABSTRACT

Sustainability has become a global challenge in the twenty first century and many higher education institutions are facing internal and external challenges in terms of managing sustainability. Higher education institutions are best equipped to address issues and find solutions to sustainability as they have a powerful tool, which is knowledge and education. The study focuses on the role of the University of KwaZulu-Natal (UKZN) Campus Management Services (CMS) in managing sustainable initiatives for energy, water and waste.

The qualitative research method was used and the data collected was done through semi-structured in-depth interviews. Purposive sampling was used to select the participants from CMS management staff. The sample size was twelve.

The research concluded that UKZN does have implemented energy management and water management systems. However, the research found that UKZN is lacking in the area of waste management. Furthermore, the research concluded that UKZN has not been able to fully implement and manage sustainability initiatives due to a number of internal and external challenges.

The research recommends that the present electronic energy system be monitored in an effort to better manage the energy costs. There is a need to implement a water monitoring system and to set up a waste management system for the different waste types so that UKZN can benefit from recycled, reduced and reused waste. Due to poor communication amongst top management, middle management and the municipality, the researcher recommended an effective communication system to improve the flow of information. There is a need to employ more skilled staff and to increase the knowledge and skills of management by implementing training workshops. There is a need for written policies to guide the management of sustainable initiatives.

The researcher recommends that UKZN should embrace innovative technology and the need to collaborate with businesses to improve in the management of sustainability initiatives.

TABLE OF CONTENTS

DECLARATION	i
ACKNOWLEDGEMENTS.....	ii
LIST OF ACRONYMS AND ABBREVIATIONS.....	iii
ABSTRACT	iv
LIST OF TABLES.....	vii
LIST OF FIGURES	vii
CHAPTER 1	1
OVERVIEW OF THE STUDY	1
1.1 INTRODUCTION.....	1
1.2 THE STRUCTURE OF THE STUDY	1
1.3 MOTIVATION FOR THE STUDY.....	2
1.4 FOCUS OF THE STUDY	3
1.5 BACKGROUND OF THE STUDY.....	3
1.6 PROBLEM STATEMENT	4
1.7 PURPOSE STATEMENT	6
1.8 RESEARCH OBJECTIVES	6
1.9 RESEARCH QUESTIONS.....	6
1.10 SIGNIFICANCE/IMPORTANT CONTRIBUTION OF THE STUDY.....	6
1.11 JUSTIFICATION OF MY STUDY	7
1.12 CONCLUSION	7
CHAPTER 2.....	8
LITERATURE REVIEW.....	8
2.1 INTRODUCTION.....	8
2.2 BACKGROUND.....	8
2.3 SUSTAINABILITY CONCEPTS.....	11
2.4 SUSTAINABILITY AND SUSTAINABILITY DEVELOPMENT	12
2.5 THREE PILLARS OF SUSTAINABILITY.....	13
2.6 OVERVIEW OF SUSTAINABILITY INITIATIVES	18
2.7 SUSTAINABILITY IN THE TERTIARY EDUCATION SECTOR.....	26
2.8 INTERNATIONAL HIGHER EDUCATION INSTITUTIONS.....	26
2.9 CASE STUDIES	28
2.10 AFRICAN UNIVERSITIES	31
2.11 CASE STUDIES	33
2.12 SOUTH AFRICAN UNIVERSITIES	37
2.13 UNIVERSITY OF KWAZULU-NATAL	41
2.14 THEORY UNDERPINNING THE STUDY	42
2.15 CONCLUSION	45
CHAPTER 3.....	46
RESEARCH METHODOLOGY.....	46
3.1 INTRODUCTION.....	46
3.2 RESEARCH DESIGNS.....	46
3.3 RESEARCH METHODS	50
3.4 QUANTITATIVE METHODS	51
3.5 QUALITATIVE METHODS.....	52
3.6 STUDY SITE.....	53
3.7 TARGET POPULATION.....	53
3.8 SAMPLE.....	54
3.9 SAMPLING AND SAMPLING SIZE	56

3.10 SAMPLING METHOD	56
3.11 PROBABILITY SAMPLING	56
3.12 NON-PROBABILITY SAMPLING	58
3.13 DATA COLLECTION	62
3.14 DATA QUALITY CONTROL	64
3.15 RELIABILITY AND VALIDITY	65
3.16 DATA ANALYSIS	68
3.17 ETHICAL CONSIDERATIONS	72
3.18 CONCLUSION	72
CHAPTER 4.....	73
FINDINGS AND DATA ANALYSIS.....	73
4.1 INTRODUCTION.....	73
4.2 PRESENTATION AND DISCUSSION OF THE INTERVIEW RESULTS	74
4.3 THEME 1: ENERGY MANGEMENT	75
4.4 THEME 2: WATER MANAGEMENT	77
4.5 THEME 3: WASTE MANGEMENT.....	79
4.6 THEME 4: CHALLENGES IN IMPLEMENTAITON OF SUSTAINABILITY INITIATIVES.....	80
4.7 SUMMARY OF FINDINGS	90
4.8 CONCLUSION	91
CHAPTER 5.....	92
DISCUSSION ON THE FINDINGS	92
5.1 INTRODUCTION.....	92
5.2 SCOPE OF THE STUDY	92
5.3 Objective 1: TO ASCERTAIN THE ENERGY MANAGEMENT SYSTEMS MANAGED BY UKZN CAMPUS MANAGEMENT SERVICES	92
5.4 Objective 2: TO DETERMINE THE WATER MANAGEMENT SYSTEMS IN PLACE TO ADDRESS THE WATER PROBLEMS.....	94
5.5 Objective 3: TO ASCERTAIN THE WASTE MANAGEMENT SYSTEMS MANAGED BY UKZN CAMPUS MANAGEMENT SERVICES	96
5.6 Objective 4: TO IDENTIFY THE GAPS AND MAKE RECOMMENDATIONS ON SUSTAINABILITY INITIATIVES TO CAMPUS MANAGEMENT SERVICES.....	97
5.7. CONCLUSION	106
CHAPTER 6.....	107
CONCLUSION AND RECOMMENDATIONS.....	107
6.1 INTRODUCTION.....	107
6.2 CONCLUSION	107
6.3 RECOMMENDATIONS.....	110
6.4 LIMITATIONS	116
6.5 FUTURE RESEARCH.....	117
6.6 OVERALL CONCLUSION	118
REFERENCES	120
ANNEXURE A: PERMISSION TO CONDUCT RESEARCH	132
ANNEXURE B: INFORMED CONSENT LETTERS.....	133
ANNEXURE C: INTERVIEW SCHEDULE.....	136
ANNEXURE D: ETHICAL CLEARANCE LETTER.....	139
ANNEXURE E: LETTER CONFIRMING PROOFREADING AND EDITING OF DISSERTATION.....	140

LIST OF TABLES

TABLE	TITLE	PAGE
3.8.1	Summarizes the demographic details of the UKZN key Informants as research participants in the current study	55

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.5.4	Three Pillars of Sustainability	18
2.14.1	The Three Spheres of Sustainability	44
3.16.1	Steps to follow in the data analysis for qualitative research	70
4.7.1	Diagram showing the internal and external challenges affecting the management of energy, water and waste	90

CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

This chapter provides an overview of the study. The study focuses on the role of the University of KwaZulu-Natal (UKZN) Campus Management Services (CMS) in managing sustainability initiatives for energy, water and waste. More specifically, it offers insights into higher education management of sustainability initiatives from a South African perspective.

The following areas are outlined in the study: the structure of the study, the motivation for the study, the focus of the study, the background of the study, research objectives, research questions, significance of the study and the justification of the study.

1.2 THE STRUCTURE OF THE STUDY

Chapter 2 reviews literature from the body of knowledge. The sustainability concepts are discussed in detail. The three pillar conceptual framework, which is economy, environment and society, was outlined as it was relevant to the study. The body of knowledge also contributed to literature on the overview of energy, water and waste and its impact on the economy, environment and society. The literature reviews sustainability in higher education institutions from a Global, African and a South African context and case studies will be used to illustrate the management of sustainability initiatives for energy, water and waste and the impact on the economy, environment and society. Literature on the existing theoretical frameworks for sustainability initiatives, energy, water and waste will be viewed in the context of the study.

Chapter 3 outlines the research methods that are undertaken by the researcher to conduct the study in line with the research objectives. Literature on the different research designs and research methods applicable to this study are discussed in detail. The research methodology also includes the study site, the target population, the sampling and data collection methods, methods to ensure reliability and validity and the data analysis method. The chapter also outlines the research processes and the methodology chosen by the researcher in line with the purpose of the research study. This chapter also includes the ethical issues that were taken into consideration and discussed.

Chapter 4 presents the analysed findings of the interviews. Themes that emanate during the interviews are captured in line with the research objectives and questions and the results are presented and discussed. Verbatim presentation of participants' responses is also quoted in the presentation of data in order to convey the participants' emotions, feelings, convictions and sentiments in their responses during interviews.

Chapter 5 of this dissertation provides a detailed theoretical discussion of the research findings of the study and previous studies associated with the research. This chapter interprets and discusses the major findings in conjunction with previous research, conducted both locally and internationally, to either refute or concur with the findings of the study. This chapter addresses the main aims and objectives of the research.

Chapter 6 concludes the study of the management of sustainability initiatives for energy, water and waste using UKZN, South Africa, as a case study and offers recommendations based on the findings of the research. Limitations of the study and suggestions for future research are also covered in this chapter.

1.3 MOTIVATION FOR THE STUDY

Sustainability is a critical subject in the 21st century, especially for higher education institutions. Globally, there has been some research conducted on sustainability initiatives managed by higher education institutions. In the African context, very little research has been done on sustainability initiatives by university campus services. A survey carried out in some parts of the African continent revealed that African Universities have not promoted sustainability initiatives due to the lack of funds, lack of human resource skills and lack of awareness (Mohamedbhai, 2012).

The University of KwaZulu-Natal, Research Division has done some research in the area of energy management, waste management, water management, economic development, poverty reduction and social development pertaining to their discipline of study (The Research Office and Corporate Relations Division, 2011). Thus the researcher concludes that very little research was done on the management of sustainability initiatives managed by UKZN CMS and feels that this research would help to provide some insights on the management of sustainability initiatives. The researcher feels motivated to explore the extent to which sustainability initiatives are managed by higher education institutions, using the UKZN CMS as a case study.

1.4 FOCUS OF THE STUDY

The study focuses on sustainability initiatives managed by UKZN for energy, water and waste.

1.5 BACKGROUND OF THE STUDY

Sustainability has become a global challenge in the 21st century and many higher education institutions are facing internal and external challenges in terms of managing sustainability. Some of the external challenges are global competition, innovative technology, economic volatility, declining sources of income and student demands, all of which can impact on campus management services (Byrant, 2013). The internal challenges are lack of funds, lack of human resource skills and lack of awareness and governance (Mohamedbhai, 2012). The researcher is of the opinion that it is possible for campus management to manage the internal challenges but the external challenges are difficult to manage due to forces beyond one's control. Despite the fact that higher education is better equipped to address issues on sustainability and find solutions to the problems; the challenge of sustainability in higher education institutions continues (Abubakar, Al-Shihri and Ahmed, 2016, Alshuwaikhat and Abubakar, 2008, Shriberg, 2002).

CMS plays an important role in the management of sustainability initiatives. Campus Management Services is "an integrated approach to operating, maintaining, improving and adapting the building and infrastructure of an organization in order to create an environment that strongly supports the primary objectives of that organization" (Atkin and Brooks, 2015: 1). CMS provides a supporting management function to the core business of the organization and it involves a wide range of activities that involves people, places, processes and technology in executing its support function (Amaratunga, Baldry and Sarshar, 2000, Ogbeifun, 2011). Campus Management Services works closely with all departments and across all campuses, including all staff (University of San Diego, 2017). An effective campus management service can help the institution to achieve the institutional goals in the effective management of sustainability initiatives such as energy, water and waste (Alshuwaikhat and Abubakar, 2008, Yale University, 2017).

UKZN comprises five campuses, all located in the KwaZulu-Natal province of South Africa. The UKZN CMS is located on all campuses to manage the daily operations and sustainability initiatives of the institution. The UKZN strategic plan has identified the sustainability initiatives for the institution, which is protecting the environment, sustaining natural resources, creating awareness, valuing staff, being a top research university, and to continuously improve in the area of policy, processes and systems (Corporate Relations UKZN, 2017). In line with the UKZN strategic goals, the researcher feels that it would be important to carry out this research to see how the institutional sustainability goals are linked to the sustainability goals managed by UKZN CMS.

1.6 PROBLEM STATEMENT

Sustainability has become a challenge in the 21st century and many higher education institutions have identified that this needs to be addressed in various ways otherwise it will have negative consequences for the institutions (Teferra and Altbachl, 2004, Van Weenen, 2000). “Business sustainability has become critical because there is increasing demand and complexity of demand on business from the natural, social and economic environment. Sustainability cannot be a standalone issue, divorced from business as usual. Sustainability needs to be embedded into business” (NRF, 2017).

Research has shown that at least 10 international higher education institutions around the world, namely, Yale University, Peking University, University of Oxford, University of Copenhagen, Australian National University, University of Tokyo, National University of Singapore, University of Cambridge, University of California Berkeley and ETH Zurich University, are leading in the area of sustainability, and research centres are working with these institutions to produce a guidebook, ‘Green Guide for Universities’, so that higher education institutions can make use of same to address sustainability issues and find solutions to the problems (Mellino, 2014: 1). The guidebook tries to focus on research that identifies the problems and finds solutions to the problems in the area of energy, environment and buildings, and waste (Mellino, 2014: 1).

It is evident that some higher education institutions are taking the matter seriously and are thus implementing sustainability in their daily operations, research and curriculum by responding to social, economic and environmental issues, while other higher education institutions are still lagging behind (Shriberg, 2002: 1, Van Weenen, 2000: 22, James and Card, 2012: 174).

In an African context, very little research has been undertaken on sustainability initiatives managed by CMS (MDPI, 2017). A survey was carried out by the Global University Network for Innovation , the International Association of Universities and the Association of African Universities to assess the sustainability initiatives taken by African higher education institutions (GUNI-IAU-AAU, 2011). This survey was carried out as a result of the declaration made by African Leaders at the 12th General Conference of Association of African Universities (AAU 2009) to promote sustainability (Mohamedbhai, 2012).

An online questionnaire was sent to 500 African Institutions but only 73 institutions responded. The questionnaire covered teaching and learning, research, outreach and services, institutional governance and campus operations (Mohamedbhai, 2012). The survey revealed that in terms of research, which is important to improve and promote sustainability development, only 20% of the institutions was greater than 40%, implying that the majority of institutions were not working in the area of research (Mohamedbhai, 2012). The research also revealed that African universities had not promoted sustainability initiatives due to the lack of funds, lack of human resource skills and lack of awareness (Mohamedbhai, 2012). The findings also revealed that very little was happening in terms of energy conservation, waste reduction, recycling, water conservation and sustainable land practice (Mohamedbhai, 2012). Different studies undertaken on African higher education institutions have concluded that it is crucial that higher education institutions collaborate and work with the private as well as government sectors to promote sustainability development (Mba, 2017, MDPI, 2017, Mohamedbhai, 2012).

There are some universities in South Africa that have done research on sustainability, such as the University of Western Cape which has done research on the environment, waste management, job creation and energy management (Institutional Advancement, 2014). The University of Cape Town has done research on environment, building, electricity, water, waste, global warming, health and safety, poverty and inequity, and policies integrating in their daily operations (Rippon, 2013). Universities such as Stellenbosch and Rhodes University are also focusing on the green initiatives (Green Africa Directory, 2012).

Sustainability is an important approach to development for many businesses and higher education institutions to be successful. Although some research on sustainable initiatives have been conducted in various, disciplines the problem is that there is a lack of documented

information on sustainable initiatives managed by UKZN campus management services. Furthermore literature has shown that higher education institutions have realised and identified that sustainability is important for institutional success but have failed to implement sustainability due to a lack of knowledge in the area and also very little research which then makes it difficult for institutions to develop a sustainable framework. The researcher is of the opinion that there is a gap in published knowledge on sustainability initiatives managed by higher education institutions and this research will help to provide an insight into the management of sustainability initiatives using the case study UKZN from a South African perspective.

1.7 PURPOSE STATEMENT

The main purpose of the study is to explore how UKZN Campus Management Services manage their sustainability initiatives for energy, water and waste.

1.8 RESEARCH OBJECTIVES

Specific objectives are:

- 1) To ascertain the energy management systems managed by UKZN campus management services.
- 2) To determine how UKZN campus management services address the water crisis.
- 3) To ascertain the recycling management systems managed by UKZN campus management services.
- 4) To identify gaps and make recommendations on sustainability initiatives to campus management services.

1.9 RESEARCH QUESTIONS

The research questions underpinning this study are: -

- 1) What energy management systems are in place to address the energy crisis?
- 2) What water management systems are in place to address the water crisis?
- 3) What waste management systems are in place to address the recycling of waste?
- 4) What are the gaps that affect the managing of sustainability initiatives by campus management services?

1.10 SIGNIFICANCE/IMPORTANT CONTRIBUTION OF THE STUDY

The research will be important as it will provide some insights into the management of

sustainability initiatives using the case study UKZN from a South African perspective. The research focuses on energy, water and waste management. This research is documented so that the gaps identified can assist UKZN CMS to improve on the management of sustainability initiatives. This study will also contribute to the body of knowledge so that poorly sustained higher education institutions can make use of this research to improve on the management of sustainable initiatives in their daily operations.

1.11 JUSTIFICATION OF MY STUDY

The University of KwaZulu-Natal has done some research in the area of energy management, waste management, water management, economic development, poverty reduction and social development in the different disciplines of study (THE RESEARCH OFFICE AND CORPORATE RELATIONS DIVISION, 2011). The researcher is of the opinion that UKZN CMS has done some work in the management of sustainability initiatives for energy, water and waste but was not able to access this information from the website. Therefore, this research would be useful to compile documentation on the management of sustainability initiatives by UKZN CMS. Furthermore, there does not appear to be any concrete research, which can evaluate these initiatives. There is no published research on sustainability initiatives managed by UKZN and, therefore, the researcher desires to properly investigate this situation through formalized research.

1.12 CONCLUSION

This chapter outlines the overview of the study. The motivation for the study, the focus of the study, the background and the problem statement for this research are discussed. This chapter outlines the aims and objectives of the research as well as the research questions. The significant contribution and the justification of the study are also discussed. The next chapter pertains to the literature on sustainability and sustainability initiatives.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Higher education institutions have identified that sustainability and sustainability development concepts are important for institutional success. The recognition that sustainability is important for institutional success has prompted higher education institutions to implement and manage sustainability initiatives in a way that protects and promotes the economy, environment and society. There is a vast amount of research and literature covered on sustainability development and sustainability initiatives in higher education institutions. However, little research has been conducted on sustainability initiatives managed by Campus Management Services (CMS). The researcher is of the opinion that this gap in literature warrants an in-depth study on sustainability initiatives managed by CMS. This research will focus on energy, water and waste sustainability initiatives managed by UKZN CMS and guided by the three pillar conceptual framework, economy, environment and society.

2.2 BACKGROUND

Sustainability has become a global challenge in the 21st century and research carried out in Canada on 50 Canadian high education institutions have identified that this subject is critical and needs to be addressed in different portfolios to improve the area of sustainability (Vaughter, Mckenzie, Lidstone and Wright, 2016). The challenges identified need to be addressed through workshops, seminars, conferences and round table discussions (Baharum, Nordin, Rahim, Zakaria, Aziz, Khoro, Alam, Salleh and Luthfi, 2017). Research has proved that higher education institutions are best equipped to address problems and find solutions on sustainability; however the challenges on sustainability continue (Abubakar et al., 2016, Alshuwaikhat and Abubakar, 2008, Shriberg, 2002). Despite the fact that they are still faced with internal and external challenges, higher education institutions have recognized that 'education' is a powerful tool to promote 'sustainability development' (Mohamedbhai, 2015:1).

Some of the external challenges are global competition, innovative technology, economic volatility, declining sources of income and student demands, all which can have an impact on higher education institutions (Byrant, 2013). The internal challenges are lack of funds, lack of human resource skills, lack of awareness and governance (Mohamedbhai, 2012).

It is argued that, while it is possible for higher education institutions to manage the internal challenges, the external challenges are difficult to manage due to forces beyond one's control.

According to Professor Francis Peterson, deputy vice-chancellor at UCT and vice-chancellor designate at the University of Free State argued that "Business sustainability has become critical because there is increasing demand and complexity of demand on business from the natural, social and economic environment. Sustainability cannot be a standalone issue, divorced from business as usual. Sustainability needs to be embedded into business" (NRF, 2017: 12). Higher education institutions have more challenges than corporate businesses as they have to incorporate sustainability into all areas of campus administration, including integrating it into curriculum, research, daily operations, service delivery and education (Krizek, Newport, White and Townsend, 2012). In addition, they have to respond to global issues that affect the environment, society and economy, which then becomes an operational challenge (Krizek et al., 2012). Isa and Usmen (2015) and Velazquez, Munguia, Platt and Taddei (2006) further argue that higher education institutions have to practice sustainability in every area of campus administration, which then becomes an operational challenge and more complex than corporate businesses.

Furthermore, higher education institutions focus on many areas of research, service delivery and education, and each discipline focuses on achieving discipline goals by working in silos rather than achieving institutional goals (Krizek et al., 2012). For example, sometimes higher education institutions focus on integrating sustainability in their curriculum but will fail to implement a sustainability initiative in campus operations by installing energy meters to monitor energy usage (Filho, Shiel and Paco, 2015, Krisek et al., 2012). Krizek et al. (2012) further argues that campus operations have to provide numerous services to a complex environment; the work is focused in many areas and, as a result, the level of services is not of a high standard.

According to Lubin and Esty (2010), corporate businesses are more successful than higher education institutions as businesses make use of business models to respond to global issues that are affecting the economy, environment and society by implementing practices and principles. Furthermore, Lubin and Esty (2010), argue that corporate businesses are in a position to respond to the triple bottom line, which is economy, society and the environment.

Corporate businesses are making good management decisions and there is good accountability, all of which can contribute to the business being successful (Krizek et al., 2012). Lubin and Esty (2010), argue that the difference between corporate businesses and higher education institutions is that corporate businesses have members who are shareholders and higher education institutions have members who are stakeholders and, therefore, do not have mechanisms in place to address threats to the external environment.

Compared to corporate businesses, higher education institutions have to respond to global and domestic competition. Sometimes higher education institutions have to adjust the programmes to be competitive and, in the process, the market share can decrease, resulting in a negative impact on the institution's finances (Hemsley-Brown and Oplatka, 2006, Krizek et al., 2012). Another economic challenge that higher education institutions face is economic recession. They need to respond to such challenges by reducing costs, increasing employee productivity without compensation, and recruiting skilled staff able to optimize opportunities and minimize threats, to management positions (Krizek et al., 2012).

Another challenge faced by higher education institutions is leadership hierarchy at different structural levels (Abubakar et al., 2016). The different philosophies and opinions of leaders can create barriers which can affect positive change (Abubakar et al., 2016). Krizek et al. (2012) argue that higher education institutions have the ability to possess good attributes but the problem lies within governance structures which can prevent success. On the other hand, corporate businesses focus on core products and services with comparative ease and in line with the business model (Krizek et al., 2012).

Higher education institutions are complex and it is important to be proactive to make sure that the mission statement includes sustainability in the area of campus operations, research and curriculum (Yarime and Tanaka, 2012). James and Card (2012) further argue that the CMS team must understand the institutional goals and strategies well so that they may manage sustainability initiatives in such a way that the departmental and institutional goals may be achieved.

Scientists have lobbied that there will be challenges on energy generated from coal versus renewable energy and there will be an opportunity for management to provide leadership on devising systems on facilities and operations to create a sustainable environment

(Stellenbosch University, 2013).

Sustainability and Sustainability Development are concepts that many managers find challenging to implement and to find a balance between these concepts and the three pillars of economy, environment and society (Boyer, Peterson, Arora and Caldwell, 2016). These pillars, economy, environment and society, should not be separated but must work together for institutional success (Boyer et al., 2016).

2.3 SUSTAINABILITY CONCEPTS

Sustainability and Sustainability Development are concepts that many higher education institutions have recognized and identified as important and necessary for long term success (Groenewald and Powell, 2016).

There are different definitions of sustainability, the most commonly used being from the Bruntland Report, formally known as the World Commission on Environment and Development (1987). It defines sustainability as “the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (The United Nations Conference on Environment and Development, 1992). A sustainable campus is defined to be clean and enjoyable, improving the economy, promoting social equity and justice, protecting the environment and managing the resources of energy, water and waste (Alshuwaikhat and Abubakar, 2008, Howarth, 2012, Roper and Beard, 2006). These definitions focus on the triple bottom line, which is to promote and protect the economy, environment and society.

On the other hand, some authors have defined sustainability for higher education as a “concept that makes use of education and training and all areas of public awareness to create an understanding of sustainable development so that the required skills, knowledge, values will empower people to enjoy a sustainable future” (Yarime and Tanaka, 2012: 64). Cole (2003: 7) defines a sustainable campus “that addresses and find solutions to its problems at a local and global level as well as protects the well-being of humans and the environment”. These authors have focused on either the societal or environmental pillar. However, it is important to focus on all three pillars for institutional success. The University of Stellenbosch defines sustainability for Facilities Managers as a concept to manage and implement projects evaluated by different working groups (Stellenbosch University, 2013).

2.4 SUSTAINABILITY AND SUSTAINABILITY DEVELOPMENT

Higher education institutions can achieve sustainability if management can adapt to the changing environment in the areas of energy, water, waste, technology, leadership styles and human behavior (Stellenbosch University, 2013). This will help to contribute to a body of knowledge in the area of operations, training and research (Salvioni, Franzioni and Cassano, 2017). It is important for higher education institutions to strive for equal sustainability at an operational, academic and research level (Salvioni et al., 2017).

Higher Education Institutions should adopt a sustainable culture that manages energy, water and waste in an effort to promote and protect the economy, environment and society (Stellenbosch University, 2013). It is also important for the community to understand the importance of sustainability and the contribution made can benefit the economy, environment and society (Alshuwaikhat and Abubakar, 2008). Higher education institutions should identify a model that involves all the stakeholders and not specific people and departments (Alshuwaikhat and Abubakar, 2008).

Facilities Managers have recognized that problem solving on sustainability can lead to economic, environmental and societal benefits through reduced costs, risks minimized, increased attractiveness to talent and increased competition (Kiron, Kruschwitz, Reeves and Goh, 2013). It is important for Facilities Managers to include sustainability in the daily planning and operational work and to make sure that there is a balance between the economy, environment, and society (Stellenbosch University, 2013).

