



Exploring Solid Waste Management (SWM) Behaviour in Etosha National Park, Namibia

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PREFACE AND ACKNOWLEDGMENTS

“It is right to protect what is wondrous and wrong to destroy it. This is part of what “right” means – to enhance, rather than diminish, what is of value.”

Kathleen Dean Moore *Moral Ground: Ethical Action for a Planet in Peril*

Due to the limited research on waste-related behaviour in protected areas, this research aimed to understand waste management behaviour within Etosha National Park, Namibia, through an adapted Theory of Planned Behaviour (TPB).

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ABSTRACT

The expansion of tourism activities in protected areas increases the potential for waste generation, posing a threat to these sensitive environments. Despite growing environmental concerns around waste management in Southern African protected areas, research on waste management practices in Namibia's national parks remains sparse, particularly from a behavioural point of view. This study aims to explore the factors influencing solid waste management behaviour in Etosha National Park (ENP), employing an extended Theory of Planned Behaviour (TPB) as a framework to identify challenges and opportunities for improvement. The focus is placed on the behaviours of both tourists and staff members within ENP.

The research was conducted from 2022 to 2024, with on-site data collection carried out from 28 April 2023 to 2 May 2023. A total of 57 tourists and 18 staff members participated in structured survey questionnaires designed according to the TPB framework. Tourist data was gathered exclusively from the main camp, Okakuejo, (n=57), while staff data was collected from Okakuejo Camp (n=8), Dolomite Camp (n=4), Olifantsrus Camp (n=2), and Galton Gate Camp (n=4). In addition, observations across central and western parts of the park provided insights into the real-world waste management conditions. Structured open-ended questions and semi-structured interviews were used to assess the perceived challenges and opportunities for improving waste management behaviour, as well as future prospects for waste management within the park.

The results of this research indicate that tourists generally held positive attitudes towards waste management and perceived it as well-managed within ENP. Awareness and perceived moral obligation were found to be most influential when attempting to understand the behavioural intentions of participants. However, some international tourists identified areas for improvement, such as enhancing waste management infrastructure, services, and public education. Staff responses suggested that, while waste management practices were considered adequate, there were observed instances of littering and insufficient waste separation in staff areas, attributed to limited waste services.

This study faced some limitations, especially regarding the number of staff members who were willing to participate in the research. It is recommended that future research be focussed on improving the sample size of staff – by including all camps within the park and employing local researchers. This will provide a comprehensive understanding of the state of waste management in ENP.

Despite the relatively low volume of waste generated within the park, inefficient waste management still poses a potential threat to the park's environment. This research contributes to the literature on waste management in the protected area context by extending the TPB. It is hoped that the findings of this study can aid interventions aimed at improving the factors that influence the intentions of individual's within ENP to participate in responsible waste management.

Keywords: *Theory of Planned Behaviour (TPB), waste behaviour, protected area (PA), Etosha National Park (ENP), Namibia.*

ABBREVIATIONS AND ACRONYMS

A	Attitude
AW	Awareness
B	Behaviour
BNP	Bwabwata National Park
CBO	Community Based Organisation
EC	European Commission
ERB	Environmentally Responsible Behaviour
EMA	Environmental Management Act
EMP	Etosha Management Plan
ENP	Etosha National Park
FNAS REC	Faculty of Natural and Agricultural Sciences Research Ethics Committee
GDP	Gross Domestic Product
HIC	High Income Countries
I	Intention
IUCN	International Union for Conservation of Nature
KNP	Khaudum National Park
LAA	Local Authority Act
LIC	Low Income Country
MET	Ministry of Environment and Tourism
MEFT	Ministry of Environment, Forestry and Tourism
MRF	Material Recovery Facility