It is important to measure and manage sustainability in a way that has a positive impact on the institution's success by identifying the relationship between the institution's sustainability performance, its competitiveness and its economic performance (Alshehhi, Nobanee and Khare, 2018). Higher Education institutions should include sustainability in the business plan to gain a competitive advantage (Stellenbosch University, 2013).

Furthermore, higher education institutions need to identify and recognize the concept of 'sustainability' and how this concept plays an important role for CMS to manage sustainability initiatives in a way that protects the environment and boosts the economy and respect for society.

According to Teodorescu (2012) and Groenewald and Powell (2015), sustainability encompasses three pillars: economy, environment and society.

2.5 THREE PILLARS OF SUSTAINABILITY

In the 1970s sustainability development focused on the economic pillar which had serious implications on the environment, such as global warming, carbon footprints and climate changes (Grossman, 2012). This development model did not address issues relating to the economy, environment and society at a global level (Martine and Alves, 2015). It was revised in the 1980s, focusing on the economy, environment and society in relation to addressing issues on poverty and the well-being of humans (Wironen, 2007). In the 1990s the sustainability development model identified that society is very important and focused on reducing poverty and inequality, situations which can have a positive impact on economic growth (Martine and Alves, 2015).

The need to address these issues came into direct conflict with the concept of neoliberalism, which focused on economic growth production being the key to the lessening of poverty (Grossman, 2015). Grossman (2015) further argued that this concept of neoliberalism did not improve people's lives and poverty was not reduced. Martine and Alves (2015) further argued that the doctrine of neoliberalism will be effective in the promotion of economic growth and this can be achieved by reducing social inequalities, poverty and the redistribution of resources. Furthermore, some people in the north focused either on environmental issues or socio-economic issues and working in silos does not lead to institutional success (Grossman, 2015).

“Sustainability development has become an oxymoron, given the increasing difficulties in the conciliation of economic growth, social wellbeing and environmental sustainability” (Martine and Alves, 2015: 2).

The triple bottom line helps the institution to focus not only on the economic value but on the social and environmental values as well; and working together can lead to successful businesses and institutions (Žak, 2015). According to Clune and Zehnder (2018), the three pillars can assist with problem solving on sustainability projects and projects will only be successful if the three pillars work together as they are interrelated.

The triple bottom line is also referred to as the three Ps: planet, people and products, and it is important to develop strategies to maximize opportunities and to minimize threats (Earls, 2017). Sustainability and the three pillars, society, environment and the economy, are to ensure that society is protected, the environment is preserved and the economic pillar is to make sure that the environment and sustainability challenges are connected to economic production and consumption in order to be globally competitive (Clune and Zehnder, 2018).

2.5.1 Economic Pillar

During the twentieth and twenty first centuries efforts were made to improve the economic growth by increasing consumption and production at the expense of the environment (Martine and Alves, 2015). The economic growth of the twentieth century was mainly due to abundant natural resources that were previously untouched, such as land, water and forests. Even though the population increased with longer working lives, there was a paradigm shift of the population to urban areas resulting in economies of scale to mass produce, which then led to increased production so that society and the producer sectors benefited (Martine and Alves, 2015).

According to Martine and Alves (2015), economic growth is to make use of non-renewable resources effectively and efficiently, of processes to protect the environment, and to address social inequalities between the rich and poor. Clune and Zehnder (2018) argue that it is important to have policies and planning for economic growth in order to protect society and the environment but, at the same time, it is important to be flexible as not all global issues have sustainability solutions. The environmental costs are not being fully accounted for by institutions while these costs are fully accounted for by the environment, for example, climate change exposure and adaptation costs is paid by the world which can last for decades (Clune and Zehnder, 2018).

Furthermore, as the population increases, the consumption of raw materials exceeds production and it is therefore important that businesses and organizations devise an economic model to manage the consumption of raw materials (Chapple, 2013). The increased growth in population has led to increased pressure on the environment which has an impact on the environment and economy (Teodorescu, 2012).

The economic model should ensure that raw materials are distributed fairly and the consumption of raw materials should be utilized effectively and efficiently so that natural resources are protected and, at the same time, there is economic growth (Chapple, 2013). It is important to measure economic attractiveness by taking into account the environment and the welfare of society (Musson, 2013). Musson (2013) argues that sustainable economic attractiveness should measure and indicate performance on the environment and society. It is important to have policies for not only one pillar but, also, all three pillars. This would contribute to economic attractiveness (Musson, 2013).

Creative and improved technology plays an important role in improving the economy, environment and society (Clune and Zehnder, 2018). Technology creates opportunities to address and find solutions to the problems on sustainability; working with the three pillars, without improved technology, may not help to maximize opportunities and minimize threats (Clune and Zehnder, 2018). According to Clune and Zehnder (2018) the use of innovative technology can assist in identifying the best economic and market possibilities and the three pillar conceptual framework can be used as a guide to find solutions to economic problems. On the other hand, Marine and Alves (2015) argue that not all technology is useful technology as there are many limitations with innovative technology which can create problems when addressing economic, environmental and social threats and opportunities.

Many organizations have identified that, by protecting and taking care of the environment, there will be benefits as the proper recycling and reuse of waste can be a resource rather than a waste, thereby a boost for the economy (Beattie, 2017).

2.5.2 Environmental Pillar

According to Global Footprint Network (2003), there is an imbalance between human activities and the environment which has increased persistently over the years (Global Footprint Networks, 2003). It is important for society to manage the non-renewable resources properly as the poor management of these resources can lead to poverty deprivation and health problems, which can then negatively impact globally (Martine and Alves, 2015). According to Martine and Alves (2015), climate change and global warming can have a huge impact on the environment.

The increase in the population has led to humans invading the space of the ecosystem, which then negatively impacts on the environment (Martine and Alves, 2015). Every citizen should be aware of the importance of the environment and should protect it and make use of natural resources in such a way that they do not become entirely depleted but can be replenished in order that there be a continuity of resources that can be controlled and monitored (Stellenbosch University, 2013). It is important for businesses and organizations to manage their sustainability initiatives, such as renewable energy, recycling of waste and water conservation, in an effort to protect the environment (Stellenbosch University, 2013).

Some resources are more abundant than others. There is, therefore, a need to consider material scarcity as damage to the environment since extraction of these materials can affect the environment (Circular Ecology, 2017). Hence, efforts must be made to contain these resources (Circular Ecology, 2017). The environmental pillar gets the most attention when it comes to sustainability and many companies are becoming environmentally conscious by managing their energy, water and waste with the intention of protecting the environment (Beattie, 2017). One of the challenges of the environmental pillar is that institutions cannot cost certain externalities such as waste, land reclamation and wastewater (Beattie, 2017). Therefore benchmarking is important so that these costs, which can be reported as a benefit to the company, can be quantified and measured (Beattie, 2017).

The Northwestern university in the United States of America (USA) has developed procurement policies as part of the environment sustainability initiative; suppliers are selected on environmental merit (Benitez, 2018).

2.5.3 Social Pillar

Social sustainability has become a critical component for global sustainability and, even though economic growth has contributed to improving the lives of billions of people, the problem lies in that these resources are not equally distributed (Martine and Alves, 2015). Economic growth is stemmed by consumer buying power spreading to all continents (Martine and Alves, 2015). Cavalcanti (2012) argues that natural resources are important for economic growth; consequently, not managing these resources efficiently can lead to environmental risks, as well as risks associated with a growing population.

There has been a lot of research done on economic growth, environmental threats and population dynamics, but more research needs to be done on the majority of the world's

population who do not participate in the global society consumption and have not contributed to addressing issues to the environment (Martine and Alves, 2015). This majority will suffer the most by global climate changes through greenhouse gases generated by ‘development’ (Martine and Alves, 2015: 17). It is important to resolve inequality in order to promote social justice and economic growth, since increasing inequality will result in rising poverty and a limited number of people becoming rich (Kolev, 2017).

Marx, in his perspective on people diversity, believed that the communist revolution would solve everything (Martine and Alves, 2015). This perspective failed but was correct in assuming that the capitalist system would not include the poor and the marginalized, resulting in social conflicts (Martine and Alves, 2015, Kolev, 2017). According to Clune and Zehnder (2018), the three pillar theory tries to find solutions through human knowledge to improve social sustainability which is accomplished by understanding human social systems into decision- making and institutional processes (Boyer et al., 2016). It is important to understand how these three pillars are linked: the human survival (society) is linked to economic opportunity (economy) which is linked to environmental survival (environment) (Earls, 2016). The increase in human population has an effect on the economy and the environment as the output will increase at the expense of the environment (Boyer et al 2016).

This pillar ensures that there is an ethical responsibility to respond to any social injustices relating to inequalities and poverty so that issues raised are addressed, which will benefit the people at grassroots to live in a just society (Benitez, 2018). A sustainable business should have the support and approval of its employees, stakeholders and the community it operates in (Beattie, 2017). It is important for employees to be happy and satisfied with their jobs, which leads to job satisfaction, which then leads to increased productivity and finally business success (Teodorescu, 2012). It is difficult to separate the economic and social dimensions as the economy depends on the social relations and its constant interaction with the environment (Teodorescu, 2012).

The Northwestern University tries to connect with diverse communities in the neighbourhood in an attempt to building stronger communities and promoting partnerships between the community and the university (Benitez, 2018). The building of community partnerships includes educational programmes for local youth, investments in community development and collaboration on public health and safety (Benitez, 2018). The Northwestern University

has a social equity programme led by women to address social equity issues, such as gender issues, sexual harassment and reproductive justice issues, so that everyone has a fair chance irrespective of race, ethnicity, religion, gender, sexual orientation and economic background (Benitez, 2018).

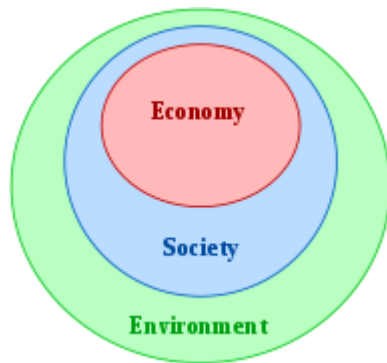


Figure 2.5.4 Three Pillars of Sustainability (Stellenbosch University, 2013).

Figure 2.5.4 shows that the economy is a subsystem of society, which is a subsystem of the environment illustrated by concentric circles. It shows that both society and the economy are constrained by environmental limits (Stellenbosch University, 2013).

CMS focus on many areas of operations such as energy, water, waste, reducing pollution, infrastructure and environmental performance in building design, but the researcher will focus the research study on energy, water and waste management as these play an important role in any institution (Wells, 2007).

2.6 OVERVIEW OF SUSTAINABILITY INITIATIVES

2.6.1 Energy

South Africa is experiencing an energy problem where the demand is greater than the supply (Fig, 2013). Due to the legacy of the past rural people were deprived of electricity and electricity was cheap for those connected to the electricity grid (Edkins, Marquard and Winkler, 2010). After democracy, the government tried to rectify the problems of the past and it was noted that only 70% of the people were connected to the electricity grid - a major economic and societal problem (Edkins et al., 2010). Even though Eskom tried to increase its electricity production, it was noted that the production was less than the demand (Fig, 2013). The

problems such as late arrival of materials, wet coal and routine plant maintenance further delayed production (Fig, 2013).

South Africa was faced with power outages, which affected homes and businesses (Fig, 2013). Due to the shortage of electricity in South Africa, the country then embarked on building new power stations called the Medupi and Kusile plant (Edkins et al., 2010). The Medupi plant is ranked 3rd biggest and the Kusile plant is ranked 4th biggest in the world in terms of output (Fig, 2013). The plant is not yet in operation due to cost and delay factors (Yelland, 2017).

The government was under pressure and, in an attempt to attract foreign investors and businesses, the government tried to increase the energy reserves by fracking (Fig, 2013). Research has proved that South Africa has rich minerals such as shale gas, which can be explored by fracking (Department of Mineral Resources, 2012). The fracking technique uses high-powered equipment to extract shale gas deep beneath the surface (Fig, 2013). The National Plan Commission Report reported that the energy reserves can be increased by extracting shale gas (Fig, 2013).

The government then granted exploration rights to four companies to explore for shale gas in the Karoo (Department of Mineral Resources, 2012). Fracking is very controversial and many organizations were opposed to fracking because of social, economic and environmental concerns (Fig, 2013). Furthermore, South Africa is a water stressed country and fracking involves using large amounts of water (Fig, 2013). Even though fracking is controversial the government, due to the energy crisis and with the intention of improving the economy and society, has given the go ahead to explore for shale gas in the Karoo (Etheridge, 2017). This will be a long process, which can take years, and so it is important for South Africa to find alternative energies to alleviate the present energy crisis.

Energy is very important for social and economic development but the manner in which it is produced can affect the environment as economic growth depends on long term availability of energy from sources that are affordable, accessible and environmentally friendly (Omer, 2008, Oyedepo, 2012, Winkler, 2005). Energy plays a vital role for economic growth, progress and development as well as poverty eradication and security for the nation (Oyedepo, 2012). Energy and poverty reduction are not only closely connected with each other but, also, with socio-economic development, which involves productivity, income growth, education and

health (Oyedepo, 2012).

Due to the high unemployment rate in South Africa, a country prone with poverty, it is important for South Africa to invest in affordable, adequate and reliable energy supplies, which is a challenge (Von Bormann and Gulati, 2014, Winkler, 2005). Furthermore, South African higher education institutions face the challenge of electricity demand, increasing costs and, at the same time, have to be energy efficient (Maistry and McKay, 2016). The demand is greater than the supply and, with rising costs of electricity, institutions are having difficulty finding this additional income for electricity and, at the same time, being energy efficient (Maistry and McKay, 2016). It would therefore be in the interest of institutions to resort to renewable energy to alleviate the energy crisis in South Africa and, at the same time, the environment will be protected (Pegels, 2010). However, even though many benefits can be obtained from renewable energy, there has been little progress made with regard to renewable energy and solar energy as they are costly (Pegels, 2010). Renewable energy can be converted into electricity through solar thermal energy and photovoltaic (Pegels, 2010).

The University of Stellenbosch has made some progress in the management of energy. Having placed meters and modems at various buildings, the university has implemented an energy management programme to manage its energy usage (Stellenbosch University, 2013). Regular audits are done to monitor this system and to establish whether or not it is yielding savings in electricity. The Power Watch Programme has been installed to observe the energy programme and to check its progress in terms of the required standards (Stellenbosch University, 2013). Light bulbs were replaced by energy saving bulbs, and trees were planted in certain areas to avoid the use of air conditioners, the latter being somewhat costly (Stellenbosch University, 2013).

2.6.2 Water

South Africa is facing a huge challenge, the scarcity of water being due to drought and global warming (Turpie, Marais and Blignaut, 2008, WWF-SA and Dugmore, 2016). The challenges being faced on water management lie in quality water affected by factors such as global warming and climate changes (Pegels, 2010, WWF-SA and Dugmore, 2016). Pegels (2010) argues that, even if South Africa does not experience erratic climate changes, the supply of water will be depleted within the next two decades. The growing concern of global warming can increase water scarcity and decrease the quality of the water, which can affect human health

(Pegels, 2010). Most municipalities are finding it difficult to control the quality of water due to lack of funds (Von Bormann and Gulati, 2014).

The National Development Plan reports that the agricultural sector consumes 60% of water for agriculture while the percentage for the Gross Domestic Product (GDP) is only 3% (Von Bormann and Gulati, 2014). Even though the agriculture sector only contributes 3% to the GDP, this sector is important as it both provides food for citizens and creates jobs, which is important to boost the South African Economy (Von Bormann and Gulati, 2014).

The demand for water will increase as the population and economy grows (McCartney, Bharati and Nicol, 2018, Turpie et al., 2008). As it is important for every person to have access to water, it should be a basic right for the unemployed and those living in poverty to have access to free quality water (Muller, 2008, WWF-SA and Dugmore, 2016). In trying to manage the water scarcity, many municipalities are coping with the demand. However, prices increase as the demand increases (Muller, 2008). The shortage of water can have an impact on energy, which can have an impact on electricity (Von Bormann and Gulati, 2014).

The National Development Plan further identifies that South Africa lacks skilled people, including engineers, to manage the water reserves (Von Bormann and Gulati, 2014). It is critical that South Africa looks at alternative energies to generate electricity that uses little or no water lest the threat of water becomes a challenge in the near future (Von Bormann and Gulati, 2014).

It is important for businesses and institutions to identify and mitigate risks to improve the management of water (Muller, 2018). Institutions should manage their supply and demand effectively and efficiently in order to reduce water wastage (Muller, 2018). It is important to carry out research on methods to purify water at low costs using less energy (Shannon, Bohn, Elimelech, Georgiadis, Marinas and Mayes, 2008).

The University of Stellenbosch has managed its water usage by locating water stations in the campus so that students can access fresh clean water (Stellenbosch University, 2013). The university prohibits students from using bottled water as it is wasteful and, furthermore, the bottles generate waste which is harmful to the environment (Stellenbosch University, 2013).

Water-saving shower taps were installed in the residences to monitor the water usage (Stellenbosch University, 2013). The University of Cape Town has done some research on reducing the consumption of fresh quality water, but more research needs to be done in this area (Rippon, 2013). Research will be carried out once the university receives the data from the municipality regarding information on water usage (Rippon, 2013).

2.6.3 Waste

South Africa is facing the economic challenges of an unequal society due to the legacy of the past and, at the same time, is trying to protect the environment and its natural resources to support sustainable products and design so that the resources are utilized effectively and efficiently to reduce waste (Department of Environmental Affairs, 2011). The products must be utilized effectively and, when they expire, the products should be recycled into compost to generate energy (Department of Environmental Affairs, 2011).

The challenge for South Africa is that the increased growth in population and increased rates in urbanization have led to increased waste, which requires an effective waste management system to address these issues (South African Environmental Outlook, 2012). There are many problems as to why waste management systems are not properly managed, such as inefficient data collection methods, poor infrastructure, lack of education and awareness of people within that sector, high operational costs, poor support from the municipalities, poor recycling, poor reuse of waste and, finally, the finding of suitable land to dispose of the waste (Department of Environmental Affairs, 2011).

Due to the legacy of the past, the South African government is still trying to create jobs for the unemployed, both skilled and unskilled, by creating job opportunities in the area of waste management (Department of Environmental Affairs, 2011). The South African Waste Management Act (No 59 of 2008) adopts a hierarchical approach when addressing issues around reduced, reused, recycled waste and the generation of energy from waste composts (Department of Environmental Affairs, 2011).

Globally research has indicated that there is increased pressure on higher education institutions to manage waste and many universities, such as the University of West Indies, University of Idaho in the USA, University of Wolverhampton in the United Kingdom, and Prince George Campus at the University of Northern British Columbia, are faced with the challenges of waste management (Aseto, 2016). Waste is seen as a global problem which affects the economy and, therefore, it is important that society understands the importance of managing it. Countries should collaborate and partner with one another so that waste can be managed efficiently and effectively (Dell, 2016).

It is important to manage waste properly lest it leads to health and environmental problems (Bailey, Pena and Tudor, 2015, Ferronato, D'avino, Ragazzi, Torretta and De Feo, 2017). The Caribbean has had many problems in managing waste, such as financial constraints, poor human resource management, poor infrastructure, high operating costs for the management and recycling of waste, increased growth in population and the paradigm shift to urbanization (Phillips and Thorne, 2013). Research was carried out on the West Indies higher education institution to assess whether the institution was managing waste properly (Bailey et al., 2015). The research found that waste management was not being managed properly and the main challenge was funding (Bailey et al., 2015). However, the management of recycled waste was managed well as the Caribbean is a tourist attraction and promoting and protecting the environment can generate income which can boost the economy (Phillips and Thorne, 2013).

Furthermore, surveys carried out on higher educational institutions in Europe, such as the University of Insubria and the Salesian University (Italy), University of North London, University of College London, University of East London, London School of Economics and Political Science and London Guildhall University (UK), have revealed that institutions were relatively poor in terms of recycling, the main barriers being finances, lack of knowledge, lack of awareness, lack of education and institutional reluctance to change (Dahle and Neumayer, 2001, Ferronato et al., 2017). This is further argued by Bailey et al. (2015) that the main problems to recycling were that staff lacked motivation, knowledge and awareness of the benefits of recycling. According to (Ferronato et al., 2017) managing waste effectively can generate income for the country which, in turn, will benefit society, economy and the environment. It is therefore important that citizens are educated in the knowledge of the

harmful practices of waste on the environment, society and the economy.

In Africa waste management problems are varied and complex, ranging from infrastructural, political, social, economic, legal, environmental, organizational management and governance challenges (Godfrey, Ahmed, Gebremedhin, Katima, Oelofse, Osibanjo, Richter and Yonli, 2019). There is no proper management of waste which, regrettably, is disposed of in a manner that adversely affects human health and the environment (Aseto, 2016). It is important to have proper structures in place in order to efficiently dispose of waste but, unfortunately, no infrastructure exists (Aseto, 2016). According to Aseto (2016), higher education institutions in Nairobi constitute 23% of the total waste generated and the institution is responsible for the collection and disposal thereof.

South Africa is faced with many socio-economic challenges such as a growing economy, population growth, a high rate of unemployment, financial constraints, lack of education in, and awareness of, the waste sector, unavailability of land to dispose of the waste, poor infrastructure, poor governance and poor incentives for the recycling and reuse of waste (South African Environmental Outlook, 2012). In an effort to respond to the above- mentioned challenges, it is critical that higher education institutions engage in research to address these challenges and to find solutions to these problems so that waste can be seen as a benefit rather than a problem.

The waste management sector has viable economic opportunities that can be explored to improve the economy, protect the environment, create jobs, improve the infrastructure, improve skills and contribute to the strengthening of small and medium businesses in the waste sector (South African Government News Agency, 2015). At present, only 10% of waste is being recycled (Frost, 2015). Even with these challenges, South Africa is leading in the African continent in the area of waste management and there is progress in terms of sustainability (Frost, 2015). Research undertaken by Cristina Trois has shown that South Africa is improving in the area of waste management and is collaborating with partners so that waste can be seen, rather, as a resource (Frost, 2015).

The Minister of Environmental Affairs, Edna Molewa, argues that it is important to have a plan to manage waste as waste should be seen as a resource and not a problem (A-Thermal Retort Technologies, 2016). A plan has been implemented which benefits the unemployed as 3 000

jobs were created and economic opportunities for 200 small and medium businesses were generated (A-Thermal Retort Technologies, 2016). The government and the waste industries are exploring ways on how recycling will improve, grow and develop the economy, create jobs for the unemployed and, at the same time, protect the environment (A-Thermal Retort Technologies, 2016). Research was done at the University of KwaZulu-Natal (UKZN) and a waste management model has been developed with strategies so that municipalities can use these strategies to manage waste (Frost, 2015).

It is evident that most South African higher education institutions are progressing in the area of waste management as they have the knowledge and education in the area of research, innovation and job creation. The Institutions of Technology are keen to partner with the Department of Environmental Affairs and waste industries with the intention of improving the management of the different waste types and this collaboration can generate income for the institution (Dell, 2016). Waste should not be seen as a problem but as a resource which can benefit the unemployed and small and medium businesses (Dell, 2016). There is a huge budget for waste management from which unskilled people can benefit by acquiring a level of qualification which would enable them to become skilled (Dell, 2016).

The Vaal University of Technology has launched an electronic waste recycling system where students acquire skills and expertise to help waste industries manage waste (Dell, 2016). The income generated from this centre is used for bursaries for needy students (Dell, 2016). The North West University, Cape Peninsula of Technology, the University of Limpopo and the World Toilet Association hosted an international conference in year 2018 on the proper management of sanitation (waste) and water which has a direct bearing on the quality of life but, more especially, on cities and communities (NWU, 2018). The conference's intention was to unearth the scarcity of fresh water resources that are being depleted and contaminated by human waste from industries and households (NWU, 2018).

On the other hand, Rhodes University's waste management initiative is to support the municipal recycling system in reducing the overall amount of refuse being transported to landfill sites by recycling paper, cards, glass, plastic and metals (Rhodes University, 2017). The University of Stellenbosch has a green recycling programme for large quantities of waste which would otherwise be transported to municipal landfills (Stellenbosch University, 2012).

The University of Western Cape was awarded the green campus initiative for excelling in waste reduction and recycling (Institutional Advancement, 2014). This university's recycling initiative is a huge success as an average of 70 tons of recyclables are collected every month, thus creating job opportunities for 120 formerly unemployed people (Green Africa Directory, 2012). The University of Western Cape also benefits financially from the recycling initiative as the recycled materials are sold to companies, consequently boosting the institution's finances (Green Africa Directory, 2012).

The University of Pretoria developed a policy on reused, reduced and recycled waste by adopting the principle of 'prevent, minimize or control' in respect of waste management and hazardous waste, ensuring that waste is managed in such a manner that negative impacts are prevented, minimized or controlled in accordance with the relevant legal requirements (University of Pretoria, 2014: 2). The University of Witwatersrand has published a book on waste management which focuses on a holistic approach to waste generation, recycled and reused waste, interventions of waste management, policies and regulatory framework on the management of waste, focusing on metal and mineral waste (Ndlovu, Simate and Matinde, 2017).

Globally many higher education institutions have identified and recognized the importance of sustainability since the proper management of energy, water and waste can yield economic, environmental and societal benefits, all of which can contribute to institutional success.

2.7 SUSTAINABILITY IN THE TERTIARY EDUCATION SECTOR

2.8 INTERNATIONAL HIGHER EDUCATION INSTITUTIONS

Some higher education institutions, such as the University of Dammam in Saudi Arabia, University of Kebangsaan in Malaysia, University of Hamburg in Germany, University of Lumburg in the UK, University of Bournemouth in England, Yale University in the USA, National University of Singapore, University of Copenhagen in Denmark, Cornell University in the USA, Duke University in the USA, Harvard University in the USA and Universitas Indonesia in Indonesia, have realized the importance of sustainability development and are incorporating sustainability in research, curriculum, community engagement and daily campus operations (Abubakar et al., 2016, Amaral, Martins and Gouveia, 2015, Baharum et al., 2017,

Ragazzi and Ghidini, 2017, Razman, Abdullah, Wahid and Muslim, 2017).

Even though there are ongoing sustainability initiatives to improve sustainability, there are ongoing challenges and institutions in Malaysia which have identified that this is an international challenge which needs to be addressed in workshops, seminars, conferences and round table discussions (Baharum et al., 2017). Researchers have identified that higher education institutions are successful if sustainability is applied in all areas of work such as governance, operations, research, community engagement and education (Razman et al., 2017, Baharum et al., 2017). The problem lies in that many institutions focus mainly on operations and governance instead of applying sustainability to all areas, which can then negatively impact on the institution's economy, environment and society (Razman et al., 2017, Baharum et al., 2017).

According to Abubaker et al. (2016), education plays an important role in educating students about sustainability, making them aware of the importance of the environment and its impact on campus activities and operations. Some higher education institutions in Malaysia, such as the Universiti Pendidikan Sultan Idris (UPSI) and University of Marai (UITM), have noted and realized the importance of sustainability in campus operations but have failed to implement sustainability due to a lack of knowledge in this area and, also, because very little research has been done. This makes it difficult for institutions to develop a sustainable framework (Cole, 2003, Isa, 2017, Razman et al., 2017, Saleh, Kamarulzaman, Hashim and Hashim, 2011). Razman et al. (2017) further argue that more research needs to be done in this area so that information can be shared. It is also important to understand all the issues and concepts, and to develop action plans which can be used as guidelines appropriate for higher education institutions.

Research has shown that many higher education institutions focus mainly on environmental sustainability, and that almost 400 higher education institutions from 52 countries have signed the Tailors Declaration which urges institutions to carry out sustainable campus operations by protecting the environment and including sustainability in their research, operational activities and curriculum (Razman et al., 2017). Many higher education institutions in the United States of America (USA) and Europe are addressing the challenges of sustainability in many ways. These have adopted the ISO 14001 international standards of practice in order to manage their services and operations and achieve environmental sustainability (Alshuwaikhat and

Abubakar, 2008, Redfern and Zhong, 2017). It is important that higher education institutions not only focus on the green initiatives but, also, educate and create awareness so that everyone understands the importance of sustainability and its effects on the environment (Abubakar et al., 2016, Cortese, 2003, Shriberg, 2002).

A few higher education institutions in the Middle East, such as the University of Dammam, Saudi Arabia, Qator Foundation Education City, Saudi Arabia's King Abdullah University of Science and Technology and New York University Abu Dhabi have made some progress in managing sustainable initiatives by addressing the environmental impact on campus operations (Abubakar et al., 2016, Alshuwaikhat, Adenle and Saghir, 2016). Research carried out at the University of Dammam has concluded that most higher education institutions in Saudi Arabia have a top-down management approach: decisions are made at management level without the consultation of the students and other stakeholders, resulting in an autocratic system and no team work can negatively impact on the institution (Abubaker et al., 2016).

Research has shown that at least 10 international higher education institutions, Yale University, Peking University, University of Oxford, University of Copenhagen, Australian National University, University of Tokyo, National University of Singapore, University of Cambridge, University of California Berkeley and ETH Zurich University, are leading in the area of sustainability (Mellino, 2014). These Universities are working with Research Centres to produce a guidebook, "Green Guide for Universities", so that higher education institutions can make use of this guidebook to address and find solutions to sustainability problems (Mellino, 2014). This guidebook focuses on problem solving for energy, environment, buildings and waste (Mellino, 2014).

2.9 CASE STUDIES

2.9.1 University of Yale

At the University of Yale the Office of Facilities plays an important role in achieving institutional goals in the areas of campus planning, building design and construction, energy management, water management, waste management, cleaning and maintenance (Yale University, 2016). The Sustainability Plan incorporates all departments to work as a team to achieve institutional sustainability The university has adopted policies and processes to protect the economy, environment and society (Yale University, 2016). Yale University has further adopted a number of principles to protect and preserve the environment (Yale University,

2016). The Office of Facilities has been very successful in managing the daily operations and maintenance (Yale University, 2016).

2.9.1.1 Energy Management

As energy resources are becoming scarce, one of the initiatives of Yale University is to reduce its greenhouse gas emissions below 43% by 2020 (Yale university Office of Facilities, 2019). The institution set its targets to reduce its energy usage and greenhouse emissions by 5%, using year 2013 as the baseline (Yale University, 2013). Research has shown that in 2016 greenhouse emissions were reduced by 8.7% and energy usage by 16.8%, which implies that the sustainable initiatives implemented are being managed well (Yale University, 2013). The sustainability initiative for renewable energy increased by 1.6%, which shows that the Office of Facilities has been proactive in the area of sustaining alternative energies due to the scarcity of energy resources (Yale University, 2013). Direct Digital Control Systems and the Central Metering System were implemented to control the management and the use of energy in buildings (Yale university Office of Facilities, 2019).

2.9.1.2 Water Management

The University of Yale tried to reduce its storm water by implementing regional plans to achieve sustainable goals, but this is still work in progress (Yale University, 2013). Even though the institution did not meet the goal to reduce water consumption by 5%, the water consumption was reduced by 0.5%, which implies that more research needs to be done in this area (Yale University, 2013). The university did, however, successfully implement water conservation projects to reduce the consumption, such as the installation of low-flow showerheads in residences and the gym area (Yale University, 2013).

2.9.1.3 Waste

The University of Yale's Office of Facilities has recognized the importance of having a proper waste management system and has implemented strategies so that reused, recycled waste can be identified at the point of origin to the end (Yale University, 2013). It is important to have proper strategies to manage waste so that waste can be seen as a benefit rather than a waste (Yale Office of Sustainability, 2018). The Strategic Plan (2016) sustainability initiative on waste management was to reduce waste by 50% and make it a resource and benefit in the area of recycling, reusing and composting, and it was noted that waste was reduced by 63.1%; this implies that waste was being managed well (Yale University, 2013). The institution further

identified that more research needs to be done on waste management at a municipal level so that municipalities can implement correct waste procedures at an institutional level (Yale University, 2013). The institution has further adopted the LEED standards for the management of toxic waste so that the environment and society are protected (Yale University, 2013).

Some countries in the East, such as Malaysia, Indonesia, China and Saudi Arabia, have become progressive and have identified that sustainability is important in an institution but more research needs to be done so that the sustainability initiatives can be managed well to achieve institutional success like the University of Marai (UiTM) in Malaysia.

2.9.2 University of Marai (UiTM)

2.9.2.1 Water Management /Energy Management/Waste Management

Research carried out at UiTM reveals that Facilities Management has implemented many sustainability initiatives in the management of energy, water and waste but more research needs to be done in these areas so that the current practices can be identified and evaluated to measure performance and, thus, further improve on the present sustainable approach (Saleh et al., 2011).

The findings also reveal that there was poor communication at all levels, especially communication with senior management, making it difficult for senior management to intervene when problems with the implementation of the policies and procedures occurred (Ishak, Mahayuddin and Mohamed, 2015, Saleh et al., 2011). Due to poor communication it was recommended to have an efficient management software system to manage the flow of information so that timeous decisions could be made with regards to operations, research and community outreach (Saleh et al., 2011). It is important for management to lead so that the departmental and institutional goals are achieved (Ishak et al., 2015, Saleh et al., 2011).

The research also shows that many people are not aware of the importance of sustainability and it was recommended that training and workshops are important to increase knowledge and awareness on the harmful effects on the economy, environment and society of improper practices survey reveals that more research is necessary in the area of energy and emissions in order that management may devise strategies over a five-year period to evaluate process and performance (Saleh et al., 2011). The buildings should be designed in a way that protects the environment with the intention of managing energy utilization in the most effective manner (Saleh et al., 2011). The Sustainability Plan on energy is to encourage greater efficiency in

buildings, offices and occupants by making use of natural lighting and ventilation to avoid the use of air conditioners, which is costly, in an effort to save energy (Saleh et al., 2011).

As can be seen, many international higher education institutions have tried to respond to sustainability by implementing sustainable initiatives in their daily operations, community outreach, curriculum and research in order to address the economic, social and environmental demands, while other higher education institutions are still lagging behind. The challenge lies within African higher education institutions.

2.10 AFRICAN UNIVERSITIES

African universities are facing the challenge of sustainability and it is important to address this problem through education, research and teaching the next generation to critically engage in the area of sustainability and find solutions to the problems (MDPI, 2017). African higher education institutions have identified that education is a powerful tool that needs to be used at all levels to promote sustainable development and this has led to the concept of ‘education for sustainable development’, but the ongoing challenges have created barriers for institutions to achieve sustainability (Mohamedbhai 2015: 1, MDPI, 2017).

African higher education institutions function under very difficult conditions and therefore the rise to success is not an easy one (Mba, 2017, Mohamedbhai, 2012, Teferra and Altbachl, 2004). Some of the challenges faced by African higher education institutions are colonialism, financial constraints, government policies, excess support staff, management issues, private higher education, gender parity, research and publishing, academic freedom, lack of capacity building, lack of knowledge amongst staff and management structures (Mba, 2017, Mohamedbhai, 2012, Teferra and Altbachl, 2004). Apart from internal and external challenges, African higher education institutions are also faced by global challenges such as water security, renewable energy, biodiversity and urbanization, all of which needs to be addressed globally to become globally competitive (Mohamedbhai, 2015).

It is therefore important for higher education institutions to have a proper Facilities Management to manage the daily operations and sustainable initiatives, but many Facilities Management in Africa are not maintained properly, resulting in the poor management of daily operations (Odediran, Gbadegesin, Babalola, 2015). Odediran et al. (2015) further argues that most African higher education institutions, such as institutions in Nigeria, do not take care of and maintain the buildings and facilities, the result being that the facilities are in a terrible state. It is important to have an effective Facilities Management to support the core business of the institution. Facilities Management is an aspect of education that is being overlooked in Nigeria with no attention being paid to maintenance and services (Odediran et al., 2015). The key challenges faced by Nigerian Facilities Management are poor funding, lack of awareness and poor governance (Odediran et al., 2015). Most of the research done in Nigeria focuses on the role of facilities management in the light of the initial concept, which was property and maintenance management (Okafor and Onuoha, 2016). This concept becomes a challenge if higher education intuitions focus mainly on property and maintenance without focusing on the core business, which is key to achieving the institutional goals.

A survey was carried out by the Global University Network for Innovation (GUNI 2010), the International Association of Universities and the Association of African Universities to assess the sustainability initiatives taken by African higher education institutions (Mohamedbhai, 2012). This survey was carried out as a result of the declaration made by African Leaders at the 12th General Conference of Association of African Universities (AAU 2009) to promote sustainability (Association of African Universities, 2009). An online questionnaire which covered teaching and learning, research, outreach and services, institutional governance and campus operations was sent to 500 African Institutions in the sub-Saharan continent, but only 73 institutions responded (Mohamedbhai, 2012).

The survey reveals that, even though this sector is increasing rapidly in Africa, private higher education institutions are not taking sustainability seriously (Mohamedbhai, 2012). The survey also reveals that public higher education institutions are addressing some of the sustainability challenges through teaching, research, outreach functions and operations, but more research work needs to be done on sustainability initiatives (Mohamedbhai, 2012). The survey reveals, furthermore, that in terms of research, which is important to improve and promote sustainability development, only 20% of the institutions is greater than 40%, implying that the majority of institutions were not working in the area of research (Mohamedbhai, 2012). The survey also

reveals that African universities have not promoted sustainability initiatives due to the lack of funds, lack of human resource skills and lack of awareness (Mohamedbhai, 2012). Moreover, the findings reveal that very little was happening in terms of energy conservation, waste reduction, recycling, water conservation and sustainability land practice (Mohamedbhai, 2012).

On the other hand, the International Association of Universities (IAU) is further trying to promote sustainability and has created an online portal to encourage institutions to showpiece their work on sustainability, which can assist poorly sustained institutions to follow suit (Mohamedbhai, 2015). A report published by the United Nations Education, Scientific and Cultural Organization (UNESCO) has further confirmed that higher education institutions in Africa are making some progress in the area of sustainability by addressing and finding solutions to the problems (Mohamedbhai, 2015). Some higher education institutions are even integrating sustainability in their curriculum, research, community engagement and campus operations, but some institutions are finding it difficult to embrace this concept (Mohamedbhai, 2015).

Different studies undertaken on challenges of sustainability, sustainability development goals, online surveys on sustainability, poverty reduction and sustainable initiatives for African higher education institutions have concluded that it is crucial that higher education institutions collaborate and work with the private as well as government sector to promote sustainability development (Mba, 2017, Mohamedbhai, 2012, University of Bergen, 2017).

In Africa, literature has revealed that some higher education institutions are promoting sustainability in the management of energy, water and waste while others are still lagging behind.

2.11 CASE STUDIES

2.11.1 Nnamdi Azikiwe University, Awka

2.11.1.1 Energy Management

Research carried out at the Nnamdi Azikiwe University, Awka, Nigeria, has revealed that the institution experienced problems with the management of electricity and power outages and, as a measure, implemented the use of generators to assist during power outages (Okafor and Onuoha, 2016). The survey reveals that this initiative has not been successful, as the generators are poorly maintained and not operational all the time due to lack of funds (Ikediashi, Ogunlana, Bowles, Mbamali, Laryea, Agyepong, Leiringer and Hughes, 2016, Okafor and Onuoha, 2016). The findings also reveal that the standard of equipment was low and recommended that designated funds be set aside for purchasing high standard equipment and, furthermore, a special budget be set aside for the maintenance of equipment (Okafor and Onuoha, 2016). It was noted that the management of finances was poor and, therefore, it was recommended that better planning and techniques be implemented to avoid the misappropriation of funds so that the designated funds can be used for operational and maintenance work (Asiabaka, 2008, Okafor and Onuoha, 2016).

Due to the level of equipment being in a poor state it was further recommended that regular inspections be made to improve the standard of equipment and to avoid breakdowns which can disrupt work operations (Odediran et al., 2015, Okafor and Onuoha, 2016). Facilities Management being vital, it is essential for management to lead in the running of sustainability initiatives so that the departmental and institutional goals can be achieved (Asiabaka, 2008, Ikediashi et al., 2012).

2.11.1.2 Water Management

Research carried out at the University of Nnamdi Azikiwe, Awka, Nigeria, found that the management and distribution of water was not managed well and recommended that other water supplies and facilities be researched so that water can be made available for institutional use and stored through proper water facilities (Okafor and Onuoha, 2016).

2.11.1.3 Waste Management

A survey was carried out at the University of Nnamdi Azikiwe in Awka, which was comprised mainly of fourth year students, to assess the management of waste (Okoye, Onyali and Ezeugbor, 2015). The findings reveal that students did not dispose of the waste properly as there was inadequate disposal of the different waste types (Okoye et al., 2015). This can adversely affect society and the institution's economy and environment (Okoye et al., 2015). The survey also reveals that students were, at the time, not aware of the importance of waste

management and recommended that workshops, training and seminars be held on waste management so that all stakeholders could gain knowledge and awareness of the importance of waste management (Okoye et al., 2015).

According to Okoye et al. (2015), workshops and training are important so that knowledge of waste management can be increased. This would facilitate in finding solutions and addressing the problems. The findings reveal, in addition, that it is important for government to intervene so that, in the interest of protecting human health and the environment, proper equipment can be given to the institution to dispose of the waste (Okoye et al., 2015).

It was recommended, as part of the waste management initiative, that student bodies should monitor and supervise students so that rules and regulations on disposal of waste are followed (Okoye et al., 2015). The University of Makerere has also had challenges but, on the other hand, has made some progress in the areas of energy, waste and water management.

2.11.2 Makerere University

2.11.2.1 Energy Management

Makerere University is located in Uganda. Even though Uganda has abundant energy and other renewable resources, there is still an energy crisis in the country (Succeed Network, 2017). The institution experienced power shortages and, sometimes, technical faults which could affect the institution's power supply (Winkelmann and Godfrey, 2016). Research carried out at the Makerere University shows that the students were not managing the energy supplies well; lights were left on during the day, devices were left unplugged, building lights were left on during all hours and food was cooked on high powered electricity (Winkelmann and Godfrey, 2016).

Due to the challenges in the management of energy, the institution recommended renewable energy sources, such as hybrid solar and hydroelectric power, to be used in buildings (Winkelmann and Godfrey, 2016). However, since renewable energy is costly, it is important to have solar plants near the institution to help reduce expenses (Winkelmann and Godfrey, 2016). The university's initiative in managing energy usage is to have automatic switches so that electricity can be monitored, as well as regular inspections so that faults can be identified (Nabatte, 2018, Winkelmann and Godfrey, 2016). The institution further encourages that, as omissions are harmful to the environment, omissions from burning wood be reduced by using biomass (Winkelmann and Godfrey, 2016). Furthermore, the institution embarked on a green

week campaign focusing on best practices for energy so that students could be made aware of the importance of energy and its impact on the environment, economy and society (Succeed Network, 2017).

2.11.2.2 Water Management

Makerere University has no proper water harvesting system and therefore most of the rainwater is wasted (Winkelmann and Godfrey, 2016). Inspection showed many leakages in bathrooms (Winkelmann and Godfrey, 2016). Some of the existing drainage channels were clogged with soil and solid waste which, in turn, caused waste to flow on the surface during heavy rains (Winkelmann and Godfrey, 2016). As part of the water management initiative to conserve water it was recommended that water pipes be checked regularly in order to avoid water being wasted and leakages that spill over (Winkelmann and Godfrey, 2016).

More research needs to be conducted on wastewater so that proper systems can be implemented for reuse of wastewater for toilet flushing (Winkelmann and Godfrey, 2016). Water Campaigns and Programmes should be done on a regular basis to make students aware of the importance of water and, consequently, take cognizance of saving water by changing their thinking and behaviour (Winkelmann and Godfrey, 2016). Tanks should be installed outside campus buildings so that rainwater can be stored and used (Winkelmann and Godfrey, 2016). The best practice used on water saving was the installation of water nozzles which resulted in 30% water savings and 5-7% on energy savings (Succeed Network, 2017).

2.11.2.3 Waste Management

Waste management was a problem at Makerere University as there were no proper waste management systems to dispose of the different waste types and, especially, the disposal of hazardous waste from laboratories (Winkelmann and Godfrey, 2016). There were no proper policies on waste management and its impact on the environment and humans (Winkelmann and Godfrey, 2016). The university further had problems with the collection of waste and, on some days, the waste was not collected at all, resulting in rotting waste which could adversely affect the environment and humans (Winkelmann and Godfrey, 2016).

As part of the waste management initiative, the institution recommends a proper waste management system for reduced, reused and recycled waste (Wamai, 2018). A proper waste management system should be introduced to help sort out the different waste types and this would help reduce litter (Wamai, 2018, Winkelmann and Godfrey, 2016). Hazardous waste is dangerous and, therefore, it is important to dispose of the chemicals in a manner that will not affect the environment and humans; the chemical suppliers should be contacted to collect the containers (Winkelmann and Godfrey, 2016). The recycled bins should be located at convenient places so that the sorting and collecting can be done without any problems (Winkelmann and Godfrey, 2016). Campaigns should be coordinated to make students aware of the importance of waste management and the harmful effects of waste/plastic bottles on the environment (Wamai, 2018, Winkelmann and Godfrey, 2016). The campaign for the management of waste recommends that students make use of refillable water bottles instead of plastic bottles in an effort to protect the environment (Wamai, 2018, Winkelmann and Godfrey, 2016).

In the South African context, the National Development Plan has identified that the country is facing the challenges of poverty, economic volatility and the degradation of the eco-system and it is important to note that some higher education institutions have identified these challenges and are taking the necessary measures to address these challenges through sustainability initiatives (Von Bormann and Gulati, 2014). The University of Cape Town has to some extent addressed these challenges through research and actions (Rippon, 2013).

2.12 SOUTH AFRICAN UNIVERSITIES

Some South African higher education institutions, such as the University of Cape Town, University of Western Cape, Stellenbosch University, Rhodes University and the University of Fort Hare, have identified and are aware of the importance of campus management operations in achieving institutional success and are finding ways to manage their campus operations by implementing sustainability practices therein.

The University of the Western Cape (UWC) has done research and has implemented sustainability measures to manage its energy, water and waste (Institutional Advancement, 2014). One of the initiatives implemented by UWC was to focus on the environment and its protection, hence the Green Campus Initiative, initiated by students, addresses environmental issues and sustainability, which is included in their curriculum (Institutional Advancement,

2014). Furthermore, the UWC has a waste management programme which has created employment for 120 people and solar powered golf carts to travel across campuses as an effort to manage energy (Green Africa Directory, 2012).

The University of Cape Town has done research on the environment, buildings, electricity, water, waste, global warming, health and safety, poverty and inequity and policies integrating with their daily operations (Rippon, 2013). The University of Cape Town was awarded the green campus initiative award for addressing issues on climate change and the environment, and has integrated sustainability in the curriculum to benefit the economy, environment and society (Green Africa Directory, 2012).

2.12.1 University of Cape Town

2.12.1.1 Energy Management

The University of Cape Town, located in Cape Town, South Africa, has identified that the local energy shortage, aggravated by power outages, is being caused by the demand being greater than the supply (Rippon, 2013). Reduction measures to manage energy usage and an increase in annual tariff rates have led to an efficient utilization of energy resources (University of Cape Town, 2019). Research was done at the University of Cape Town to improve the management of energy, research on technology for lighting and heat pumps for water heating (University of Cape Town, 2019). Research carried out at the University of Cape Town on energy usage showed that the energy consumption increased from 2012 to 2013 by 0.4%, which is low (Rippon, 2013). The initiative to maintain and service air conditioners to reduce the energy usage and costs has improved since 2007 (Rippon, 2013). The University of Cape Town did not invest in renewable energy due to the cost factor and, moreover, did not designate a budget for renewable energy (Rippon 2013). The institution, nonetheless, tried to further reduce energy costs: solar water heaters were installed for small and medium residences, as the cost was low, and energy efficient heat pumps were installed for large residences (Rippon, 2013).

2.12.1.2 Water Management

Cape Town experienced a period of severe drought which led to water being exceptionally scarce. It therefore became crucial to manage the water resources effectively. Research shows that it was difficult to measure and monitor the water consumption because of inaccurate data received from the municipalities (Rippon, 2013). Even though research has been done on

digital water-metering systems, this technology will not be used until the energy meters are installed (Rippon, 2013). As part of the water initiative, water efficient sanitary fittings were installed in new buildings (Rippon, 2013). Research has proved that waterless urinals are becoming more feasible but this project is still work in progress (Rippon, 2013). The institution further tried to save water by using water from the dams to irrigate the gardens and sports fields (Rippon, 2013). Ongoing research is being done on how to gain access and make use of storm water (Haw, 2018).

The Green Campus Initiative has put together a “to do list” and “not to do list” on water saving tips due to the water crisis in Cape Town (Swingler, 2017).

2.12.1.3 Waste Management

Waste management was a problem at the University of Cape Town as different waste types were placed in incorrect bins, resulting in contaminated bins which could adversely affect the environment and humans (Rippon, 2013, Swingler, 2018). As part of the waste management initiative, the University of Cape Town implemented an outdoor system, which is a two-bin separation system, to help manage waste and which is easily accessible (Rippon, 2013). Due to the poor management of recycled waste it was important to do more research on an indoor waste recycling system (Rippon, 2013, Swingler, 2018). The management of solid waste requires attention and more research needs to be done in this area to improve the recycling and management of waste (Rippon, 2013, Swingler, 2018). The University of Cape Town has embarked on a waste management initiative, which is to train staff, students and community so that knowledge can be gained and an awareness of the importance of waste management and its effects on the environment, society and economy can be created (Rippon, 2013).

2.12.2 Fort Hare University

The University of Fort Hare, situated in the Eastern Cape, has a Properties and Services Department responsible for the management of energy, water and waste (Onyango and Kukubo, 2016). This department is responsible for the daily operational and maintenance work, prioritizing planned work before dealing with work that is not planned (Onyango and Kukubo, 2016). The University of Fort Hare has a Quality Management and Assurance unit (QMA) which uses a theoretical framework to monitor the quality of research and delivery service (Snyders, 2013). The institution applies the Conformance To Specifications (CTS)

model at an operational level, focusing more on the technical aspect of how activities should be planned in order to achieve the desired goals (Snyders, 2013). The mission of the Properties and Services unit is to provide a safe environment, which ensures full human dignity as exposed in the charter of human rights, and aims to achieve this by providing a service that engages both human and technological resources (Onyango and Kukubo, 2016).

2.12.2.1 Energy Management

The University of Fort Hare extended its Campus to East London and, in line with the mission, the Properties and Services Department manages the energy usage by making sure that the buildings are naturally ventilated, thereby reducing energy costs (Industry News, 2012). Furthermore, air conditioners were not purchased as they are expensive and costly to maintain and would increase the energy usage bill (Industry News, 2012). Instead, natural lighting is used to heat and cool the buildings, thereby reducing the electricity bill (Industry News, 2012). The University of Fort Hare had student protests as students were unhappy with the power outages which disrupted their studies (Ntongana, 2017). The university management was pressured to meet student demands and agreed to repair the faulty electric boxes that caused power outages so that students could continue to work without any disruptions and delays (Nowicki, 2017).

2.12.2.2 Water Management

When the University of Fort Hare extended its Campus to East London, the Properties and Services Department, in line with the mission, managed water by collecting it from the roofs and storing it in tanks (Industry News, 2012). The stored water was used to irrigate the gardens, toilets, bathrooms and kitchen, indicating that water was being effectively used, not wasted, thereby reducing the water costs (Industry News, 2012). Students of the university collectively protested as they were unhappy with the water outages (Ntongana, 2017). The university management was pressured to meet the student demands and agreed to build water reservoirs on campus and to install two more water pumps to address the water problems (Nowicki, 2017).

2.12.2.3 Waste Management

Still in line with the mission, the properties and Services Department of the University of Fort Hare in East London managed the waste usage by purchasing good quality, low maintenance

and durable materials so that these can be replaced without any wastage, thus effectively reducing costs (Industry News, 2012).

The researcher could not access material on the website with regards to the management of waste on the campus but is of the opinion that initiatives are being taken as the extension of the East London Campus indicates that materials and waste is being managed well.

2.13 UNIVERSITY OF KWAZULU-NATAL

UKZN comprises five campuses which are Edgewood, Howard College, Medical School, Pietermaritzburg and Westville (University of KwaZulu-Natal, 2017). The CMS falls under the Institutional Planning and Governance unit. The services offered by CMS are standardized for all campuses and CMS management is located on all campuses.

The University of KwaZulu-Natal (UKZN) has done some research in the area of energy management, waste management, water management, economic development, poverty reduction and social development pertaining to their discipline of study development (The Research Office and Corporate Relations Division, 2011). UKZN has done research in different areas of water management and, due to this research, the university has become internationally recognized as a top university in water research development (The Research Office and Corporate Relations Division, 2011). UKZN was one of eight, and the only one in Africa, out of 22 institutions to take part in the “Reinvent the Toilet” challenge, which aims to design a toilet system that will lead to the safe disposal of wastewater in poor communities (The Research Office and Corporate Relations Division, 2011).

UKZN has a number of units that are collaborating with Sasol and Eskom on energy management and sustainability development (The Research Office and Corporate Relations Division, 2011). There are a number of research projects on renewable and alternative energy systems and technologies, such as solar and wind, biofuels, and conversion of municipal waste to natural gas for electricity, being conducted (The Research Office and Corporate Relations Division, 2011).

A research study on waste that was done at UKZN reveals that waste management is a complex socio-technical challenge and in South Africa only 10% of waste is being recycled (Frost, 2015).

UKZN is rated as a top research university in Africa and the UKZN strategic plan has identified the sustainability initiatives for the institution, which is protecting the environment, sustaining natural resources, creating awareness, valuing staff, being a top research university, and to continuously improve in the area of policy, processes and systems (Corporate Relations UKZN, 2017).

Literature reveals that there was some research done on energy management for Howard Campus of UKZN and the findings show that Howard College has a Building Management System (BMS) and an Energy Management System (EMS) (Govender, 2005). The findings further reveal that meters have been installed to monitor energy consumption and that this project has been completed (Govender, 2005). The installation of interior lights, maintenance policy, energy policy and reduction of maintenance and equipment costs is work in progress (Govender, 2005).

Literature also reveals that UKZN had an active recycling programme and waste removal policy to sort the recyclable and reusable waste and it was noted that the PMB Campus was very successful in the implementation of the recycling programme (University of KwaZulu-Natal, n.d.). In line with the vision and strategic plan of UKZN the researcher is of the opinion that, since UKZN has taken some measures to manage the sustainable initiatives in the management of energy, water and waste, this research will be useful in exploring the extent to which sustainability initiatives are managed by UKZN CMS and its impact on the economy, environment and society.

2.14 THEORY UNDERPINNING THE STUDY

Many higher education institutions have taken the initiative in trying to achieve campus operations sustainability but they have failed due to very little research done on campus operations and limited knowledge and materials to assist in developing a theoretical framework for campus sustainability (Razman et al., 2017). Due to limited research and knowledge, many higher education institutions have developed their own framework to assess and measure campus sustainability (Alshuwaikhat and Abubaker, 2008; Yarime and Tanaka, 2012).

Over the years many theoretical frameworks were developed and researchers were quick to point out strengths and weaknesses (Er and Karudan, 2016, Sonetti, Lombardi and Chelleri, 2016, Yarime and Tanaka, 2012). Yarime and Tanaka (2012) further argued that the previous studies conducted on theoretical frameworks have identified the strengths and weaknesses based on qualitative analysis and not quantitative analysis which makes it difficult in terms of comparisons among universities. According to Legacy (2004) most of the frameworks lacked details. Some of the theoretical frameworks are Campus Sustainability Assessment Framework (CSAF), Sustainability Tracking Assessment and Rating System (STARS), Penn State Indicator Report, and Campus Sustainability Assessment Framework Core (CSAF Core) (Yarime and Tanaka, 2012).

The Penn State Indicator Report is based in the USA and this theoretical framework covered 33 indicators and each indicator was assessed with a value of four points (Er and Karudan, 2016). Although this framework was well written, the sustainability initiatives related to sustainability in the USA only and, therefore, lacked comprehensiveness (Er and Karudan, 2016).

Campus Sustainability Assessment Framework (CSAF) is a theoretical tool, which is used in research to address and find solutions to problems raised on sustainability by the communities, society, students, staff and academic staff (Cole, 2003, Wright, 2002). STARS was established in 2006 as a project coordinated by The Association for the Advancement of Sustainability in Higher Education (AASHE), which seeks to build a sustainable future (Fadzil, Hashim, Che-Ani and Aziz, 2012). STARS mission is to promote sustainability in higher education institutions through various sectors from governance and operations to curriculum and outreach through education, communication, research and professional development (Fadzil et al., 2012).

There is a weakness with a CSAF framework is it covers a wide range of indicators; the problem lies in inadvertently choosing indicators which may not suit the study (Er and Karudan, 2016). The disadvantage of STARS framework is that it is USA based and each institution is treated the same and each category has the same worth but subcategories are weighed (Sonetti et al., 2016). Even though there are weaknesses with these frameworks, the researcher modified these frameworks to suit the research. The researcher made use of CSAF,

STARS and Vanderbilt University theoretical framework as a theoretical guide to assist with achieving the research questions and objectives. The framework included the three pillars, which was the economy, environment and society and the sub elements of energy, water and waste.

The Three Spheres of Sustainability

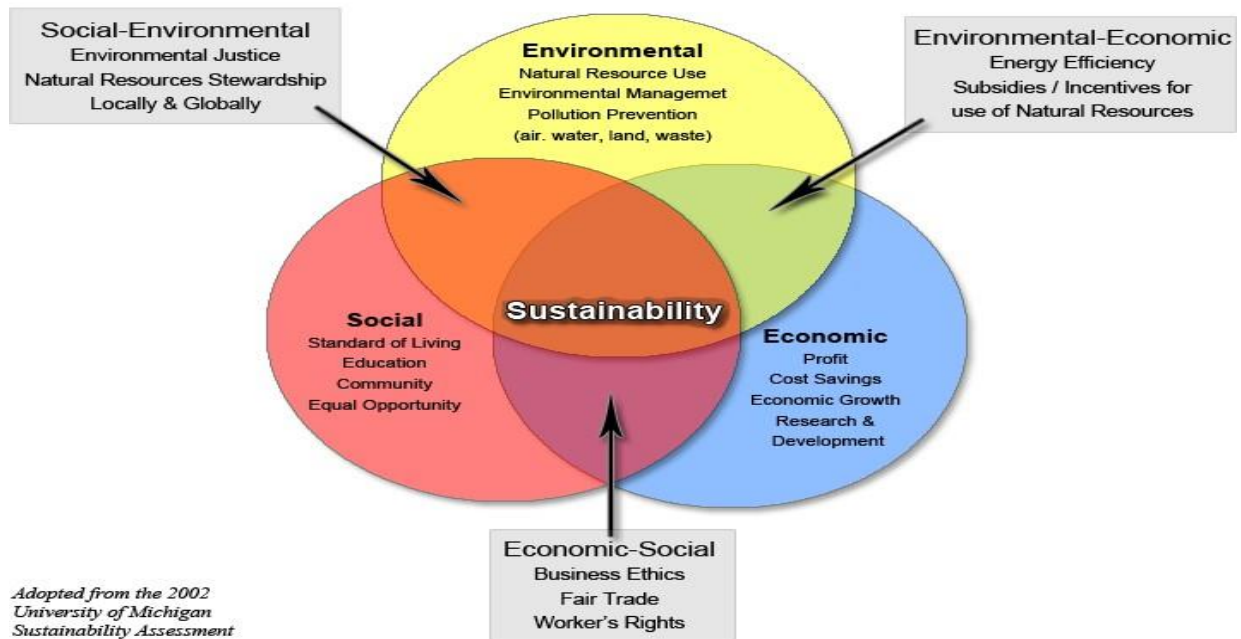


Fig 2.14.1 The Three Spheres of Sustainability (Vanderbilt University, 2017).

Fig 2.14.1 shows that the researcher made use of the theoretical framework that encompasses the three pillars, the environment, society and the economy. These three pillars will include water management, energy management, waste management, and its impact on the environment, economy and society.

This framework will be used for the research as a management system that helps to create a vibrant campus economy, respecting the needs and quality of life for humans and sustaining natural resources to protect the environment. The three pillars are interlinked and must work together to achieve departmental and institutional goals. This is not an individual effort but a team effort to protect and promote the economy, environment and society. At an environmental level it is important for campus management services to make sure that the natural resources are protected and utilized efficiently so that there is a continuity, rather than depletion, of resources. Efficient management of these resources can lead to improved

economy and growth within the institution. An improved economy can lead to employees being remunerated fairly, leading to job satisfaction, improved productivity and ultimately institutional success.

2.15 CONCLUSION

This chapter reviewed literature from the body of knowledge on the concepts of sustainability and sustainability development in detail. Literature on the three-pillar concept, which is the economy, environment and society, was discussed. The body of knowledge also contributed to literature for energy, water and waste and its impact on the economy, environment and society. The literature viewed sustainability in higher education institutions from a Global, African and South African context. Case studies from International, African and South African higher education institutions were used to illustrate how higher education institutions are managing their energy, water and waste and its impact on the economy, environment and society. Literature on the existing theoretical frameworks for sustainability initiatives and its impact on the environment, economy and society were viewed in the context of the study. The next chapter provides the research methodology under which this study will be conducted.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the research methods undertaken by the researcher to conduct the study. The researcher provided literature on the different research designs, methods and sampling strategies and then identified the appropriate design methods chosen with reference being made to the purpose for specific choices. The researcher then provided information on the respondents, the criteria used to select the respondents and how they were sampled. The different data collection methods were discussed and the researcher identified and motivated the instruments that were used for the purpose of the study. The researcher outlined the different procedures and the choices were motivated in line with the research matter. Lastly, the researcher discussed the techniques used to analyze the data and the ethical clearance procedures that were followed.

3.2 RESEARCH DESIGNS

There are different research designs for qualitative research such as ethnography, narrative, phenomenological, grounded theory and case study (Sauro, 2015).

3.2.1 Ethnography Method

In ethnography research, researchers try to be part of the target population's environment by understanding the goals, cultures, challenges, motivations and themes that emerge (Sauro, 2015). The target population would be to study a group that shares the same culture (Creswell, 2012). The sample size can be any number (Sauro, 2015).

As with any research, there are some challenges. Researchers have to have knowledge of the culture and the concepts of the research and it is important that they are trained in languages, interviewing methods, note taking, data collection methods and data analysis in order to avoid the collection of extensive unwanted material, resulting in a book rather than research material (Huddle, 2018).

3.2.2 The Narrative Method

The narrative method focuses on individual experiences, chains of events and how the individual stories relate to a larger audience (McAlpine, 2016). The sample size for the

narrative method is 1 or 2 and the data collecting method is the collecting of stories from individuals and documents (Sauro, 2015). The data collection method, done through in-depth interviews and document collection, identifies themes to analyze the story (Sauro, 2015).

There are some challenges to this method as extensive information needs to be collected so that there is a clear understanding; also, the right source of information needs to be identified to capture the stories of individual experiences and, so, avoid inconsistencies in narrating them (Cresswell, 2012).

3.2.3 The Phenomenological Method

The phenomenological method focuses on people who have experienced the phenomenon (Maxwell, 2013). A lot of emphasis needs to be placed on each participant's own perspective to provide information about the phenomenon (Sauro, 2015). The sample size is 5 to 25 and the data collection method is done by conducting interviews, watching videos, reading relevant documents and visiting places to better understand the responses collected (Sauro, 2015).

The limitations with this design is that it is time consuming and labour intensive (Janesick, 2010). It is important for researchers to understand these concepts before pursuing phenomenological research as there is large amount of data that needs to be analyzed (Hickman, 2015).

3.2.4 Grounded Theory

Grounded theory tries to find an explanation or build a theory behind the events (Sauro, 2015). The sample size for grounded theory is more than 20 and can be less than 60 and the data collection method is done by open-ended interviews (Sauro, 2015). Grounded theory is useful as the detailed information can help identify conflict and contradiction which, then, eliminates confusion in producing a theory, thus eliminating bias (Bryant and Charmaz, 2007).

3.2.5 Case Studies

Case studies were the first types of research that were used for qualitative methodology (Starman, 2013). A case study research method allows the researcher to examine the data within a specific context (Starman, 2013, Zainal, 2017). Case studies are used mainly in the social sciences, education, management, public administration and social work (Starman, 2013).

Starman (2013: 29) argues that “Most research methods texts either ignore case studies or confuse it with other types of social research” while Gerring (2004: 341) states as follows: “Case studies are therefore misunderstood as a type, as well as a method, of qualitative research”. Thus we can conclude that, even though case studies are popular, there are “inconsistencies” and doubts “in understanding their definition, subjects of investigation, and methodological choice (Verschuren, 2003: 121).

Creswell (2013: 96) defines a case study method as follows: “It explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information and reports a case description and case themes”. Yin (2009: 2) explains that a case study investigates a contemporary phenomenon within its real-life context. When the boundaries between the phenomenon and context are not clearly evident, then multiple sources of evidence are used.

The choice of method is dependent on the nature of the problem (Noor, 2008, Starman, 2013). Case study method allows the researcher to closely examine the data within that context (Starman, 2013, Zainal, 2017). Case study methodology is an ideal research tool to explore sustainability initiatives in higher education institutions (Corcoran, Walker and Wals, 2004, Gustafsson, 2017). This method is used to understand complex events through description and contextual analysis (Corcoran et al., 2004, Gustafsson, 2017). Case study can be both descriptive and theoretical and answers the questions how and why the event occurred and to explore other similar situations (Corcoran et al., 2004).

Yin (2014) indicates that single case studies can be appropriate if the aim of the research is to explore a study that has not been researched. A case study research method selects a limited number of individuals within a geographical area for specific research (Gustafsson, 2017, Zainal, 2017). According to Zainal (2017), the case study design must have the appropriate questions relating to the incident, the evidence must be either qualitative or quantitative, the format must be in line with the research study and the interviews must be properly stored as this is the main source of data. The case study must be linked to the theoretical framework (Zucker, 2009).

Case studies are useful as they are flexible and can be conducted at various points of the research process (Gustafsson, 2017). They are used in pilot studies so that the researcher can

identify whether this research should continue or whether it is feasible to conduct new research in the future (Murphy, 2012). There are limitations with case study research in that the findings cannot be generalized (Gustafsson, 2017, Murphy, 2012). The researcher must make sure that the case study sites are chosen carefully and to see whether the analysis ties in with the research findings that have been generated via other research designs (Yin, 2009). It is important for the researcher to describe and explain the social phenomenon because, without correct interpretation, the research findings can lack meaningful presentation (Gustafsson, 2017, Stake, 2005).

The researcher did not make use of the narrative research design as the sample size was more than 2 participants and the research did not focus on individuals narrating individual stories. The researcher did not make use of ethnography research, as this research is not about studying groups of people sharing the same cultures. Grounded theory design would not suit this study as the research does not focus on generating a theory. Phenomenology research design focuses on a phenomenon by studying several individuals who have shared the 'essence of the experience' and is not applicable for this research. The researcher used the case study design as this method was best suitable to explore the research objectives and, furthermore, the research concentrated on a case study of UKZN CMS which is a single institution (Yin, 2014).

Yin (2014) states that there are three forms of case study research: exploratory, explanatory and descriptive.

3.2.5.1 Exploratory Research

Exploratory research helps the researcher to explore the research questions in order to better understand the research problem (Dudovskiy, 2016, Stebbins, 2001). This does not offer final solutions to the problem (Dudovskiy, 2016). Exploratory research is useful as it is flexible and adaptable to change, effective in laying the groundwork that will lead to future research and saves time and other resources by determining, at an early stage, the type of research that is worth pursuing (Dudovskiy, 2016, Stebbins, 2001). The limitations to exploratory research is that the interpretations can become biased, the samples may not represent the target population, it is difficult to generalize the findings to a wider population, and the findings will not be appropriate to make decisions at a decision making level (Dudovskiy, 2016).

3.2.5.2 Explanatory Research

Explanatory research focuses on analysing the problem and explains the pattern of relationships between the variables (Dudovskiy, 2016, Yin, 2011). The data collection method is accomplished mainly by experiments (Cornelissen, 2017). Explanatory research is useful as the researcher is able to explain the reasons as to why certain processes are undertaken and what their impact might be; and, should there be changes, the researcher would be able to explain them (Dudovskiy, 2016). The limitations of explanatory research are that it is difficult to arrive at a correct conclusion on the findings due to a number of factors and variables in the social environment and that the results can be coincidental and cannot be proved with a high level of certainty (Dudovskiy, 2016).

3.2.5.3 Descriptive Research

Descriptive research is used in surveys to describe a characteristic or behaviour of the target population and the data collection method is done through close-ended questionnaires (Dudovskiy, 2016, Lambert and Lambert, 2012). The information gathered is quantifiable and this method is used to measure the strength of the target group's opinion, attitude or behaviour regarding the research matter (Dudovskiy, 2016, Nassaji, 2015). Descriptive studies can be done through surveys, observation and case studies (Nassaji, 2015). A limitation of descriptive research is that it cannot test or verify the research problem statistically, resulting in the research becoming biased (Dudovskiy, 2016). Furthermore, the research cannot be repeated as it is done by observing the phenomenon, which makes it difficult to ensure validity (Dudovskiy, 2016).

Explanatory research is not suited for this research study as it is done mainly through experiments and does not entail experiments. Descriptive research was not considered as the data collection method is done by close-ended questionnaires. The researcher used a case study exploratory research design as this method was best suited to explore sustainable initiatives managed by UKZN Campus Management Services (Cocoran et al., 2004, Yin, 2014).

3.3 RESEARCH METHODS

Qualitative and quantitative methods are two methods used for the collection of data (Bricki and Green, 2007, Kura and Sulaiman, 2012).

3.4 QUANTITATIVE METHODS

Quantitative research is a means of testing objective theories by examining the relationship among variables (Polit, Beck and Hungler, 2006). The quantitative method makes use of numbers, which are scales of measurement of units called variables used to generalize matters concerning a phenomenon (Hopkins, 2008). Research findings can be captured and analyzed by using a software package (Hopkins, 2008). Quantitative research generates figures and statistics through large-scale survey research and is based on the measurement of quantity or amount (Kumar, 2011, Laws, Harper, Jones and Marcus, 2013). Sometimes research can include the qualitative and quantitative method which focuses on a case study but uses numbers as part of the research (Corcoran et al., 2004, Kura and Sulaiman, 2012). Quantitative research is useful in gathering empirical data and the findings can help one gain a better understanding of the research (Klazema, 2014).

There are four types of quantitative methods used for research. They are descriptive, correlational, quasi experimental and experimental (Ingham-Broomfield, 2014).

3.4.1 Descriptive Method

A descriptive method describes the status of the event and the hypothesis is only developed after the data is collected (Grand Canyon University, n.d, Ingham-Broomfield, 2014). The data collection method is by observation and surveys (Grand Canyon University, n.d, Ingram-Bromfield, 2014, Sukamolson, 2007). The sample size is randomly selected and this allows for accurate findings across a randomly selected sample (Grand Canyon University, n.d, Ingram-Bromfield, 2014).

3.4.2 Correlational Method

The correlational method is a survey method which is used to determine correlations between two or more variables (Ingham-Broomfield, 2014, Jhangiani, Chiang and Price, 2015). The data collection method is by observation and the sample size is random (Grand Canyon University, n.d, Ingram-Bromfield, 2014).

3.4.3 Quasi-Experimental Method

The Quasi Experimental design is to identify a cause-effect relationship between two or more variables, the sample size is identified and exposed to the variables and the results are compared to groups not exposed to the variables (Grand Canyon University, n.d Ingram- Bromfield,

2014). The sample is chosen accidentally or by convenience and the data collection method is by observation and questionnaire (Grand Canyon University, n.d, Ingram-Bromfield, 2014).

3.4.4 Experimental Method

The experimental method focuses on experiments using scientific methods to identify the cause/effect and relationships among groups of variables, the sample size being randomly selected (Grand Canyon University, n.d, Ingram-Bromfield, 2014). The experimental research is guided by hypothesis (Klazema, 2014).

3.5 QUALITATIVE METHODS

Roller and Lavrakas (2015: 2) describe that

...qualitative research is about making connections. It is about understanding that good research involving human beings cannot be anything but complex, and that delving beyond the obvious or the expedient is a necessary tactic in order to understand how one facet of something adds meaning to some other facet, both of which lead the researcher to insights on this complexity.

The data collected for qualitative research is mainly through case studies, interviews, observations and videotapes (Hamilton and Finley, 2019). Qualitative research makes use of a small sample size selected for the purpose of the research study, whereas quantitative research makes use of a big sample size (Atieno, 2009). The data extracted from qualitative research is not quantifiable (Entrepreneur Handbook, 2018). Qualitative research enables active participation and interaction, which then enable the researcher to get a better understanding of the respondent's behaviour and the phenomenon being studied (Hamilton and Finley, 2019). In qualitative research the data is easily generated and easy to understand and interpret (Atieno, 2009). This, consequently, helps the researcher to identify the strengths and weaknesses of the research (Entrepreneur Handbook, 2018).

There are shortcomings with qualitative research in terms of reliability and validity in the findings and the one way to overcome these shortcomings, and thus increase the validity of the findings, is to choose purposive sampling and to make sure there is no bias in the way the data is collected and analyzed. The researcher can further ensure validity by trying to identify themes and patterns and to test for hypotheses (Entrepreneur Handbook, 2018). Another method to test for validity is to make use of the triangulation method to establish comparisons

and similarities, which can then increase validity (Hamilton and Finley, 2019). Ethical issues become prevalent in qualitative research and the two main issues that researchers face are invasion of privacy and ensuring the confidentiality of their findings (Atieno, 2009). Sometimes respondents try to give safe answers for protection, which can then reduce the validity of the findings (Entrepreneur Handbook, 2018). Researchers can overcome this problem by not informing respondents that they are part of a research study, which will then encourage the respondents to speak freely about the subject, thereby increasing the validity of the findings (Hamilton and Finley, 2019).

The researcher chose qualitative method instead of quantitative method to gather the data as the research required in-depth information and explanations and, furthermore, the sample size was small. Quantitative research is used mainly to generate figures and numbers through large scale survey research.

3.6 STUDY SITE

UKZN comprises five campuses, which are Edgewood, Howard College, Medical School, Pietermaritzburg and Westville (University of KwaZulu-Natal, 2017). The CMS services fall under the Institutional Planning and Governance (IPG) unit. Although CMS is located on all campuses, the researcher concentrated the research within the Pietermaritzburg campus as the services offered by CMS are centralized to all campuses and the researcher identified the sustainability initiatives for all campuses during the interviews. The Pietermaritzburg Staff composite is comprised of 99 full time employees. The full time Staff is made up of Garden and Grounds employees (35), Cleaning employees (49) and Admin employees (15). The management Staff for the Pietermaritzburg campus is made up of 12 employees.

3.7 TARGET POPULATION

A research population is a group of people chosen by the researcher to carry out research (Asiamah, Mensah and Oteng-Abayie, 2017). Because researchers cannot test every individual in the population - it is time consuming and expensive - most make use of sampling techniques (Explorable.com, 2009). There are two types of population: target and accessible population. Target population refers to the entire group of individuals so that researchers are able to generalize their findings (Explorable.com, 2009). Accessible population is the target population within that population which researchers target for their samples so that they are able to draw their conclusions from the findings (Explorable.com, 2009). The researcher

targeted the accessible population, which was the management staff of CMS, for the research study. The Pietermaritzburg campus is made up 99 full time staff and only 12 members of staff are in management and senior positions.

The researcher made use of total population sampling as it involves all the respondents within that target population of interest and this allows the researcher to get a deep insight into the phenomenon of interest (Lund Research Ltd, 2012).

3.8 SAMPLE

A sample is a subset of people from a larger population that is used to collect and analyse data for research purposes (Unite for Sight, 2000). The sample itself is selected from a section of the target population that is accessible to the researcher, which is the study population (Asiamah et al., 2017). It is important to show that the selected sample is representative of the target population with regards to the demographic and other relevant characteristics that may affect the outcome of the study (Omair, 2014). It is important to obtain the relevant demographic and background information from the respondents to demonstrate that they are representative of the target population (Omair, 2014).

The CMS is made up of full time and part time Staff. The Staff composite for CMS for all campuses is 528. The Pietermaritzburg Staff composite is comprised of 99 full time employees. The Staff is made up of Garden and Grounds employees (35), Cleaning employees (49) and Admin employees (15). The management Staff for the Pietermaritzburg campus number 12 employees. The researcher selected management and senior staff responsible for the management of energy, water and waste which totalled 12 employees.

Table 3.8.1 Summarizes the demographic details of the UKZN key informants as research respondents in the current study.

Study site	Participants (N=11)	Position held
Howard Campus	1	Manager - Sustainability
Howard College	1	Senior Staff – Energy Section
Howard College	1	Director of Campus Management Services
Westville Campus	1	Director of Infrastructure, Planning & Projects Units
Pietermaritzburg Campus	1	Buildings Manager
Pietermaritzburg Campus	1	Energy Manager
Pietermaritzburg Campus	1	Grounds Manager
Pietermaritzburg Campus	1	Senior Staff
Pietermaritzburg Campus	1	Senior Staff
Pietermaritzburg Campus	1	Water Manager
Pietermaritzburg Campus	1	Senior Staff – Water Section
Pietermaritzburg Campus	1	Senior Staff, Waste management

As the research requires rich, in-depth information on the research objectives, the respondents chosen and displayed in Table 3.8.1 were in management and senior positions. They managed specific areas relating to the research and, those who were in positions to do so, provided rich detailed information in line with the research objectives. The research was qualitative and the chosen number suited the aims of the research. To have included more respondents may not have added value to the research as the research would have reached a saturation point with the information becoming repetitive, redundant and time consuming (Saunders, Sim, Kingstone, Baker, Waterfield, Bartlam, Burroughs and Jinks, 2018).

3.9 SAMPLING AND SAMPLING SIZE

According to Trochim and Donnelly (2001), sampling is a process of selecting samples from the target population to carry out research by people who have an interest in the research. Sample size refers to the chosen people as they contribute and add value to the research (Bricki and Green, 2007). A sample must be representative of the target population so that the findings are more or less accurate and, also, so that any significant differences that are present in the target population may be identified (Omair, 2014). Sampling makes research more accurate and economical, and it is the sampling method which actually determines the generalisability of the research findings (Showkat and Parveen, 2017).

3.10 SAMPLING METHOD

The choice of sampling strategies will depend on the aims and objectives of the research (Blackstone, 2012). There are two types of sampling techniques that can be used to select a sample: probability sampling and non-probability sampling (Showkat and Parveen, 2017).

3.11 PROBABILITY SAMPLING

In probability sampling, also known as random sampling, each person has an equal opportunity of being chosen (Showkat and Parveen, 2017). For example, if there are 500 students at a university, a method is adopted to include the 500 students to participate in the research, implying that each person has an equal chance of being chosen (Foley, 2018). In probability sampling the researchers create a sample that is accurately representative of the real life population of interest (Dudovskiy, 2016).

Probability sampling has benefits such as the absence of systematic errors, fewer errors in terms of bias, a high level of reliability in terms of the research findings and, also, the findings can be generalized to a large sample (Dudovskiy, 2016). The limitations of probability sampling is that it is more complex, more time consuming and, usually, more expensive than non-probability sampling (Dudovskiy, 2016).

There are different types of probability sampling such as simple random sampling, systematic random sampling, stratified random sampling and cluster random sampling, each of these techniques having unique characteristics (Showkat and Parveen, 2017).

3.11.1 Simple Random Sampling

Simple random sampling is highly representative of the target population and the findings can be generalized to a wider population which can be externally validated (Lund Research Ltd, 2012, Statistics How To, 2018).

3.11.2 Systematic Random Sampling

Systematic random sampling is an improvement on simple random sampling and this method requires complete information of the target population (Etikan and Bala, 2017). This method is very useful as the sample selected is highly representative of the population, is less costly, more time efficient and is suitable for the collection of data from geographical dispersed areas that do not require face-to-face interviews (Statistics how To, 2018, Dodovski, 2016).

3.11.3 Stratified Sampling

Stratified sampling divides the population into sub-groups, called strata, which are more homogenous with the population (Etikan and Bala, 2017, Showkat and Parveen, 2017). For example, the administration of colleges can be divided into academic and non-academic staff (Etikan and Bala, 2017, Showkat and Parveen, 2017).

3.11.4 Cluster Random Sampling

Cluster random sampling is an efficient method of selecting the sample randomly and the population is divided into clusters (Showkat and Parveen, 2017). Cluster random sampling is useful as it is convenient, easy to use, increases the levels of efficiency in sampling, less costly, time efficient and suitable for a large geographical area (Statistics how To, 2018, Dudovski, 2016).

3.11.5 Multi Stage Random Sampling

Another random sampling is multi-stage sampling, which uses various techniques (Acharya Prakash, Saxena and Nigam, 2013). The target population is divided into groups at various levels - a group within a group within a group (Showkat and Parveen, 2017). This research is very useful for gender issues covered by the newspapers (Showkat and Parveen, 2017).

The researcher did not use probability sampling as this is a random sampling method. Probability sampling techniques are more useful in quantitative research than qualitative

research as the sampling methods make use of numbers and statistical information for a large sample size (Kura and Sulaiman, 2012).

3.12 NON-PROBABILITY SAMPLING

In non-probability sampling, also known as non-random sampling, not every person of the population has a chance to participate in the research (Dudovskiy, 2016). This method chooses respondents because they are easy to access, for example, colleagues and friends (Showkat and Parveen, 2017). According to Blackstone (2012), people are selected based on the judgment of the researcher. Non-probability sampling may not include a large population but that does not mean that the research will not be realistic or cannot be validated. Non- probability sampling is mainly used in the exploratory stages, such as in pilot surveys (Dudovskiy, 2016).

According to Dudovskiy (2016), non-probability sampling is useful as it is convenient and saves money and time. The limitations of this sampling technique are that the lack of samples could lead to bias, thereby making it difficult to generalize the research findings as compared to probability findings (Dudovskiy, 2016). This is further argued by Showkat and Parveen (2017) who state that the findings would apply to a specific research study and specific samples would not be appropriate to generalize the research findings to other samples. One important aspect of the non-probability method is that it helps to study the phenomenon of interest in detail and to gain a deep understanding, which can then be used for new research or to study theoretical insights (Showkat and Parveen, 2017).

There are several types of non-probability samples that can be used to select samples, such as quota sampling, accidental sampling, purposive sampling, expert sampling, snowball sampling, modal instant sampling and heterogeneity sampling (Etikan and Bala, 2017).

3.12.1 Quota Sampling

In quota sampling the researcher selects respondents from the target population guided by some characteristics such as age, race and sex (Etikan and Bala, 2017, Showkat and Parveen, 2017). This quota sampling method is useful as it accounts for potential relevant variation of the study but would not work if the strategy is to generate statistical findings (Blackstone, 2012). The limitation of this method is that the research is based on specific characteristics such as age, gender, religion, etc., and is not interested in having a sample size to represent the target population (Etikan and Bala, 2017). This sampling method did not suit this research and its

objectives as the sample is guided by certain characteristics such as age, race, gender and sex.

3.12.2 Accidental Sampling or Convenience Sampling

Accidental or convenience samples maybe selected as they just happen to be situated conveniently or administratively where the data collection is being conducted (Acharya et al., 2013). Convenience sampling is useful in that it is easy, less costly, time efficient, and the respondents are easy to access (Acharya et al., 2013). The limitation of this sampling technique is that it is neither purposeful nor strategic and can be biased (Etikan, Musa and Alkassim, 2016). This sampling method did not suit this research study because the study's aim was, in fact, to target respondents in management and senior positions, not to select a sample because of convenience.

3.12.3 Purposive Sampling

Purposive sampling occurs when “elements selected for the sample are chosen by the judgment of the researcher and researchers often believe that they can obtain a representative sample by using a sound judgment which will result in saving time and money” (Dudovskiy, 2018: 1, Guarte and Barrios, 2004). It is a non-random technique that does not need underlying theories or a set number of respondents; the researcher simply decides what needs to be known and sets out to find respondents who are willing to provide information by virtue of knowledge and experience (Etikan et al., 2016, Guarte and Barrios, 2004). It is mainly used in qualitative research in order to identify and select the respondents who can provide detailed rich information by making use of the available resources efficiently (Etikan et al., 2016). In addition to knowledge and experience the respondents must be available and willing to participate in the research (Etikan et al., 2016).

Purposive sampling is less costly and more time efficient and appropriate when there are a limited number of primary sources of data to contribute to this research (Dudovskiy, 2018). The limitations of this method are that it is susceptible to errors, low levels of reliability, high levels of bias and the inability to generalize the findings (Dudovskiy, 2018).

There are different purposive sampling methods.

3.12.3.1 Maximum Variation Sampling

This sampling method involves selecting respondents across a broad spectrum and

heterogeneous in nature (Benoot, Hannes and Bilsen, 2016). This type of sampling is useful when random sampling is not used because the sample size is small (Etikan et al., 2016). As this sampling technique focuses on a broad spectrum and sample, it was not suitable for this particular research.

3.12.3.2 Homogeneous Sampling

This type of sampling focuses on similar traits or specific characteristics such as age, culture, jobs, life experiences and the aim is to focus on precise similarities and how it relates to the research study (Etikan et al., 2016). This sampling technique was not suitable for this research as it focuses on specific traits or characteristics and the researcher would not be able to achieve the research objectives by using this method.

3.12.3.3 Typical Critical Sampling

This sampling method deals with large programmes and sets a standard in choosing respondents who have similar characteristics (Etikan et al., 2016). This purposive sampling technique was not suitable for this research as it deals with large programmes with similar characteristics.

3.12.3.4 Extreme/Deviant Case Sampling

This sampling method focuses on individuals who are unusual and this method is used by researchers to develop 'best practice guidelines', for example, in a research on heart surgery patients to identify the time of recovery, the researcher would research individuals who recovered faster or slower and the variations would be recorded as unusual (Etikan et al., 2016). The purposive sampling technique was not suitable for this research as this technique focuses on developing best practice guidelines through sampling unusual individuals; unusual sampling is not required for this research study.

3.12.3.5 Critical Case Sampling

This sampling method is very popular in the initial stages of the research and helps the researcher to identify whether or not the research needs to be continued in depth (Etikan et al., 2016, Suri 2011). This purposive sampling technique was not useful for this research as this sampling technique selects groups to identify the problems in that group and whether or not the same problem relates to similar groups.

3.12.3.6 Expert Sampling

This sampling is very useful as the samples selected would be experts in a particular field (Suri, 2011). This purposive sampling technique was not useful for this research as samples are selected based on expertise. It does not entail sampling experts but participants who have knowledge and experience in the area of the research study.

3.12.3.7 Total Population Sampling

Total Population Sampling is a type of purposive sampling technique that involves the entire target population who has particular characteristics, specific attributes, traits, experiences, attitudes, knowledge and skills about the phenomenon of interest (Statistics How To, 2018). Researchers use total population sampling when there is an interest in a research matter and the characteristics are not common (Lund Research Ltd, 2012). It covers a wide population of interest thereby reducing the risk of missing potential information from participants not included (Lund Research Ltd, 2012). The limitations of this technique are that the researcher has to get a list of the target population from the sampling frame by which the sample is being selected (Lund Research Ltd, 2012). Furthermore, it is time consuming and challenging and often the list does not exist (Statistics How To, 2018). Total population sampling is a type of non-probability sampling which makes it difficult to generalize the findings of the sample being studied (Lund Research Ltd, 2012).

3.12.3.8 Snowball Sampling

Snowball sampling uses networks so that, when the researcher knows little about a group or an organization of study, contact with a few individuals would direct the researcher to other groups (Suri, 2011). The method is useful for communicating knowledge to the individuals so that they are able to make informative decisions but the limitation of this method is that the choice of the target sample can be individuals who belong to certain cliques and, thus, can be susceptible to errors (Etikan and Bala, 2017). This method was not suitable for this research as the researcher identified and selected participants who were useful for the study.

The researcher used non-probability total population sampling, which is a type of purposive sampling technique to select all the respondents. This sampling method allowed the researcher to explore the research subject in-depth, using qualitative research methods (Lund Research Ltd, 2012). The Staff composite in the Pietermaritzburg Campus is comprised of 99 full time staff members and only 12 staff members are in management and senior positions. The

researcher chose all the respondents who were in management and senior positions as they had the experience, knowledge, skills and attributes and were willing to share information, all of which added value to the research.

3.13 DATA COLLECTION

There are various data collection techniques, like observation, archival records and interviews that can be used to collect data (Cln, 2013).

3.13.1 Observation

Observation is a data collection method which entails a systematic way of observing the behaviour, events or physical characteristics of the respondents (Walshe, Ewing and Griffiths, 2012). Observation is a useful way of collecting data when the respondents are not very cooperative or when the researcher is more interested in respondents' behaviour than in their perceptions (Kawulich, 2012). The limitations of this data collection method are that the method is susceptible to errors: it can be biased, time consuming and expensive and people perform better when being observed (Sulthan, 2017).

3.13.2 Archival Records

Archival records allows data to be collected by organization and these records are archived (Harrell and Bradley, 2009). This method is useful as the research is low cost, can be highly accurate, often good to moderate validity, usually allows for historical comparisons or trend analysis and allows for comparisons with larger populations (SAMHSA, 2017). The limitations of this data collection method are the following: it may be difficult to access local data, some data may be outdated, training would be needed to assess records for validity, data may not be required for research and, also, it may not provide a complete picture of the situation (SAMHSA, 2017).

3.13.3 Interviews

Interviews are the most common source of gathering information about a research of interest (Tellis, 1997). According to Yin (2009), there are three types of interviews to collect data: focused interviews, formal survey interviews and in-depth interviews.

3.13.3.1 Focus Group Interviews

Focus group interviews are structured interviews with small groups of similar individuals

where the questions are standardized and follow-up questions are used to explore and gain a better understanding of the research subject (Harell and Bradley, 2009). The data collection method is useful as it is low cost and rapid (SAMHSA, 2017). The limitations of this data collection method are that it is time consuming to assemble groups and difficult to collect sensitive information; also, findings can be biased, it may be difficult to analyze and generalize the findings, accuracy can be limited and difficult to specify, there is less control over process than key informant interviews, and it requires trained facilitators (SAMHSA, 2017). This data collection method was not suitable for this research as the sample size was small and, also, it was beneficial to conduct face to face interviews.

3.13.3.2 Formal Survey Interviews

In the formal survey interview method, the interviews are more structured and the questions are predetermined (Harell and Bradley, 2009). This collection tool is useful as it is highly accurate and, therefore, can be reliable and valid with quantitative data being easily generated (McLeod, 2014). The limitations of this data collection tool are that it is expensive, accuracy depends on how many people are being interviewed, there can be low response rates and there is little opportunity to explore in-depth issues (McLeod, 2014). This collection method was not suitable for this research as it is structured and the questions are pre-determined, thereby not allowing the researcher to probe for in-depth rich detailed information.

3.13.3.3 In-Depth Interviews

In-depth interviews can be done over an extended period where the researcher tries to gather information and facts, as well as the respondent's perception, relating to that phenomenon or event (Yin, 2009). There are different in-depth interviews: structured in-depth interviews, unstructured in-depth interviews and semi-structured in-depth interviews.

Structured in-depth interviews entail a pre-determined list of questions: the questions are outlined as open questions, allowing the respondent to talk freely about the subject of interest (Gill, Stewart, Treasure and Chadwick, 2008). The researcher did not make use of structured interviews as, with a pre-determined set of questions, the data is unlikely to go beyond the researchers own categories.

Unstructured in-depth interviews are called open-ended interviews (Harvey, 2012). The interviewer has no predetermined set of specific questions and the respondent is encouraged to

talk about particular areas that are of interest to the researcher (Gill et al., 2008). The aim of this research is to allow the respondents to talk freely as to what they perceive is important (Harvey, 2012). This data collection method was not suitable for this research as the research questions are unstructured and there was a possibility that the respondents could deviate from the research subject.

Semi-structured in-depth interviews entail that the researcher has a list of questions pertaining to the research and allows the respondents to talk freely so that the researcher can get a better understanding of the research subject and the possible responses (Gill et al., 2008). The researcher normally prepares a set of questions but, with in-depth semi-structured interviews, the questions are not in a given order and the respondents are allowed to converse freely (Harvey, 2012, Longhurst, 2009). These interviews are not always truthful but they offer an insight into what people do and think (Longhurst, 2009). According to Noor (2008) and Harvey (2012), semi-structured interviews are more beneficial than structured interviews as they allow for flexibility. Each respondent would approach the same question differently, thereby adding value to the research.

The researcher used in-depth semi-structured interviews to interview the respondents. The researcher was able to gather rich detailed information from the respondents about the research in a conversational manner. The questionnaires were physically given to the respondents well in advance so that they were able to engage with the interview questions before the interview to enable well thought-out responses. The interviews were recorded with the approval of the respondent so that important information was not lost (Yin, 2009). This recording was filed for easy reference (Yin, 2009). The sampling number suited the researcher to conduct face-to-face interviews with the respondents, who were able to provide rich information, and the interviews allowed them to freely express their views, ideas, knowledge, experiences and perceptions about the research (Sekaran, 2003).

3.14 DATA QUALITY CONTROL

The researcher used in-depth semi-structured interviews, an audio voice recorder and a notebook to collect the data so that the data is credible, consistent, applicable and confirmable (Baxter and Jack, 2008, Bricki and Green, 2007).

3.15 RELIABILITY AND VALIDITY

To ensure high quality and trustworthy results, validity and reliability are the two main factors the researcher has to be concerned about when designing the study (Golafshani, 2003). Validity in qualitative research means the “appropriateness” of the tools, processes, and data (Leung, 2015). Reliability is “the consistency of the analytical procedures, including accounting for personal and research method biases that may ... influenc[e] the findings” (Noble and Smith, 2015: 34). Validity in qualitative research is associated with the truth-value and it is important to have the appropriate research design, research questions, sampling, and data analysis so that the findings and conclusions are valid for the research subject (Leung, 2015). Reliability and Validity have to do with the concept of credibility, consistency, applicability and confirmability (Golafshani, 2003, Noble and Smith, 2015). It is important to have strategies in place to ensure that the research is reliable and valid. One of the shortcomings of qualitative research is bias, which can adversely affect the truthfulness of findings, but the researcher will make use of the concepts of credibility, consistency, applicability and confirmability to reduce any bias in the findings (Noble and Smith, 2015). Patton (2014) argues that it is important for the researcher to make sure that the interview is in line with the research so that the analyzed data reveals the purpose of the research, which can help with reliability and credibility.

There are different types of validity that researchers make use of in research: construct validity, internal validity, external validity and reliability (Baskarada, 2014).

3.15.1 Construct Validity

Construct validity ensures that the correct measures are used for research (Baskarada, 2014). Construct validity in case study research can be challenging as it deals with the concept of operationalization, which is a process of defining the concept through a set of attributes in order to make it measurable through empirical observations (Loseke, 2012). According to Baskarada (2014: 8) there are many threats to construct validity, such as

...inadequate explication of constructs, construct confounding, mono-operation bias, mono-method bias, confounding constructs with levels of constructs, treatment sensitive factorial structure, reactive self-report changes, reactivity to the experimental situation, experimenter expectancies, novelty and disruption effects, compensatory equalization, compensatory rivalry, resentful demoralization, and treatment diffusion.

According to Yin (2009) there are strategies to improve construct validity, such as including multiple sources of evidence by having key informants review the case study report, maintain a chain of evidence and employ multiple sources of evidence, all of which can contribute to increased construct validity and provide multiple measures of the same phenomenon. This is further argued by Baskarada (2014) who is of the opinion that the corrections made thorough reviews by key informants may enhance the accuracy of the case study as well as identify a range of competing perspectives.

3.15.2 Internal Validity

Internal validity ensures that certain conditions lead to other conditions and that the use of multiple pieces of evidence from multiple sources uncovers the phenomenon or events (Baskarada, 2014, Soy, 1997). Internal validity applies mainly to explanatory studies and not to descriptive or exploratory case studies (Baskarada, 2014). The threats to internal validity include “ambiguous temporal precedence, selection history, maturation, regression, attrition, testing, instrumentation and additive and interactive effects” (Baskarada, 2014: 8, Drost, 2011). According to Baskarada (2014), the use of methodological and data source triangulation can lead to increased validity. Data validity can be further increased when one set of data is verified against another set of data. Many researchers make use of the triangulation approach. “Triangulation is a strategy test to improve the validity and reliability of the research or evaluation of findings” (Golafshani, 2003: 603).

3.15.3 External Validity

External validity reflects whether or not the findings are generalized and if multiple sources of evidence result in the same findings (Soy, 1997, Baskarada, 2014). The threats to external validity include “the interaction of the causal relationship with units, interaction of the causal relationship over treatment variations, interaction of the causal relationship with outcomes, interaction of the causal relationship with settings, and context dependent mediation” (Baskarada, 2014: 8). Yin (2009) argues that the use of one case is similar to the use of one experiment in the sense that neither one is sufficient to reject or disprove propositions, nor are several experiments necessary to demonstrate the accuracy of a theory. In other words, case studies like experiments are generalizable to theoretical propositions and not to populations or universities (Baskarada, 2014). “Case study like experiments do not represent a sample and the researcher’s goal is to expand and generalize theories (analytical generalization) and not to compute frequencies (statistical generalization)” (Yin, 2009: 10). Halkier (2011) further argues

that the methodological literature provides little agreement regarding how exactly analytical generalization may be achieved.

3.15.4 Reliability

Reliability is concerned with demonstrating that the same results can be obtained by repeating the data collection procedure, in other words, other researchers should in principle be able to follow the same procedures to arrive at the same results (Baskarada, 2014). Two strategies for ensuring reliability in case studies include the creation of case study protocol and the development of a case study database (Yin, 2009). The case study protocol contributes to the reality of standardizing the research, which may include an overview of the project, field procedures, guiding questions and a report outline (Baskarada, 2014). Data quality is also an important criterion which relates to accuracy, objectivity, believability, reputation, interpretability, ease of understanding, concise and consistent representation, relevancy, value-added timelessness, completeness of information, accessibility and access security (Baskarada, 2014). In addition to these dimensions, data may become corrupted during collection, transmission, storage, integration, retrieval and analysis (Baskarada, 2014).

A pilot test is a mini version of the research conducted in preparation for a full-scale research and is conducted to pre-test the research instrument (Dikko, 2016). Pilot studies are useful in quantitative and qualitative research (Dikko, 2016). Pilot studies help to deflect flaws in the measurement instrument and, also, assist in the pre-testing of a small number of respondents whose characteristics are the same as the main study (Dikko, 2010). A pilot test of questions helps to identify unclear and ambiguous statements in the research and, therefore, can add credibility to the research (Dikko, 2010, Turner III, 2010). The pilot study, by identifying potential problems and areas that may require adjustments, would aid in ascertaining how well a research instrument would work in the actual study (Dikko, 2016, Turner III, 2010).

The researcher conducted a pilot study on 5 operations managers from five different schools within the UKZN Pietermaritzburg campus to ensure reliability in terms of accuracy and interpretability, to gauge whether or not the questions were easy to understand and to see if they were arranged in a consistent way. The researcher conducted a pilot study at CMS to ensure validity.

The researcher made sure that the research was credible by making sure that the transcribed

information was correctly documented (Noble and Smith, 2015). The findings were supported with literature on similar studies to ensure that the research may be credible. The information from the respondents were transcribed and sent to the respondents to confirm that the transcript information was a true reflection of their input. The researcher had to be consistent with the research process and initial outline through the development of the methods and reporting of findings (Noble and Smith, 2015).

3.16 DATA ANALYSIS

Analysing a case study is not easy as the case study database will include different evidence from different sources (Roller, 2017, Rowley, 2002). Case study involves a detailed description of the respondents followed by an analysis of the data for themes or issues about the research study (Cresswell, 2014). Data is rich and dense and not all of it would be used in the research (Roller, 2017, Thorne, 2000). The researcher focused only on the relevant data (Cresswell, 2014). Data Analysis is analysing the data, using analytical strategies to transform raw data into knowledge applicable for the specific research (Roller, 2017, Thorne, 2000).

According to Yin (2014: 132), “analytical strategies are relying on theoretical prepositions, working your data from the ground up, developing a case description, and examining plausible rival explanations”. There are also different techniques used to sort the data such as pattern matching, explanation building, time series analysis, logic models and cross case synthesis (Yin, 2014). A software programme such as Microsoft Excel should be used to save, sort and code the information and this is a good means to store and locate the data (Cresswell, 2014). The software programme, Microsoft Excel, also helps the researcher to identify whether respondents are responding to the questions in a similar or different way (Cresswell, 2014). It is important to make sure that the data collected is analyzable (Yin, 2014). It is important for the researcher to read and understand raw data so that the findings can be well interpreted (Thorne, 2000, Vosloo, 2014). Researchers have identified that the manner and the sequence in which raw data is collected and analyzed is the key to a rich or poor research (Thorne, 2000, Vosloo, 2014).

An analytical framework should be developed to reflect the themes and the data gathered should be relevant to these themes. Thereafter the data should be analysed and compared to see if it is validated from multiple sources of evidence (Rowley, 2002, Vosloo, 2014). The analysis should include all the relevant data and take into account any opposing data as well as the

researcher's prior knowledge in the area of this research (Rowley, 2002, Vosloo, 2014). The framework can include key issues, concepts and themes in line with the research questions (Spencer and Ritchie, 2002, Vosloo, 2014). The construction of the framework must be clearly defined and there must be a systematic approach to sift, chart and sort out the materials according to issues, concepts and themes (Spencer and Ritchie, 2002, Vosloo, 2014).

Qualitative content analysis is a technique that can be used to analyze data through content and themes (Vaismoradi, Jones, Turunen and Snelgrove, 2016, Vosloo, 2014). There are three different phases in the analysing of the data. In the preparation phase, the researcher will collect the relevant data required for the research (Elo, Kaarianen, Kanste, Polkki, Utriainen and Kyngas, 2014). In the organization phase, the themes and codes will be used to create categories (Elo et al., 2014). There are different codes that can be used for theme analysis such as conceptual code, relationship code, participant perspective code and participant characteristic code (Vaismoradi et al., 2016). When the researcher has very little knowledge of the research, the use of conceptual code will help him or her to convert large masses of data into small manageable codes (Vaismoradi et al., 2016). In the reporting phase, the results of the content and theme data will be analyzed (Elo et al., 2014). The researcher will make use of literature from different authors to analyze the data and the diagram below will be used as a framework to analyze the data.

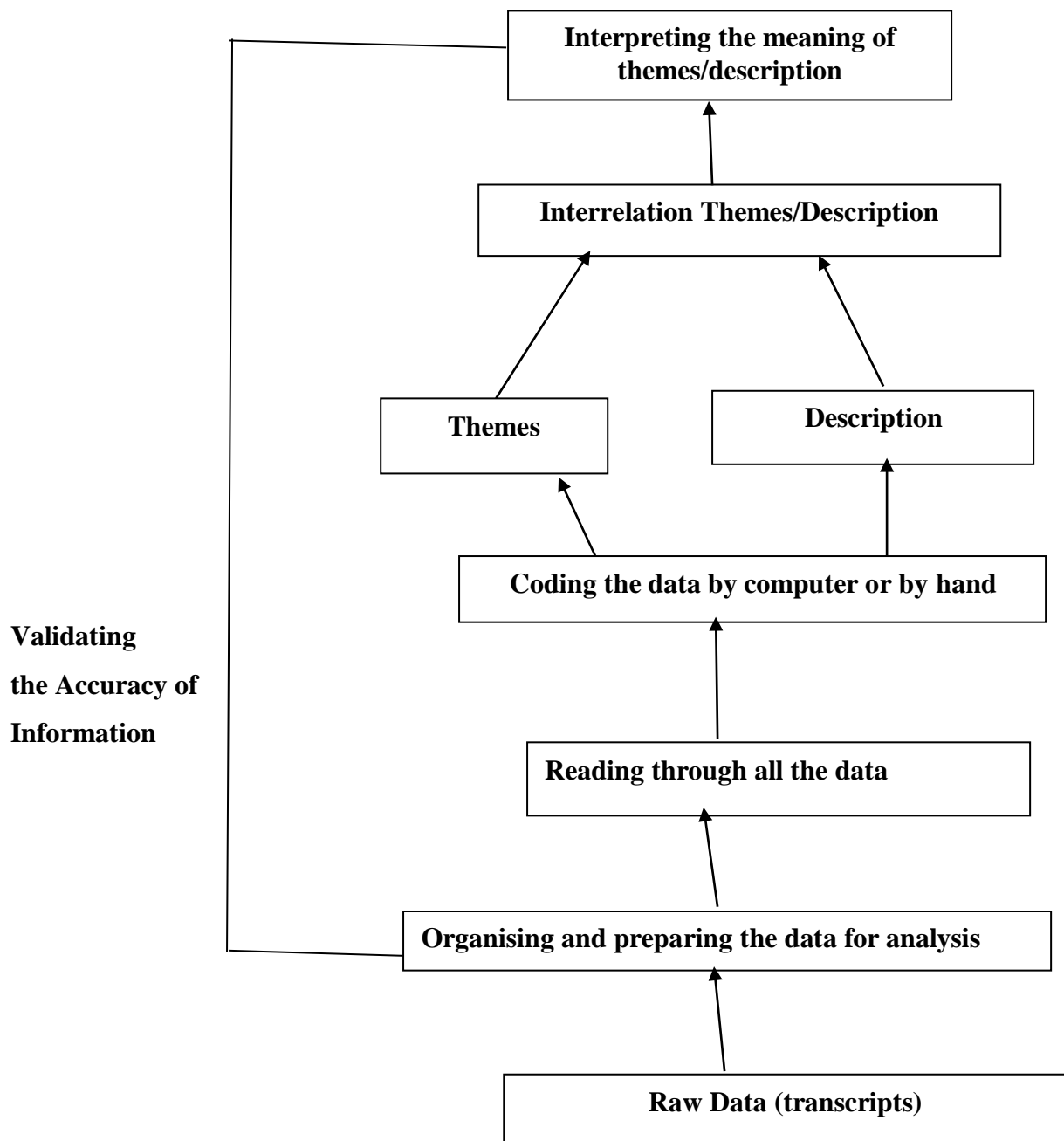


Fig 3.16.1 Steps to follow in data analysis in Qualitative Research (Cresswell, 2014).

3.16.2 Steps for Data Analysis

The researcher transcribed the interviews and thereafter sorted and arranged the data into different types according to the nature of the information (Cresswell, 2014). The researcher then read the transcripts to understand the depth of the information, making sure that the information was credible and in line with the research questions and objectives (Bailey, 2008). The researcher recorded the interviews in an effort to make sure that important information was not lost. The researcher then analyzed the data using codes and theme (Theron, 2015). Themes were displayed, supported by specific evidence or quotations to support the themes (Cresswell, 2014). The researcher used the software programme, Microsoft Excel, to capture all the data and this programme helped to identify similarities and differences which, in turn, helped to analyze the findings. The researcher narrated the findings mentioning the events, detailed discussion of the themes, multiple perspectives from individuals and any interconnecting themes of the analysis (Cresswell, 2014). The final step involved interpretation of the research about the findings, the lessons learnt, the personal interpretation of the researcher, the experiences and the knowledge of the respondent concerning the research questions and objectives (Cresswell, 2014). The findings also identify new questions that were raised by the respondent and which were not mentioned by the researcher (Cresswell, 2014). Researchers might describe how the narrative outcome will be compared with theories and general literature on the research subject (Cresswell, 2014).

The researcher made use of the above steps to analyse the data. The data collected will be done through semi-structured in-depth interviews. Pre-interviews will be carried out to make sure that the interview questions are suitable for obtaining rich quality and trustworthy data in relation to the proposed questions (Elo et al., 2014). The use of voice recorders will be used as a cross checking method to make sure that the correct information is being captured.

3.17 ETHICAL CONSIDERATIONS

Ethical approval for this research was obtained from the University Ethics Committee. The researcher received an ethical clearance letter from the management of campus services to undertake research in this department. The researcher did not disclose any private or confidential information that could compromise the university in any way. The researcher received permission from the respondents to participate in the research around specific themes of the research. The respondents remained anonymous and pseudonyms were used in the study. The information gathered from the respondents will not be available to the public. All important information will be stored by the researcher to enable future research and redundant information will be destroyed.

3.18 CONCLUSION

This chapter discussed the research processes and research methods that were undertaken for the research study. The qualitative research method was used and the data collected was done through semi-structured in-depth interviews. Total population sampling, which is a type of purposive sampling, was used to select the respondents and the data analysis method was thematic analysis. Methods to ensure validity, reliability and how ethical issues were undertaken were explained. The next chapter focuses on the findings of the research.

CHAPTER 4 FINDINGS AND DATA ANALYSIS

4.1 INTRODUCTION

The primary aim of this chapter is to present the findings of this study. This chapter describes and analyses the findings through qualitative (thematic) analysis. The management and senior staff from UKZN Campus Management Services were approached to participate in the study. The respondents chosen were in a position to provide detailed information required for the purpose of the study.

The researcher conducted face-to-face interviews with ten managers from UKZN CMS. The data was collected through open-ended interviews to gather detailed information about the research subject. The questionnaires were devised so that the respondents were able to speak in a free manner and were able to express their feelings, experiences, knowledge, skills and ideas about the research subject.

In this study, the respondents are represented by the letter R (Respondent=R). The number of respondents is represented by the number N.

A total of twelve respondents were invited to participate in the interviews but only ten consented (N=10: 83.33%), two respondents withdrew (N=2; 16.67%). Senior and middle managers of the UKZN CMS made up the demographic profile of interview respondents. The average age of the respondents was between 30 and 65 years. The average years of work experience was between 10-20 years. In terms of gender participation rate, results show wide disparities between 90% male (N=9) and 10% female (N=1). However, of the 12 (N) sampled respondents, N=10 of them were interviewed and this translated into a high participation rate of 83.33%.

Table 4.1.1 Summarizes the demographic details of the UKZN key informants as research respondents in the current study.

Study site	Participants (N=10)	Position held
Howard Campus	1	Manager - Sustainability
Howard College	1	Senior Staff – Energy Section
Westville Campus	1	Director of Infrastructure, Planning & Projects Units
Pietermaritzburg Campus	1	Buildings Manager
Pietermaritzburg Campus	1	Energy Manager
Pietermaritzburg Campus	1	Grounds Manager
Pietermaritzburg Campus	1	Senior Staff
Pietermaritzburg Campus	1	Senior Staff
Pietermaritzburg Campus	1	Water Manager
Pietermaritzburg Campus	1	Senior Staff, Waste management

4.2 PRESENTATION AND DISCUSSION OF THE INTERVIEW RESULTS

The findings were presented in order of the following themes:

Energy management

Water management

Waste management

Challenges in the implementation of sustainability initiatives:

Municipal services

Human resources

Knowledge and skills

Communication

Physical infrastructure

Policies

Collaboration

4.3 THEME 1: ENERGY MANGEMENT

4.3.1 Types of Energy Management Systems implemented at UKZN

The researcher wanted to know if there were energy management systems in place to manage the energy usage at UKZN. Eight out of the ten respondents reported that there were electronic systems, which are called the Schneider Power Monitoring Expert (PME) and Building Monitoring System (BMS), to record the energy and air conditioner usage. There are two electronic systems. One respondent reported as follows:

There are energy management systems in place to record the energy and air conditioner usage, which is based at Howard College.

Two of the respondents were not aware of these electronic energy systems and made no comment.

The energy manager reported that another energy management system, whereby UKZN gets power from the municipality at a bulk rate, was implemented at UKZN to save energy and costs and that the projects make use of this bulk rate power when it is cheap. For example, the energy manager reported as follows:

The third system is the time of use of electricity. UKZN gets power from the municipality at a bulk rate, and projects make use of the bulk rate power when it is cheaper.

Even though energy management systems were in place to manage energy, concerns were raised by five respondents regarding the electronic management system as they felt that the energy systems were recording the energy usage but were not being monitored and audited. Furthermore, respondents complained that no training was provided on the energy management systems.

One respondent reported the following:

There are reports on the energy usage and its consumption but in terms of managing energy to reduce costs, this was not being done. There is a bit of policing when managing and recording data of the spending but not when managing energy as an institution.

Another respondent said that:

... no training was given on these systems and [the respondent] has very little knowledge on these systems.

Apart from the energy management systems to manage energy, four respondents reported on a number of sustainability initiatives implemented by CMS to manage the energy usage and costs. Initiatives such as LED lights, motion detectors, sensors, automatic switches, energy efficient air conditioners and a heat farm were put into operation in an effort to manage energy.

One respondent reported that:

LED lights, motion detectors and sensors are being replaced in new buildings and switches for stoves are being replaced with switches on the wall to prevent stoves getting damaged and to reduce energy costs.

Another respondent reported that:

...air conditioners are being replaced with energy efficient air conditioners.

A third respondent reported as follows:

At Edgewood, there is a heat farm to generate hot water for residences.

Two of the respondents from the energy management section in Howard College reported that there were five research projects and work-in-progress projects to improve the management of energy.

One respondent reported the following:

Due to the high costs of air conditioners, there is work in progress to reduce the hours for air conditioner usage in an attempt to reduce energy costs.

There will be a project on photovoltaic to save energy. This will be first piloted to Shepstone building and, if this project is successful, then it will be rolled out to other campuses.

Another respondent reported the following:

There is a research project where water is heated at night when it is cheapest and stores energy (thermos storage). Students can use this water during the day and water is heated at night to reduce energy costs (pilot project).

Another system is using ice for ducted chiller air conditioning systems where water is chilled until it forms ice at night, and the melting of it during the day is used for the air conditioning plants.

Although there are projects and work-in-progress projects towards the improvement of management of energy, seven respondents indicated that the challenge lies with funding. One respondent said that:

...the challenge lies with funding for sustainability projects.

Overall, the results showed that there are strategies being formed to manage energy but the gap lies in the monitoring and auditing of the energy systems in terms of energy spending patterns. One respondent mentioned that:

...there is no effective monitoring and inspection of energy management systems.

4.4 THEME 2: WATER MANAGEMENT

4.4.1 Types of Water Management Systems implemented at UKZN

The researcher wanted to know if there were water management systems in place to address the water problems. Nine out of the ten respondents reported that UKZN does not have a proper electronic system, like the energy management system, to capture all the data from the municipal water bills for the monitoring of water usage. One respondent reported that:

...there were no electronic water management systems in place.

On the other hand, the senior manager of CMS indicated that smart meters have been installed in some campuses and reported as follows:

Smart Meters is a system which shows how much water is being consumed. Smart meters have been installed at Westville, Edgewood and Medical College. Smart meters have not yet been installed in Pietermaritzburg and Howard College; this is work in progress.

Another respondent said:

Manual meters provide a reading but they do not tell how water is being used. [We are] currently looking at a water monitoring system incorporating smart meters.

One respondent did not comment on the electronic water system.

Even though there are no electronic systems to monitor the water usage, three of the respondents reported that UKZN CMS has implemented a number of water management systems to manage the water costs and usage. Initiatives implemented are water fountains, ice farms, borehole water, power gauges, shower rollers and dual flush systems. One respondent reported the following:

Water fountains are found in buildings so that everyone has access to clean fresh water. The Medical School and Howard College are making use of ice farms for air conditioners so that water is not wasted. These farms are working well at the moment. This will be rolled out to other campuses in the future.

Another respondent reported that:

...in PMB underground water from the borehole is used for irrigating gardens and the sport field to reduce water costs and, when the borehole water fails, then municipal water is used.

Another respondent said:

Power gauges have been placed in some buildings to monitor the water usage. Shower rollers have been replaced in residences to reduce the water usage. Toilets have been replaced with dual flush systems.

Two of the respondents reported that UKZN has prioritized a number of research projects and work-in-progress projects to improve the management of water and sustainability initiatives.

One respondent said:

Research is being done on the circulation of hot water for all residences in an effort to save water.

Research is being done on hot water farms to reduce the energy and water usage.

Another respondent reported as follows:

Projects such as smart meters are in the pipeline. Other projects are to expand the water monitoring system. Pilot projects for the bathrooms are to implement sensors which monitor water usage and reduce water costs. The aim of sensors will also determine leaks in the bathrooms.

Projects in the pipeline are push button taps and dual flush toilets.

There is a project on grey water and water from the basins to be used in the toilets.

Research is to be done on technology that identifies leaks, burst pipes, and to have dedicated funding for this project.

Although there are projects and work-in-progress projects to improve the management of water, seven respondents indicated that the challenge lies in funding. One respondent said that:

...the challenge lies with funding for sustainability projects.

Overall, the findings showed that UKZN CMS has made some progress in the management of water and sustainability initiatives but the gap lies in not having an electronic water system to manage water costs, which can negatively impact on the economy, environment and society.

4.5 THEME 3: WASTE MANGEMENT

4.5.1 Waste Management Systems at UKZN

The researcher wanted to know if there were waste and recycling management systems implemented at UKZN to manage waste. Eight of the ten respondents reported that there was no proper waste management system to manage and dispose of the different waste types, which can create environmental, and health problems. There are no sorting-out bins to sort out the different waste types. One respondent said the following:

Presently there are no proper waste management systems. Waste management has been insourced and the UKZN Staff is responsible for collecting and transporting the waste to the landfills. There are no sorting bins to sort out the different waste types.

The respondent on the Pietermaritzburg campus indicated that there was an e-waste system to manage hazardous waste such as florescent tubes, and reported as follows:

There is an e-waste system for hazardous waste to recycle electronic florescent lightings. The hazardous waste is disposed in containers and the contractors are responsible to take this waste.

Seven of the respondents revealed that there was no proper structure on waste management to recycle waste. For example, one respondent said that:

...there is no dedicated waste section so that recycling can become effective.

Another respondent said that:

...recycled, reused and reduced waste must be managed well.

A third respondent said that waste management should be outsourced:

Outsource this service to sell to the service providers and transport waste to landfills at their cost.

Two of the respondents were not in a position to contribute to waste management and did not comment.

Overall, the findings revealed that UKZN has been wanting in the management of waste. This subsequently affects UKZN economy, the environment and society.

4.6 THEME 4: CHALLENGES IN IMPLEMENTAITON OF SUSTAINABILITY INITIATIVES

4.6.1 Municipal Services

Nine of the ten respondents of the study cited the municipality as the biggest external challenge in the management of energy. Challenges such as demand exceeding supply, power outages, load shedding, electricity tariffs, lack of good governance and lack of maintenance of municipal equipment were cited. One respondent said the following:

The challenges faced by Eskom [a South African electricity public utility] and municipalities on power have made UKZN think out of the box and come up with better ideas.

Another respondent reported as follows:

Power outages are not informed timeously. [They] usually disrupt UKZN activities and classes. Other challenges, such as an increase in electricity tariffs due to economic recession and poor infrastructure, have further contributed to the challenges in the management of energy by UKZN.

One respondent did not comment to the municipal challenges for energy.

Eight of the ten respondents noted that the municipality does not inform UKZN timeously about fixing burst pipes near the campus, which then disrupts campus activities. One respondent reported that:

...the municipality has poor infrastructure and lacks knowledge in the repair of burst pipes and leaks; the pipes are not maintained to the required standard. The municipality does not inform UKZN timeously when fixing a burst pipe.

Another respondent remarked as follows:

Price increase, poor infrastructure, lack of knowledge and technology, no proper systems to check meter readings, climate changes, drought, and leaks not detected early are some of the challenges faced by UKZN in the management of sustainability initiatives.

Two of the respondents did not comment on the municipal challenges for water.

Five out of ten respondents indicated that the municipality has created external barriers in the management of waste. The municipality has not been consistent in regularly providing and collecting Skips. This, naturally, creates environmental and health problems. The municipality has poor governance structures and has not enforced proper laws regarding street vendors who litter the streets. One respondent reported that:

UKZN relies on the municipality to collect and deliver SKIPS and the municipality is not consistent. Bins are overflowing which can create health and environmental problems.

Another respondent reported as follows:

The municipality has not enforced proper laws in terms of street vendors who litter the streets. This is a health hazard which affects the environment and society. Littering can affect the economy as tourists will not visit. Economy will suffer.

Five of the respondents did not comment on municipal challenges for waste.

The findings reveal that the municipality's poor communication and poor infrastructure has created problems for UKZN in managing sustainability initiatives.

4.6.2 Human resources

Eight of the respondents complained about the shortage of internal staff to manage the daily operational work for energy. One respondent said that there was:

...a shortage of staff to manage energy and sustainability initiatives.

For example, the respondent at the Pietermaritzburg campus complained that there was only one internal staff member employed by UKZN to manage the daily operational work on energy. More specifically, the challenge lies in that, when this staff member takes leave, there is no other internal staff member to manage the electricity problems. This respondent said the following:

Shortage of staff affects the management of energy. When staff go on leave there is no one to continue the work with the result that time and energy costs increase.

Three respondents noted that external contractors have been employed at the Pietermaritzburg campus to manage the daily operational work in terms of energy but the workmanship has been of poor quality. Additionally, external contractors are not dedicated and committed. Moreover, the contracting company's focus is to make a profit. Another respondent remarked as follows:

External contractors have been employed to provide quick fix solutions but the workmanship has been shoddy and poor.

A respondent on the Pietermaritzburg campus indicated that, to improve in the area of sustainability initiatives, it was important to boost staff morale which, ultimately, leads to departmental and institutional goals being achieved.

This respondent said the following:

Improved staff morale leads to job satisfaction, leads to improved productivity, leads to departmental and institutional goals being achieved in the management of sustainability initiatives.

Two respondents did not contribute to staffing problems in energy management.

Eight respondents indicated that there was a shortage of skilled internal staff to manage water.

A respondent said that there was:

...no dedicated staff to manage water problems.

A respondent in the Pietermaritzburg campus was concerned that, on the Pietermaritzburg campus, only one semi-skilled person was employed to manage the daily operational work relating to water:

Only one staff member who is semi-skilled is employed by UKZN to manage water problems in Pietermaritzburg.

Four respondents revealed that external contractors were employed in the Pietermaritzburg campus to manage the daily operational work in terms of water and, furthermore, pointed out that external contractors are not dedicated and committed as the contracting company's focus is to make a profit. One respondent remarked as follows:

The external contractors are responsible for water problems, to repair burst pipes and leaks, and are expensive.

Two respondents did not comment on staffing problems in water management.

Seven respondents reported that there were no internal dedicated staff members to manage waste. One respondent reported as follows:

There is no dedicated Staff to sort out waste, resulting [therefore] in the poor management of waste.

A respondent revealed that the present staff lacked capacity and were not motivated to set up a waste management system and reported that there was:

...no staffing to initiate a proper waste management system.

Another respondent revealed that there were no incentives awarded to staff:

There are no incentives given to staff members who assist with the recycling of waste.

Three respondents did not comment on staffing problems for waste management.

The results show that shortage of staff affects the management of sustainability initiatives which, subsequently, impacts on UKZN economy, the environment and society.

4.6.3 Knowledge and Skills

Nine respondents indicated that there was a lack of skills, knowledge and awareness on the importance of sustainability initiatives by staff. For example, one respondent remarked as follows:

There is a lack of awareness, knowledge and education on the importance of sustainability and sustainability initiatives.

Another respondent noted the following:

Staff should have the knowledge to identify the problems at the early stages so that mechanisms can be put in place to prevent the problems and reduce costs.

A third respondent reported that:

...there is a lack of expertise in the area of sustainability initiatives.

The fourth respondent remarked on:

...the lack of knowledge of the importance of recycled waste and how recycling can benefit the university.

Three respondents complained about the culture of unaccountability amongst UKZN staff and students in residences where they continually leave on heaters, air conditioners, stoves and lights when not in use. One respondent reported that:

There is a culture of staff and students not being accountable as stoves [electric cookers] and [electric] lights are left on when not in use.

One respondent did not contribute to lack of knowledge and skills on the management of sustainability initiatives.

Overall, the findings show that lack of knowledge and skills can lead to the poor management of sustainability initiatives.

4.6.4 Communication

A respondent in the Pietermaritzburg Campus felt that there was a lack of communication between CMS departmental heads and the management staff of Durban and Pietermaritzburg. The respondent was concerned that the departmental heads do not react timeously to operational issues with the result that there is a delay in the implementation of sustainability initiatives by the line managers in the Pietermaritzburg campus. Said one respondent:

There is a lack of communication between CMS departmental heads and line managers, the CMS management is situated in Westville and Howard College and they have little understanding as to the problems in Pietermaritzburg. It takes a while before CMS management reacts to problems in energy and water in the Pietermaritzburg campus.

Another respondent explained that:

UKZN management has realized that CMS is important to achieve institutional goals, a Campus Director has been appointed to bridge the gap between UKZN management and campus management and to improve the communication level so that CMS objectives can be achieved effectively and efficiently.

Four respondents noted that the management approach was top-down; decisions were made at a higher level to be followed by line managers. Furthermore there is no team work: staff members work in silos to achieve their own sectional goals instead of working as a team to achieve departmental goals in the management of sustainability initiatives.

One respondent reported that there are:

...Staff working in silos to achieve sectional goals and not institutional goals. This should not be an individual effort but a team effort to prioritize the importance of sustainability initiatives.

A respondent in the Pietermaritzburg campus explained that there was no proper planning in terms of projects and that there were no policies, no regular meetings to make everyone aware of the current issues and no plans in place to address these issues. The respondent conveyed as follows:

There is poor communication, no planning, no regular meetings between the divisional heads enforces and middle management staff. There is a lack of expertise among management in the area of sustainability initiatives.

One respondent said as follows:

A lack of knowledge within management prevents management from buying into the idea of improving sustainability initiatives.

A senior manager was concerned that management did not realize the importance of sustainability and sustainability initiatives as members lacked awareness and knowledge.

For example, this respondent explained that there was a:

...lack of awareness on the importance of sustainability. It is not an individual effort but a team effort for management to prioritize the importance of energy, water and waste in managing sustainability initiatives. It should be an institutional effort to work towards sustainability initiatives. Management is yet to prioritize a sense of awareness of the importance of sustainability and the benefits in terms of savings and costs. There is a need for better higher-level communication.

On the contrary, two respondents felt that there was some support from the management. These respondents reported as follows:

There is support from the senior management staff, middle management staff and subordinates.

However, another respondent reported that:

...suggestions made by management were not followed.

The results show that poor communication from higher-level managers can create problems in the management of sustainability initiatives.

4.6.5 Physical Infrastructure

Four of the respondents indicated that the buildings and equipment were old and outdated and, as such, consumed a lot of energy, resulting in increasing energy costs; hence the need to identify new technology that uses less energy. For example, one respondent noted as follows:

Some of the equipment is old and outdated which takes a lot of energy. There is a need to identify with new technology and to replace the old equipment so that energy and costs can be saved in the long term.

Another respondent said that:

...the generators are not serviced regularly and there is no proper system to manage the use of these generators. They are only serviced when there is a problem, resulting in poor performance standards and increased costs.

A third respondent reported the following:

Huge amounts of funds are invested in substations. The substations do not work properly and the challenge lies in managing them. Furthermore, the equipment at the substations is not properly managed as it is outdated.

Five respondents reported that, for some time, there has been a water leak on the Pietermaritzburg campus which has not yet been repaired:

On the main campus there is a burst leak which has been there for many years. The municipality has not yet identified the source of the leak and this has not yet been repaired which implies that huge amounts of water is being wasted on a daily basis, which results in water wastage and water costs.

A respondent reported that tests had been done to identify the source of the leak but work is still in progress.

Six respondents were concerned about the infrastructure being old, corroded and unmaintained due to high costs. For example, said one respondent:

The pipes are old and aged and are still being used with the result there are more maintenance costs. There is much evaporation in the area and this affects the aging of the pipes. Lots of water is wasted. Underground leaks can take a long time to be repaired.

Seven respondents also reported that there were no inspections, audits or maintenance checks made to detect problems in the early stages and, thus, prevent shutdowns. For example, said one respondent:

There are no inspections, no audits, and no maintenance checks.

Nine out of the ten respondents reported that rainwater-harvesting management was one of the most challenging water issues to manage at UKZN and, above all, that there were no initiatives in place to manage rainwater.

The poor infrastructure and sluggish embracement of innovative technology has led to the poor management of sustainability initiatives at UKZN, adversely affecting the institution's economy, the environment and society.

4.6.6 Policies

During the course of the interviews, when the respondents were asked to identify internal challenges, seven respondents indicated that one of the internal challenges was that UKZN did not have a formal policy for energy, water and waste. The researcher then tried to establish if a policy existed and was unable to identify a policy for energy, water and waste.

For example one respondent reported that there was a:

...lack of policies to manage the use of energy, water and waste.

Another respondent reported the following:

The residents are using a lot of energy and water. They do not switch lights and stoves off when these are not in use and taps are not closed properly. It is important to have policies for the residents in order to monitor the energy and water usage.

A third respondent reported that:

...everyone should be accountable and, if they do not follow policies, there must be consequences. There should be programs for educating everyone on the importance of energy, water and waste management.

The results show that, without concrete policies, it will be difficult to manage sustainability initiatives for UKZN.

4.6.7 Collaboration

The Senior Management Staff reported that UKZN was slow to introduce sustainability initiatives and, in the process, has not reaped any benefits in the management of sustainability initiatives for energy, water and waste. UKZN was slow to send out proposals to private and public enterprises to improve on energy, water and waste initiatives. One respondent revealed that it was important to establish and build partnerships so that UKZN and the energy, water and waste sectors can benefit from this partnership, reporting as follows:

UKZN is slow to initiative sustainability initiatives and, as a result, benefits have not been reaped. UKZN does not reach out. It should send proposals to private/public enterprises for assistance in managing energy, water and waste so that companies, who are expert in the field, can assist in managing sustainability initiatives.

One respondent noted that:

...it is important for UKZN to engage and explore with waste sectors on the proper management of waste. Exploring with experts in the field of waste recycling will benefit UKZN and at the same time create employment for the unemployed. This will be income generation for UKZN.

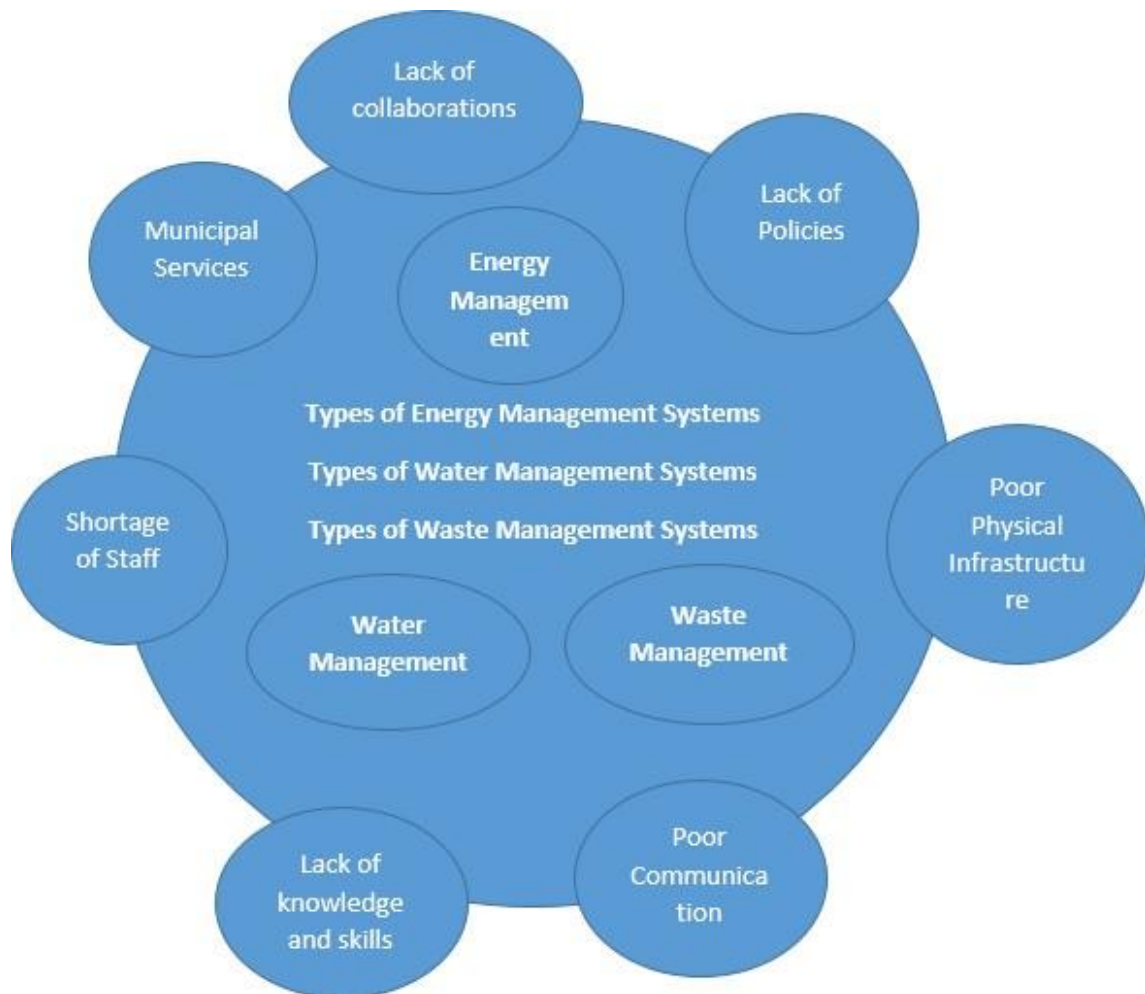
Another respondent said that:

...recycled waste should be sold to waste industries and the income generated will benefit the department. Recycled, reused and reduced waste must be managed well.

UKZN's lack of collaboration with the private and public sectors has led to the poor management of sustainability initiatives which, subsequently, has negatively impacted on the institution's economy, the environment and society.

4.7 SUMMARY OF FINDINGS

The findings show that UKZN has implemented a number of sustainability initiatives to manage energy and water. UKZN has made little progress in setting up a waste management system. The findings also reveal that there are internal and external challenges in the management of energy, water and waste. These are represented in the diagram below which, based on the findings, was drawn and designed by the researcher.



4.7.1 DIAGRAM SHOWING THE INTERNAL AND EXTERNAL CHALLENGES AFFECTING MANAGEMENT OF ENERGY, WATER AND WASTE.

4.8 CONCLUSION

The purpose of this chapter was to present the findings from interviews with ten participants from the UKZN Campus Management Services department. The participants were interviewed about initiatives at UKZN relating to the management of energy, water and waste, as well as gaps or challenges to the introduction, maintenance and improvement of sustainability initiatives. The findings were presented according to four themes: energy management, water management, waste management and challenges and, furthermore, included municipal services, human resources, knowledge and skills, communication, physical infrastructure, policy formulation and collaboration. Chapter 5 will present a discussion of the findings.

CHAPTER 5

DISCUSSION ON THE FINDINGS

5.1 INTRODUCTION

The previous chapter of this study presents the data findings and analysis. This chapter provides a discussion of the research findings of the study on “An Exploratory Study of Sustainability Initiatives: A Case Study of UKZN Campus Management Services”. This chapter interprets and explains the findings in conjunction with previous research conducted both locally and internationally to either refute or concur with the findings of the study. This chapter will address the main aims and objectives of the study. The findings will be discussed in terms of the four objectives of the study.

5.2 SCOPE OF THE STUDY

The main purpose of the study is to explore sustainability initiatives managed by UKZN Campus Management Services. This study made use of qualitative research and the data was collected using semi-structured questionnaires. The study’s objectives were as follows: -

- 5.2.1 To ascertain the energy management systems managed by UKZN campus management services;
- 5.2.2 To determine the water management systems in place to address the water problems;
- 5.2.2 To ascertain the waste management systems managed by UKZN campus management services; and
- 5.2.3 To identify the gaps and make recommendations on sustainability initiatives to Campus Management Services.

5.3 Objective 1: TO ASCERTAIN THE ENERGY MANAGEMENT SYSTEMS MANAGED BY UKZN CAMPUS MANAGEMENT SERVICES

The first objective was to ascertain the energy management systems that are managed by UKZN CMS. The findings revealed that UKZN CMS has implemented a number of electronic management systems, such as the Schneider Power Monitoring Expert (PME) and the Building Monitoring System (BMS), to manage the energy and air conditioner usage which is administered at Howard College. It is important to have energy management systems to manage energy as, currently, South Africa is experiencing an energy crisis and there are many challenges to managing energy efficiently. This concurs with research undertaken in higher education institutions across the world that the threat of power outages, demand being greater

than the supply and the high electricity tariffs have been the main drivers for institutions to manage energy effectively and efficiently and, as a result, are implementing reduction measures (Rippon, 2013, Stellenbosch University, 2013, Fig, 2013). This finding is similar to research done at the University of Yale who found that the University had successfully implemented a Direct Digital Control System and a Central Metering System to control the management and the use of energy in buildings (Yale University Office of facilities, 2019).

The findings reveal that, although there are electronic energy management systems in place, the systems are not being audited and monitored and, therefore, it is difficult to know if the sustainability initiatives are being managed well in terms of energy usage and costs. This finding is similar to research done at the University of Stellenbosch. The university is now undertaking regular audits to monitor this system and, in order to assess whether or not this system is yielding savings in electricity, the Power Watch Programme has been installed to monitor the energy programme and its progress in terms of the required standards (Stellenbosch University, 2013).

The findings also reveal that UKZN has undertaken a number of sustainability initiatives to manage energy, such as the installation of LED lights, sensors in new buildings and motion detectors, etc. Oyedepo (2012), who argues that energy efficiency leads to important benefits at an economic, environmental and social level, supports this finding of undertaking measures to improve the management of energy.

The findings reveal that UKZN CMS has been progressive in undertaking a number of research projects and work-in-progress projects to improve the management of energy and sustainability initiatives, such as reducing the hours of air conditioner usage, research on solar and renewable energy, research on hot water farms, and research on thermo storage.

This research also found that funding was a challenge for sustainability projects. It is important to carry out research on sustainability projects, which should include the three pillars, which are economy, environment and society, for sustainability success. A study undertaken by Razman et al. (2017) reveals that researchers concentrate their research mainly on the environmental pillar, as they feel it is more important than the other pillars, and are implementing initiatives to become environmentally sustainable. It is important to carry out research on sustainability and the three pillars of economy, environment and society, as they

are linked together. Working with these three pillars can improve the management of sustainable initiatives and contribute to institutional success. Furthermore, literature supports that efforts around sustainability and the three pillars will ensure that society is protected and the environment preserved. The economic component is to make sure that the environment and sustainability challenges are connected to economic production and consumption in order to be globally competitive (Clune and Zehnder, 2018). Research that concentrates on sustainability and one pillar will not contribute to institutional success.

Overall, the findings reveal that UKZN has made some progress in the management of sustainability initiatives for energy. There are a number of research projects that are being undertaken by UKZN to improve the management of energy. However, the challenge lies with funding required for sustainability projects. Furthermore, lack of control in the management of energy can lead to the poor management of sustainability initiatives.

5.4 Objective 2: TO DETERMINE THE WATER MANAGEMENT SYSTEMS IN PLACE TO ADDRESS THE WATER PROBLEMS

The second objective was to determine the water management systems that are in place to manage the water problems. Nine respondents indicated that UKZN does not have an electronic water management system to manage the water usage and consumption. A senior manager reported that the Smart Meters project is a work in progress, while another senior manager reported that smart meters have already been installed at Edgewood, Medical School and Howard College. Smart Meters is a system that is used to capture the data of water bills and can be used as a monitoring tool to manage the water usage and costs. A study conducted by Rippon (2013) supports this finding and the study, which focused on a digital water metering system, reveals that although research has been done on digital water metering systems, this technology will not be used until energy meters are installed.

It is important to identify technology that will create opportunities and minimize threats in the management of sustainability initiatives for water, and, at the same time, protect and promote the environment, economy and society. Technology creates opportunities to address threats and find solutions; working with the three pillars of economy, environment and society, without improved technology, may not help us to identify opportunities and threats (Clune and Zehnder, 2018).

Martine and Alves (2015) differ in their argument that not all technology is useful technology as there are many limitations in innovative technology which, as a result, can create problems when addressing economic, environmental and social threats and opportunities.

The findings reveal that there are a number of water management systems to manage water such as water fountains in buildings, dual flush systems in toilets, shower rollers in residences, power gauges in some buildings, borehole water being used for irrigation and the sports field and, also, some campuses are making use of ice farms for air conditioner use to save water. This concurs with a study conducted at the University of Stellenbosch that finds that water saving shower taps have been installed in the residences to monitor the water usage (Stellenbosch University, 2013).

Two respondents reported that UKZN has prioritized a number of research projects and work-in-progress projects to improve the management of water and sustainability initiatives. These are: the circulation of hot water for residences, the research on hot water farms to reduce energy and water usage, the Smart Meters project, sensors in bathrooms to help identify high costs and leaks, push button taps, dual flush toilets, the research on grey water and the research on technology that can identify leaks and burst pipes. A study by Shannon et al., (2008) supports this finding that research is important to find methods to purify water at low cost and using less energy. This is similar to the findings of the study conducted at the University of Makerere and undertaken by Winkelmann and Godfrey (2016) that more research needs to be conducted on wastewater so that proper systems can be implemented to reuse wastewater for toilet flushing. Although there were projects and work-in-progress projects, the findings revealed that funding was a challenge for sustainability projects.

It is evident that UKZN CMS has been progressive in managing a number of sustainability initiatives and research projects but the challenge lies in the management of sustainability initiatives and their attempt to protect and promote the environment, economy and society. Another challenge will be funding for sustainability projects. It is difficult to monitor the water usage as there is no water monitoring system to indicate whether or not water is being used efficiently.

5.5 Objective 3: TO ASCERTAIN THE WASTE MANAGEMENT SYSTEMS MANAGED BY UKZN CAMPUS MANAGEMENT SERVICES

The third objective was to ascertain the waste management systems that are managed by UKZN CMS. Eight respondents indicated that UKZN does not have proper systems to manage waste. This finding is similar to research on waste management undertaken at the University of Nairobi which found that there was no infrastructure for the disposal of waste and, also, that it is important to have proper structures in place to dispose of waste (Aseto, 2016). This study concurs with literature that waste management is a global problem (Dell, 2016). Furthermore, the University of Yale identifies that more research needs to be done on waste management at a municipal level so that municipalities can implement correct waste procedures at an institutional level (Yale University, 2013). A study conducted by Aseto (2016), which focuses on the challenges of waste management, reveals that, in Africa, waste management problems are varied and complex ranging from infrastructural, political, social, economic, legal, environmental, organizational management and governance challenges.

The findings reveal that there are no sorting bins to sort out the different waste types, which can lead to health and environmental problems. This finding is similar to the study undertaken on waste management at the University of West Indies which reveals that it is important to manage waste properly and that neglecting this would lead to health and environmental problems (Bailey et al., 2015, Ferronato et al., 2017). Other studies show that, for example, the Caribbean was poor in waste management but, because it is a tourist attraction, was good in managing the waste recycling in an effort to boost the economy and environment (Bailey et al., 2015, Phillips and Thorne, 2013).

The findings reveal that UKZN CMS staff members are responsible for collecting and disposing the waste to the landfills. Aseto's study (2016), which focused on waste management, supports this finding. It reveals that in Africa, for example, at higher education institutions in Nairobi, institutions are responsible for 23% of the total waste generated and responsible for the collection and disposal thereof.

The findings reveal that there are systems to manage inflorescent tubes but no proper waste system to manage other hazardous waste, such as batteries, waste of electrical equipment and metal scrap. They also reveal that it is important to dispose of hazardous waste in an effort to protect the environment and society. These findings are similar to a study conducted on waste management at Makerere University which reveals that waste management was a problem as there were no proper solid waste management systems in place to dispose of the different waste types and, also, no system for the disposal of hazardous waste from the laboratories (Winkelmann and Godfrey, 2016). The respondents did not contribute much to this objective, as presently there are no waste management systems.

5.6 Objective 4: TO IDENTIFY THE GAPS AND MAKE RECOMMENDATIONS ON SUSTAINABILITY INITIATIVES TO CAMPUS MANAGEMENT SERVICES

The fourth objective sought to identify if there were gaps in sustainability initiatives at UKZN. Seven categories of gaps or challenges were identified as a result of the research.

5.6.1 The municipality's poor communication and poor infrastructure

The findings reveal that the municipality's poor communication, poor infrastructure, lack of good governance, price increases, demand exceeding supply and estimate meter readings has created many challenges for UKZN to manage energy and water. This finding supports the study on fracking in South Africa undertaken by Fig, (2013) that South Africa is experiencing an energy problem where the demand is greater than the supply. This finding is also supported by the study on energy and sustainability development in Nigeria undertaken by Oyedepo (2012), that energy is an important factor in all sectors of any country's economy and a lack of access energy can contribute to poverty, deprivation and economic decline. A study undertaken by Maistry and McKay (2016) on promoting energy efficiency in a South African university supports this finding, stating that the challenges faced by South Africa and many South African institutions include the fact that the demand for energy is greater than the supply; and also that, with the rising costs of electricity, they are finding it difficult to acquire this additional income for electricity and, at the same time, be energy efficient.

Furthermore, the findings reveal that UKZN is not informed timeously by the municipality on power and water outages, which then disrupt UKZN activities. This concurs with research undertaken by Rippon (2013) that the University of Cape Town has identified that the energy

shortage is prompted by demand being greater than the supply and aggravated by power outages and increases in annual tariff rates. All this has forced an efficient utilization of energy resources and the implementation of reduction measures to manage energy usage.

The findings also reveal that there were many external challenges affecting the management of waste, such as poor infrastructure, poor support from municipalities, non-compliance in terms of waste regulations, no municipal law enforcement regarding street vendors and littering, and not keeping up with technology. This concurs with the available literature which discloses that South Africa faces many challenges with regard to waste management. These challenges presently involve: inefficient data collection methods, poor infrastructure, lack of education, lack of awareness of people within that sector, high operational costs, poor support from municipalities, poor recycling, poor reuse of waste and finding suitable land to dispose of the waste (Department of Environmental Affairs, 2011).

At present, due to poor waste management in South Africa only 10% of the waste is being recycled (Frost, 2015). Despite the fact that there are many challenges in Africa, South Africa still remains at the top of waste management and has been progressive in protecting the environment and boosting the economy (Department of Environmental Affairs, 2011). The respondents did not contribute much to the municipality and waste management due to lack of waste management systems. However, it is important that more research be done on the management of waste by municipalities so that the economy, environment and society benefits. This concurs with literature that research done at University of KwaZulu-Natal (UKZN) and a waste management model has been developed with strategies so that municipalities can use these strategies to manage waste (Frost, 2015).

The municipality's poor communication, poor infrastructure and lack of good governance has created problems for UKZN in the management of energy, water and waste sustainability initiatives, resulting in the economy, environment and society being adversely affected.

5.6.2 Shortage of staff

The findings reveal a shortage of skilled and dedicated internal staff to manage energy and water. This finding is similar to the findings on the research study on promoting sustainability development in Africa undertaken by Mohamedbhai (2012) which found that African

universities have not promoted sustainability initiatives due to a lack of human resource skills. It was also found that there are only two persons employed in the Pietermaritzburg campus to manage the operational work for energy and water; the person managing the water operations is semi-skilled and the accumulation of work leads to staff being less motivated and less productive, making it even more difficult to manage sustainability initiatives for water and energy. This finding is similar to research undertaken by Von Bormann and Gulati (2014) who found that the National Development Plan identified that South Africa lacks skilled people, including engineers, to manage the water reserves.

The findings further reveal that external contractors, who are profit driven, expensive and neither committed nor dedicated, have been employed to provide quick-fix solutions. The challenge to employ more staff lies with funding.

From the findings it emerges that, while the UKZN staff carried out the waste sorting, there was a lack of dedicated internal staff to sort out the waste from within. The findings also reveal that staff members are not motivated to set up waste management systems, as they do not get incentives. This finding refutes the study conducted by Krisek et al. (2012) which states that, due to the economic recession, higher education institutions should increase employee productivity without compensation. It further suggests that skilled staff with the ability to optimize on opportunities and minimize threats should be recruited in management positions.

The employment of external contractors, shortage of staff and the lack of financial resources have had an impact on the management of sustainability initiatives for energy, water and waste, which then negatively impacts on the economy, environment and society.

5.6.3 Lack of knowledge and skills

The research found that there was a lack of knowledge and skills amongst staff and those in the residences concerning the importance of energy, water and waste.

This finding is similar to a study undertaken at the University of West Indies which states that it is important that citizens are educated in order to acquire knowledge of, and create awareness of, the harmful practices of waste mismanagement on the environment, society and the economy (Bailey et al., 2015, Ferronato et al., 2017). There is also a lack of awareness of the

importance of sustainability initiatives and what their impact might be on the economy, environment and society. This study's finding is similar to research carried out at the University of Marai in Malaysia which found that many people were not aware of the importance of sustainability and recommended training and workshops to improve knowledge and awareness on the harmful effects of improper practices on the environment, economy and society (Ishak et al., 2015, Saleh et al., 2011).

Higher education institutions should focus not only on the environment but on the economy and society as well. This concurs with literature which states that it is important for higher education institutions to not only focus on the green initiatives but, also, to educate and create awareness; it is essential that everyone understands the importance of sustainability and its effects on the environment (Abubakar et al., 2016, Cortese, 2003, Shriberg, 2002).

The findings reveal the existence of a culture among the staff and students in residence whereby they do not hold themselves accountable for turning off lights, air conditioners, stoves and other electrical devices when not in use.

The findings reveal that being energy, water and waste conscious should be a team effort and everyone should be involved and understand the importance of sustainability initiatives and their impact on the economy, environment and society. This finding is similar to research undertaken at the Stellenbosch University which asserts that it is also important for the community to understand the importance of sustainability and its impact on the economy, society and the environment, and that the contribution made by the community can be of benefit to same (Stellenbosch University, 2013). Higher education institutions should identify a model that involves all stakeholders and not specific people and departments (Stellenbosch University, 2013).

The findings reveal that staff should have the knowledge to identify faults at early stages, thereby being in a position to reduce energy and water costs. A study on a problem at the University of Nnamdi Azikiwe in Nigeria regarding students' waste disposal, undertaken by Okoye et al (2015), supports this finding that workshops and training on sustainability are important so that knowledge can be increased to address and find solutions to sustainability initiative problems.

The lack of knowledge, skills and awareness can negatively affect the management of energy, water and waste, which will then affect the environment, economy and society.

5.6.4 Campus leadership poor communication

The findings reveal that there was a clear lack of communication between the departmental heads and the line managers. The findings also reveal that the line managers in the Pietermaritzburg campus were not fully aware of the initiatives being researched and implemented, ignorance thereof creating barriers in terms of leadership styles. A study by Abubaker et al. (2016) supports this finding on leadership styles in that research carried out at the University of Dammam concluded that most higher education institutions in Saudi Arabia have a top down management approach where decisions are made at management level without the consultation of the students and other stakeholders. This, he indicates, results in an autocratic system with no team work and can have a negative impact on society, the environment and the economy.

It is evident that Facilities Managers play an important role in the management of sustainability initiatives because the manner in which they are managed can boost the economy as well as protect and promote the environment and society. Furthermore, higher education institutions need to identify with and recognize the concept of “sustainability”. They need to know that this concept plays an important role for Campus Management Services to manage their sustainability initiatives in a way that protects the environment, boosts the economy and respects society. This finding is similar to a study on benefits of sustainability-driven innovation where it was found that facilities managers have recognized that, by addressing and solving issues on sustainability achieved through reduced costs, risks minimized, increased attractiveness to talent and increased competition, economic, environmental and societal benefits emerge (Kiron et al., 2013). It is important for facilities managers to include sustainability in the daily planning and operational work and there must always be a balance between economy, the environment and society (Stellenbosch University, 2013).

A break in communication between the different structural heads can create problems in managing sustainability initiatives to achieve institutional and departmental goals. This was established in the current research and supports existing literature which states that higher

education institutions can achieve sustainability if management can adapt to the changing environment in the areas of energy, water, waste, technology, leadership styles and human behaviour; this would help to contribute to a body of knowledge in the area of operations, training and research (Stellenbosch University, 2013). This concurs with research undertaken at the University of Marai in Malaysia where it was found that poor communication at all levels, especially communication with senior management, made it difficult for senior management to intervene when problems with the implementation of policies and procedures occurred (Ishak et al., 2015, Saleh et al., 2011).

The findings reveal that the staff members work in silos to achieve sectional goals instead of departmental and institutional goals. These findings support literature which reveals that higher education institutions focus on many areas such as research, service delivery and education, and each discipline focuses on achieving discipline goals by working in silos rather than achieving institutional goals (Krizek et al., 2012). James and Card (2012) further argue that the campus management team must understand the institutional goals and strategies well so that they can adapt to manage their sustainability initiatives with the intention of achieving both institutional and departmental goals.

5.6.5 Poor infrastructure and slow to embrace technology

The findings reveal that the equipment, pipes and buildings were old and outdated and, therefore, consumed a lot of energy and water. For instance, there were no inspections, audits and maintenance checks to detect problems at an early stage and thus prevent total shutdown. Two respondents indicated that huge amounts of funds were invested in the substations and that it was a challenge to manage and maintain them. This finding is similar to a study conducted in Nigeria which shows that poor maintenance can disrupt work operations. Research carried out at the University of Nnamdi Azikiwe in Nigeria found that the standard of equipment was in a poor state. The recommendation was to have regular inspections to improve the standard of equipment and thus avoid breakdowns which disrupt work operations (Odediran et al., 2015, Okafor and Onuoha, 2016).

The findings also reveal that the generators were not serviced regularly and there were no systems to monitor their use. It is important for the generators to be maintained and serviced regularly otherwise the operational costs can increase in the area of funding challenges. This

finding is similar to research carried out at the Nnamdi Azikiwe University at Awka in Nigeria where the institution experienced problems with the management of electricity and power outages and, as a measure, implemented the use of generators to assist during power outages (Okafor and Onuoha, 2016). The study also reveals that this initiative was not successful as the generators were poorly maintained and not operational all the time due to lack of funds (Okafor and Onuoha, 2016).

The findings reveal that UKZN was slow to embrace innovative technology. In an effort to promote the economy, environment and society, suggestions were made to replace old equipment with technology that would reduce energy and water costs. The challenge lies with funding. Technology is important for creating opportunities but not all technology creates opportunities because it sometimes has limitations which, then, can pose threats. Technology creates opportunities to address threats and find solutions; working with the three pillars without improved technology may not help us to identify opportunities and threats (Clune and Zehnder, 2018). Martine and Alves (2015) differ in their argument that not all technology is useful technology as there are many limitations with innovative technology, which can create problems when addressing the economic, environmental, social threats and opportunities. Therefore, it is important to identify technology that will create opportunities and minimize threats in the management of sustainability initiatives for energy and water in an effort to protect and promote the environment, economy and society.

Some of the respondents reported that there was a burst pipe in the Pietermaritzburg campus which had not been fixed and that a huge amount of water was being wasted. The findings reveal that tests had been done to identify and fix the leak but that this was still work in progress.

The findings reveal that there was no proper rainwater harvesting system to store water for irrigation and the sport field. Stored water would enable the university to be in a position to obtain less from the municipality and, thereby, reduce water costs. This concurs with research carried out at the University of Nnamdi Azikiwe in Awka, Nigeria, which reveals that the management and distribution of water was not managed well. It was recommended that other water supplies and facilities be researched so that water can be available for institutional use and stored through proper facilities (Okafor and Onuoha, 2016).

The researcher is of the opinion that UKZN has been slow to embrace new innovative technology which would consume little energy and water. Old equipment requires a lot of maintenance, which then increases the overhead energy and water costs. Poor infrastructure can create challenges for UKZN to manage energy and water initiatives and this will negatively impact on the economy, environment and society.

5.6.6 Lack of policies

The findings reveal that UKZN CMS did not have policies for energy, water and waste, and that this resulted in the residents and staff not being accountable. The researcher was unable to identify a written policy for energy and water use at UKZN. However, research undertaken by Govender (2005) reports that there was work in progress for an energy policy to be finalised for UKZN. The finding is similar to the study undertaken at the University of Yale where the study found that the institution had adopted policies and processes to protect the environment, society and economy (Yale University, 2016). It is important to have departmental and institutional policies for energy, water and waste as policies help guide activities and ensure that everyone is accountable for their actions. Policies would certainly assist in the achievement of the desired objectives of sustainability initiatives.

5.6.7 Lack of collaboration with the private/public sectors.

The findings reveal that UKZN has not been progressive in collaborating with the private and public sectors and, as a result, has not benefited from the opportunities offered by collaboration. Due to the challenges of managing sustainability, UKZN can benefit by collaborating with the energy, water and waste sectors in an effort to improve the management of sustainability initiatives and thus boost UKZN economy, environment and society. Studies that were undertaken in Africa support the finding that, due to the challenges of sustainability, it is crucial that higher education institutions collaborate and work with the private sectors as well as the government sector to promote sustainability development (Mba, 2017, Mohamedbhai, 2012, University of Bergen, 2017). The waste management sector has viable economic opportunities that can be explored to improve the economy, protect the environment, create jobs, improve the infrastructure, improve skills and contribute to the strengthening of small and medium businesses in the waste sector (South African Government News Agency, 2015).

The findings reveal that renewable energy is the way forward but, as it is expensive, UKZN must try and build partnerships with the renewable energy sectors in order to be in a position to benefit from it. A study on renewable energy in South Africa, undertaken by Pegels (2010), supports this finding that it would be in the interest of institutions to resort to renewable energy to alleviate the energy crisis in South Africa and, at the same, protect the environment. However, despite that there are many benefits, there has been little progress made about renewable energy and solar energy as renewable energy is costly (Pegels, 2010). The University of Cape Town has not invested in renewable energy due to the cost factor and, furthermore, there should be a designated budget for renewable energy (Rippon, 2013). The University of Cape Town tried to further reduce energy costs; solar water heaters were only installed in small and medium residences and energy efficient heat pumps were installed in large residences (Rippon, 2013).

A study undertaken on waste reveals that waste is seen as a global problem which affects the economy. The study also states that it is important for society to understand the importance of managing waste, and that countries should collaborate and partner with one another in an effort to manage it efficiently and effectively (Dell, 2016). South Africa, due to the past legacy of apartheid, is still trying to create jobs for the unemployed, both skilled and unskilled, by creating opportunities in the area of waste management (Department of Environmental Affairs, 2011).

Past research on waste has shown that South Africa is improving in the area of waste management and is collaborating with partners so that waste can be seen as a resource rather than a waste (Frost, 2015). The government and the waste industries are exploring ways on how recycling can improve, grow and develop the economy, create jobs for the unemployed and, at the same time, protect the environment (A-Thermal, 2016). With the help of research done at the University of KwaZulu-Natal (UKZN) on waste management, a waste management model has been developed with strategies that municipalities can use (Frost, 2015).

The findings reveal that a small portion of the waste was being recycled but there was no proper waste recycling system to benefit UKZN. There were no management systems for reused, recycled and reduced waste and, as a result, UKZN has not been rewarded. A study

by Beattie (2017) supports this finding on waste recycling and also reveals that the proper recycling and reuse of waste can be a resource rather than a waste and could, thus, boost the economy and protect the environment. This finding is similar to research undertaken at universities which are recycling their waste. The University of Western Cape benefits financially from its recycling initiative as the recycled materials are sold to companies, consequently boosting the institution's finances (Green Africa Directory, 2012). The University of Western Cape was awarded the green campus initiative and they excelled in waste reduction and recycling (Institutional Advancement, 2014). The University of Western Cape's recycling initiative has been a huge success, as an average of 70 tons of recyclables are collected every month and this has created employment for 120 formerly unemployed people (Green Africa Directory, 2012).

5.7. CONCLUSION

The purpose of this chapter was to discuss the findings in conjunction with previous literature conducted locally and nationally to support or refute the findings of the study on sustainability initiatives. The findings reveal that energy management systems are in place. However, there are external and internal challenges creating barriers in the management of energy. There are also water management systems in place. Nonetheless, external and internal challenges affect the management of water. There are no waste management systems in place. However, the findings reveal that there are external and internal challenges to the management of waste. Chapter 6 will discuss the conclusion and recommendations.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This chapter concludes the study and offers recommendations based on the findings of the research, which was the study of the role of Campus Management Services in managing sustainability initiatives for energy, water and waste in higher education institutions, using the case study of the University of KwaZulu-Natal, South Africa. The majority of studies discussed in the previous chapters have shown that CMS plays an important role in managing sustainability initiatives for energy, water and waste in higher education institutions. Although there is some agreement in this regard, the findings in this study also indicate that there are many challenges to the management of energy, water and waste. This chapter also discusses limitations and future research.

6.2 CONCLUSION

This study focuses on the role of CMS in managing sustainability initiatives for energy, water and waste. The data was collected from ten CMS management staff by empirical research. The study concludes on the following objectives:

Objective 1: To ascertain the energy management systems managed by UKZN Campus Management Services

The research shows that UKZN did implement electronic energy management systems, such as the Schneider Power Monitoring Expert and Building Monitoring System, to manage the energy and air conditioner usage for all campuses. However, these electronic systems were not monitored in terms of energy usage and costs and, therefore, it would be difficult to know whether or not the energy was managed well.

UKZN has undertaken a number of sustainability initiatives to manage energy, such as the installation of LED lights, sensors in new buildings, automatic switches, motion detectors, etc. There are a number of research sustainability projects and work-in-progress projects such as renewable energy, solar energy, hot water farms, thermos storage and the monitoring of air conditioner usage. However, the challenge lies with funding for sustainability projects.

Objective 2: To determine the water management systems which are in place to address the water problems

This research study finds that UKZN CMS implemented a number of water management systems, such as shower rollers in residences, power gauges in some buildings, dual flush systems in toilets and the use of ice farms, to address water problems at all campuses. However, the research finds that UKZN did not have a water electronic system to manage the water usage and consumption so it would be difficult to know if water had been managed. UKZN is in the process of implementing Smart Meters, which is a water management system, but this is still work in progress.

The research finds that UKZN undertook a number of research sustainability projects to improve the management of water, but the challenge lies with funding. The research projects involve hot water farms, sensors in bathrooms to identify leaks, grey water harvesting and technology which can identify leaks and burst pipes.

Objective 3: To ascertain the waste management system managed by UKZN Campus Management Services

The study finds that UKZN CMS was lacking in the area of waste management and managing the different waste types. There are no sorting-out bins to sort out the different waste types. There is no dedicated waste section so that recycled, reduced and reused waste can benefit UKZN. The management of waste is done by UKZN staff members who are responsible for collecting and transporting the waste to the landfills. However, there was an e-waste system to manage hazardous waste such as florescent lightings.

Objective 4: To identify the gaps and make recommendations on sustainability initiatives to Campus Management Services

The research finds that there were many external and internal challenges in the management of energy, water and waste.

6.2.1 Municipal Services

The research finds that the municipality's poor communication, poor infrastructure, lack of good governance, price increases, estimate meter readings and demand exceeding supply

have created many challenges for UKZN to manage sustainability initiatives for energy, water and waste.

6.2.2 Human Resources

The research finds a shortage of internal, dedicated staff to manage energy and water. External contractors who are profit driven, expensive, not committed and, most of all, expensive, have always been employed to provide quick fix solutions for energy and water problems. The challenge to employ more staff lies in funding.

The research also finds a lack of internal dedicated staff to sort out the waste from within UKZN. Staff members were not motivated to set up a waste management system, as they did not receive incentives.

6.2.3 Knowledge and Skills

The research finds a lack of knowledge and skills amongst UKZN staff members concerning the importance of energy, water and waste management and its resulting impact on the economy, environment and society. There was a culture of staff and students living in the residences who did not hold themselves accountable for switching off lights, air conditioners, stoves and other electrical devices when not in use.

6.2.4 Communication

There was a clear lack of communication between departmental heads and line managers. Staff worked in silos to achieve sectional goals rather than departmental and institutional goals. The break in communication amongst the different structural heads has created problems in managing sustainability initiatives to achieve departmental and institutional goals.

6.2.5 Physical Infrastructure

The research finds that the equipment, pipes and buildings were old and outdated and thus consumed a lot of energy and water. There were no inspections and audits to detect problems at an early stage to reduce costs and prevent total shutdown. The research finds that UKZN was slow to embrace innovative technology and suggestions were made to replace the old technology with new innovative technology that consumed less energy and water. However, the challenge lies with funding for innovative technology.

6.2.6 Collaboration

The research finds that UKZN has not been progressive in collaborating with the private and public sectors. UKZN has, therefore, not benefited from the opportunities of collaboration with the energy, water and waste sectors.

The research concludes that UKZN has made some progress in the management of energy and water. However, it finds that UKZN is lacking in the area of waste management. Furthermore, the research concludes that UKZN was not able to fully implement and manage sustainability initiatives due to a number of internal and external challenges. In the light of these challenges, the researcher has made some recommendations to CMS management to improve in the area of energy, water and waste so that UKZN economy, environment and society benefits.

6.3 RECOMMENDATIONS

The following recommendations made are based on the findings of the research.

6.3.1 The management of energy should be monitored and audited

The findings reveal that there are electronic energy management systems in place but no one is monitoring and auditing the systems in terms of energy usage and consumption. It is thus difficult to know whether or not the present systems are working well enough to yield savings in energy. There is a need to implement monitoring systems to improve the management of energy so that UKZN benefits from the energy savings.

The research finds that UKZN CMS initiated a number of sustainability energy initiatives in an attempt to manage energy; there are a number of research projects and work-in-progress projects on energy management. The challenge lies in funding for sustainability projects. The majority of respondents interviewed made an appeal that UKZN investigates different sources of funding to undertake sustainability projects, as research is important for the improvement of sustainability initiatives. It is recommended that the sustainability projects for energy be included in the operational plan and budget of CMS.

Policies guide all activities of the institution and it was recommended that the institution plus CMS have policies for energy management.

6.3.2 The implementation of a water management system

The results reveal that UKZN implemented a number of water sustainability initiatives to manage the water usage and consumption but the lack of a monitoring and auditing tool means that UKZN cannot tell if water is being managed well or wasted. The researcher is of the opinion that research should be carried out on Smart Meters before implementation, as research is important to identify whether this equipment will yield water savings and economic benefits.

The results find that there are a number of research projects and work-in-progress projects on water management. The challenge lies in funding for sustainability projects. The majority of respondents interviewed made an appeal that UKZN investigates different sources of funding to undertake sustainability projects, as research is important for the improvement of sustainability initiatives. It is recommended that the sustainability projects for water be included in the operational plan and budget of CMS.

Policies guide all activities of the institution and it is recommended that the institution plus CMS have policies on water management.

6.3.3 The development of a waste management system

The findings reveal that waste management was not a priority compared to the energy and water management at UKZN. This is despite the fact that research shows that improving the management of waste can yield environmental, economic and societal benefits. The researcher recommends that research be carried out so that a proper waste management system can be implemented for all campuses to sort out the different waste types with the intention of benefiting UKZN. There are benefits for recycled, reduced and reused waste and some of the respondents interviewed recommended that UKZN collaborate with the waste sectors on waste management so that reused, reduced and recycle waste can benefit UKZN. The researcher is of the opinion that CMS makes contact with Prof Christina Trois (UKZN), an expert in the area of waste management, to assist with devising systems for the different

waste types. Research undertaken by Cristina Trois on waste has shown that South Africa is improving in the area of waste management and is collaborating with partners so that waste can be seen as a resource rather than a waste (Frost, 2015). There should be systems to manage the different hazardous waste in an effort to promote and protect the environment and humans.

Waste management is a global problem and the researcher recommends that there should be government intervention so that designated funds from the government can help UKZN to develop a proper waste management system.

Policies guide all activities of the institution and it is recommended that the institution plus CMS have policies on waste management.

6.3.4 Software system should be implemented to improve the flow of information from and to municipality

The results find that the shortcomings at the municipality have been the biggest challenge in the management of energy, water and waste and the gap lies in poor communication channels. The researcher recommends that UKZN tries to bridge the communication gap between UKZN and the municipality by implementing a software system to improve the communication so that timeous decisions are made concerning campus disruptions. CMS should make contact with ICT concerning communication software packages.

The findings reveal that the municipality infrastructure has been poor and that there is a lack of good governance. The researcher recommends that more research be done at a municipal level to improve municipal infrastructure and governance. This would improve the management of sustainability initiatives at an institutional level. Research done at University of KwaZulu-Natal (UKZN) on waste management has developed a waste management model with strategies that municipalities can use to manage waste (Frost, 2015).

6.3.5 The employment of skilled, knowledgeable, committed and dedicated staff

The findings reveal that there was a shortage of staff to manage the daily operational work of energy and water and that this had created challenges in the management of sustainability initiatives. Due to the problem of staff shortage, the researcher recommends that CMS examines the current staffing situations in energy and water with a view to deploying staff with the right skills and knowledge to improve in the area of sustainability initiatives.

The findings reveal that there is no dedicated internal staff to manage waste and the researcher recommends that CMS management deploy staff from within CMS to manage waste initiatives.

6.3.6 There should be a culture of learning and a culture of engagement

The results of the research reveal that the majority of respondents identified that skills, knowledge and awareness were very important for departmental and institutional success. The majority of respondents interviewed indicated that it was important to empower staff with the relevant knowledge and skills, particularly managers, so that they may have a clear understanding of the importance of sustainability initiatives and their resulting impact on the economy, environment and society. The researcher recommends that CMS adopts a culture of learning by implementing training programmes and workshops to increase knowledge and skills, and that these should be ongoing. It is important that everyone at CMS be involved in improving sustainability initiatives. A team effort would facilitate interest, enthusiasm and commitment to improving sustainability initiatives.

It is recommended that employees should be educated about and encouraged to switch off lights, computers, printers, copiers, air conditioners, boilers and other energy using devices and equipment at the close of the day to save energy and other costs. Leaking taps should be closed to reduce the water costs. This must be an established office culture.

It is recommended that employees be encouraged to open their office curtains and blinds during the day and work with natural light to avoid switching on electric lights when sunlight is available. This would save energy and unnecessary costs.

6.3.7 Bridging the gap between Campus Leadership and Sub-ordinates

The findings reveal that there was a communication gap between the departmental heads and managers as the departmental heads are based at the Durban campuses of UKZN (Howard College and Westville campus) and the middle managers at the Pietermaritzburg campus. Not everyone is aware of the sustainability initiatives that are being planned to address the energy, water and waste problems. Top management plays a vital role in the management of sustainability initiatives and improving the communication channel between top managers and middle managers.

The support from top management can help improve the management of sustainability initiatives and can contribute to the success of the department and the institution. Top managers must guide middle managers in, and implement policies on, the management of sustainability initiatives so that middle managers can be guided by these policies and accordingly help solve problems. Managers are visionaries and implementers, they are the captains of the organization, and if they do not steer the ship in the right direction, the ship can sink. Management commitment is, therefore, important for institutional success. As managers are responsible for making financial decisions, it is important for management to buy into improving the management of sustainability initiatives so that there can be departmental and institutional success.

The researcher recommends that the top managers and middle managers make use of technological facilities, such as video conferencing and Skype, so that regular meetings can be held. This will help bridge the communication gap and, also, reduce travel costs.

A respondent interviewed hopes that the employment of the Campus Director will serve as a communication link between Campus Management and University Management so that issues raised by CMS are addressed at various structures so that departmental and institutional goals are achieved in the management of sustainability initiatives.

6.3.8 To embrace innovative technology

As revealed from the interviews, UKZN has not kept up with innovative technology as the pipes and infrastructure are old and outdated and this has increased the maintenance costs. The researcher recommends that old and outdated equipment be replaced with new, innovative technology which consumes less energy and water, thereby creating opportunities and minimizing threats. The researcher feels that, even though innovative technology can create opportunities, more research must be done on technology, as not all technology can be beneficial as it has its own limitations and problems. Some technology is useful in creating opportunities and minimizing threats so it is important to identify the technology which will, indeed, create opportunities and minimize threats in an effort to improve UKZN's environment and economy.

Some of the respondents interviewed recommended that there should be regular audits, inspections and maintenance checks by maintenance providers to identify faulty equipment at an early stage and, in so doing, prevent additional costs, shutdowns and delays. There should be a designated budget for the purchase and maintenance of the equipment.

The use of generators should be reduced. The researcher recommends that new buildings be designed in a way that makes use of natural lighting in order to reduce energy costs. This option will not work for old buildings which were not designed for natural lighting. Old geysers consume a lot of energy and, therefore, the researcher recommends that geysers be replaced with new technology, such as heat pumps.

The researcher recommends that the burst pipe in Pietermaritzburg should take top priority in being fixed as lots of water and money is being wasted on a daily basis. Some of the respondents interviewed identified the use of JoJo tanks to capture this water to be used in the sports field and irrigation in an attempt to reduce the municipality water bills. CMS management must take the responsibility to address and find the solution to this problem.

6.3.9 Collaborating and partnering with the private/public sectors

The findings reveal that UKZN has been slow to collaborate and partner with the private and public sectors and, in the process, has not benefited from experts in the field of energy, water and waste to better manage sustainability initiatives and in an effort to promote and protect UKZN economy, environment and society. The researcher recommends that CMS identifies experts in the fields of energy, water and waste so that UKZN can benefit in the long term by improving in the management of sustainability initiatives.

The findings reveal that, despite solar energy being the best way forward in providing sustainability and clean energy, it is expensive. A respondent indicated that higher education institutions cannot rely solely on renewable energy as it is costly. More research needs to be done on renewable energy so that there is an option in making use of multiple energy sources such as renewable energy and municipal supplied energy. UKZN should partner and collaborate with the renewable energy sectors so that UKZN can benefit from the partnership. Renewable energy provision should be work in progress.

As rainwater harvesting is a challenge for UKZN, the researcher is of the opinion that CMS makes contact with water experts to improve in the management of rainwater harvesting so that research can be carried out at UKZN in an effort to improve the management of water sustainability initiatives.

6.3.10 Benchmarking

The researcher feels that more research like the current research study must be carried out with other similar institutions within KwaZulu-Natal to see how they are achieving their sustainability initiatives, to benchmark and measure performance so that gaps can be identified, and to improve performance in the management of energy, water and waste in an effort to promote and protect the economy, environment and society.

The findings reveal that UKZN has a sustainability plan in place for energy, water and waste management and the researcher is of the opinion that the sustainability plan must be a guide for CMS to implement sustainability initiatives. The sustainability plan must be revisited to make sure that the objectives are achieved in line with the sustainability model otherwise the sustainability plan will not work. It is recommended that the sustainability initiatives for energy, water and waste be clearly stated in the sustainability plan. The sustainability plan will also help CMS to monitor the progress in achieving sustainability goals.

6.4 LIMITATIONS

The researcher has identified that there is a gap in published knowledge on sustainability initiatives managed by higher education institutions in Africa. This research, by using the case study of UKZN from a South Africa perspective, will be important as it will provide some insight into the management of sustainability initiatives. The study is limited to the UKZN management staff and, therefore, having concentrated on a single institution, cannot be generalized to a wider audience. The researcher is of the opinion that future research should include more than one institution so that the findings can be generalized to other similar education institutions. Despite using a single institution (UKZN) as the case study, the researcher feels that UKZN, being one of the largest higher education institutions on the continent, and comprising a lot of complex infrastructures on its five campuses, is large enough to conduct research on sustainability initiatives in the management of energy, water and waste. In addition, the strength of this study is based on that fact that very little research has been covered on managing sustainability initiatives for energy, water and waste in African higher

education institutions. Therefore, this research provides some insight into the challenges and issues affecting the management of energy, water and waste at higher education institutions. In the context of UKZN, the researcher feels that this research would be important to explore and document the sustainability initiatives managed by UKZN CMS and identify the gaps affecting them, so that the researcher can make recommendations to management.

6.5 FUTURE RESEARCH

This research merely gives an insight into the management of sustainability initiatives for higher education institutions using UKZN CMS as a case study. This research was done on a single institution so comparisons cannot be made with other similar institutions. The researcher recommends that more research on the management of sustainability initiatives needs to be done on more than one institution in KwaZulu-Natal so that comparisons can be made on similarities and differences to create a benchmark for performance. As this research was broad, the researcher recommends that more in-depth studies be done on energy management, water management and waste management so that in-depth, detailed information for the improvement of the management of sustainability initiatives can be identified.

The researcher identifies that some universities in South Africa have done research on the management of sustainability initiatives, such as University of Cape Town, University of Stellenbosch, University of Western Cape, Rhodes University, University of KwaZulu-Natal, Vaal University of Technology, North West University, Cape Peninsula University of Technology, University of Limpopo, Durban University of Technology, University of Witwatersrand and the University of Pretoria. It is imperative that research be undertaken at all of the remaining higher education institutions in South Africa so that an overall picture on sustainability initiatives for energy, water and waste can be developed with the intention of developing a national strategy and, also, so that benchmarks can be established.

6.6 OVERALL CONCLUSION

Sustainability is a challenge in higher education institutions. This current study sets out to investigate the role of UKZN CMS in managing sustainability initiatives for energy, water and waste and contributes to the growing body of knowledge regarding sustainability initiatives managed by higher education institutions in the management of these areas.

This chapter also addresses the research objectives and research questions of the research. The results show that UKZN made some progress in managing sustainability initiatives for energy and water but that there is still work to be done to improve the management of sustainability initiatives. There are no systems for waste management. CMS Management should prioritize waste management in an effort to promote and protect UKZN economy, the environment and society.

The major themes identified, such as types of management systems for energy, water and waste, tie in with literature which states that systems are important. However, the systems need to be audited and monitored so that the economy, environment and society may benefit. Furthermore, this research finds a number of external and internal challenges, such as inefficient municipal services, staffing problems, lack of knowledge and skills, poor communication from top management and a slowness to embrace innovative technology, all of which ties in with literature which states that these challenges can create barriers to the management of sustainability initiatives. It is important to carry out research and further studies on these challenges so as to improve the management of sustainability initiatives.

Ultimately CMS Management plays an important role in the management of sustainability initiatives as, in order to benefit the institution, it is in a position to make decisions on funding for sustainability practices as well as decisions pertaining to human resources. Management should take the lead with CMS to recommend, initiate and implement sustainability practices in an effort to benefit UKZN's economy, the environment and society.

This is a small-scale study and the findings should not be generalised for other similar institutions. This research was qualitative and did not include quantitative data. It is therefore difficult to know whether or not the findings are credible, transferable, confirmable and acceptable as the research concentrated on only a single institution. This research merely provides an insight into the management of sustainability initiatives for energy, water and waste by using UKZN as a case study. It is important that other higher education institutions wanting to adopt these recommendations make a careful study hereof, before implementation, in order to identify whether or not they can be used to achieve their own particular objectives.

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ANNEXURE A: PERMISSION TO CONDUCT RESEARCH



15 June 2018

Mrs Camilla Laban (SN 200276479) School
of Management, IT and Governance College
of Law and Management Studies
Pietermaritzburg Campus
UKZN

Email: labanc@ukzn.ac.za Chiweshen@ukzn.ac

Dear Mrs Laban

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN), towards your postgraduate studies, provided Ethical clearance has been obtained. We note the title of your research project is:

"An exploratory Study of Sustainability initiatives: A Case of UKZN Campus Management Services".

It is noted that you will be constituting your sample by conducting interviews with full time Management staff on the Pietermaritzburg campus.

Please ensure that the following appears on your notice/questionnaire:

- Ethical clearance number;
- Research title and details of the research, the researcher and the supervisor;
- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
- gatekeepers approval by the Registrar.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book. Identity numbers and email addresses of individuals are not a matter of public record and are protected according to Section 14 of the South African Constitution, as well as the Protection of Public Information Act. For the release of such information over to yourself for research purposes, the University of KwaZulu-Natal will need express consent from the relevant data subjects. Data collected must be treated with due confidentiality and anonymity.

Yours sincerely

MR SS MOKOENA
REGISTRAR

Office of the Registrar

Postal Address: Private Bag X54001, Durban, South Africa

Telephone: +27 (0) 31 260 8005/2206 Facsimile: +27 (0) 31 260 7824/2204 Email:
registrar@ukzn.ac.za Website: www.ukzn.ac.za

ANNEXURE B: INFORMED CONSENT LETTERS

COVERING LETTER AND INFORMATION CONSENT

Informed Consent Letter

UNIVERSITY OF KWAZULU-NATAL
School of Management, IT and Governance

Dear Respondent,

Research Project

Researcher: Comilla Laban Telephone number: 033-2606295 Email: labanc@ukzn.ac.za
200276479@stu.ukzn.ac.za

Supervisor: Mr Nigel Chiweshe (Telephone number: 033-2605355 (Email: Chiweshen@ukzn.ac.za

Research Office: Humanities & Social Sciences Research Ethics Administration, Govan Mbeki Building,
Westville Campus, Tel: + 27 (0)312608350, Email: hssreclms@ukzn.ac.za

I, Comilla Laban am an M Com student in the School of Management, IT and Governance], at the University of KwaZulu-Natal. You are invited to participate in a research project entitled: An exploratory Study of Sustainability Initiatives: A case of UKZN Campus Management Services.

The aim of this study is to explore sustainability initiatives managed by UKZN Campus Management Services.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this research project. Confidentiality and anonymity of records will be maintained by the researcher and School of Management, IT and Governance, UKZN. All collected data will be used solely for research purposes and will be destroyed after 5 years.

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number HSS/0847/018M).

The interview should take about 60 minutes to complete. Thank you for your time.

Sincerely

This page is to be retained by participant

**UNIVERSITY OF KWAZULU-NATAL
School of Management, IT and Governance**

Research Project

Researcher: Comilla Laban Telephone number: 033-2606295 (Email: labanc@ukzn.ac.za
/200276479@stu.ukzn.ac.za

Supervisor: Mr Nigel Chiweshe (Telephone number: 033-2605355 (Email: Chiweshen@ukzn.ac.za

Research Office: **Humanities & Social Sciences Research Ethics Administration, Govan Mbeki Building,
Westville Campus, Tel: 27 31 2604557, Email: HSSREC@ukzn.ac.za**

CONSENT

I _____ (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire.

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview YES / NO

Signature of Participant

Date

ANNEXURE C: INTERVIEW SCHEDULE

Interview Guide

Energy Management

- 1) Would you discuss the energy management systems that are in place to address the energy problems?

- 2) Would you describe the external challenges that are affecting the management of energy?

- 3) Would you describe the internal challenges that are affecting the management of energy?

- 4) Would you describe the gaps identified in the management of energy?

- 5) Would you discuss the possible solutions to the problems experienced in the management of energy?

Water Management

- 6) Would you discuss the water management systems that are in place to address the water problems?

7) Would you describe the external challenges that are affecting the management of water?

8) Would you describe the internal challenges that are affecting the management of water?

9) Would you describe the gaps identified in the management of water?

10) Would you discuss the possible solutions to the problems experienced in the management of water?

Waste Management

11) Would you discuss the waste management systems in place to address the waste problems?

12) Would you describe the external challenges that are affecting the management of waste?

13) Would you describe the internal challenges that are affecting the management of waste?

14) Would you describe the gaps identified in the management of waste?

15) Would you discuss the possible solutions to the problems experienced in the management of waste?

ANNEXURE D: ETHICAL CLEARANCE LETTER



23 July 2018

Mrs Comilla Laban (200276479)
School of Management, IT & Governance
Pietermaritzburg Campus

Dear Mrs Laban,

Protocol reference number: HSS/0847/018M

Project Title: An exploratory study of Sustainability Initiatives: A case of UKZN Campus Management Services

In response to your application received 05 July 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

Approval Notification – Expedited Application

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shamila Naidoo (Deputy Chair)

/ms

Cc Supervisor: Mr Nigel Chiweshe
Cc Academic Leader Research: Professor Isabel Martins
Cc School Administrator: Ms Debbie Cunyngame

Humanities & Social Sciences Research Ethics Committee

Professor Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

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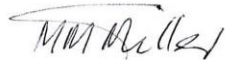
**ANNEXURE F: LETTER CONFIRMING PROOFREADING AND EDITING OF
DISSERTATION**

TO WHOM IT MAY CONCERN

18 July 2019

I confirm that, at the request of the author Comilla Laban, I language edited a manuscript entitled:

An Exploratory Study of Sustainability Initiatives: A Case of UKZN Campus Management Services



May-Muriel Miller MTh (UKZN)