MSW	Municipal Solid Waste
MNP	Mudumu National Park
NAM	Norm Activation Model
NGO	Non-Governmental Organisation
NNP	Namib Naukluft Park
NWR	Namibia Wildlife Resorts
NSWMS	National Solid Waste Management Strategy
PBC	Perceived Behavioural Control
PMO	Perceived Moral Obligation
PPE	Perceived Policy Effectiveness
RNF	Recycle Namibia Forum
SCNP	Skeleton Coast National Park
SN	Subjective Norms
SF	Situational Factors
SWM	Solid Waste Management
SWMP	Solid Waste Management Plan
TA	Thematic Analysis
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UNCTAD	United Nations Conference on Trade and Development
VBN	Value Belief Norm
VIF	Variance Inflation Factor
WTTC	World Travel and Tourism Council

KEY DEFINITIONS

Attitude:

In terms of the Theory of Planned Behaviour (TPB), attitude refers to “*a disposition to respond favourably or unfavourably to an object, person, institution, or event*” (Ajzen, 2005:3).

Awareness:

Awareness is defined as an “*individuals’ ability to directly know, perceive, feel or to be conscious of events or happenings in his or her immediate environment*” (Kazaure, 2019).

Behaviour:

Behaviour is the “*mannerisms, actions and conduct of individuals in a situation or towards other people*” (Uher, 2016).

Environment:

Environment means “*the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including - (a) the natural environment that is the land, water and air, all organic and inorganic material and all living organisms; and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values*” (Environmental Management Act 7 of 2007).

Intention:

Intention entails “*the factors that motivate an individual to perform a behaviour, or the amount of effort individuals are willing to expend performing a behaviour*” (Ajzen, 1991).

Perceived behavioural control:

In the context of the TPB, perceived behavioural control is “*the sense of self-efficacy or ability to perform the behaviour of interest*” (Ajzen, 2005), or the “*factors that can facilitate or impede performance of the behaviour*” (Ajzen, 2020).

Perceived moral obligation:

In the context of the TPB, perceived moral obligation is defined as “*an individual’s judgment of moral correctness of performing a specific behaviour*” (Babazadeh et al., 2023).

Perceived policy effectiveness:

In the context of TPB, perceived policy effectiveness is “*an individual’s favourable or unfavourable evaluation on the clarity, adequacy and facilitation of policy measures*” (Wan et al., 2014a).

Protected area:

A “protected area” is defined by the Namibian Nature Conservation Ordinance 4 of 1975 as “*a geographical area that has been declared to be a game park or nature reserve under section 14*”. where “*The Minister may declare any area a game park or a nature reserve for the propagation, protection, study and preservation therein of the wild animal life, fisheries, wild plant life and objects of geological, ethnological, archaeological, historical and other scientific interest and for the benefit and enjoyment of the inhabitants of Namibia and other persons*”.

Situational factors:

In the context of TPB, situational factors refer to the “*actual resources and opportunities available to an individual within a specific context that will determine the likelihood of the individual performing a behaviour*” (Ajzen, 2005).

Subjective norms:

In the context of TPB, subjective norm is “*the perceived social pressure to perform or not to perform the behaviour*” (Ajzen, 1991).

Theory of Planned Behaviour (TPB):

The Theory of Planned Behaviour is a psychological model used to understand and predict behaviour. It is assumed that individuals will act in a sensible manner, according to certain beliefs (Ajzen 1991; Ajzen, 2005; Ajzen, 2011).

Waste:

“*Wastes are undesirable or superfluous by-products, emissions, or residues of any process or activity that have been disposed of or accumulated for the purpose of disposal. Waste products may be gaseous, liquid or solid or any combination thereof*” (MET, 2003).

Waste management hierarchy:

The principles of the waste hierarchy advocate that “*waste minimisation and recycling is preferred to waste treatment and disposal*” (MET, 2017).

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CHAPTER 1 INTRODUCTION

12.1 Background

The environment is described by Arihila and Arihila (2019:54) as *“a biological, physical, social, economic and cultural habitat in which the living beings maintain their relationships throughout their lives and in their mutual interaction”*. The importance of the interactions between living things and the environment can, therefore, not be understated (Arihila & Arihila, 2019). The unintentional damage to the environment is, however, often the result of these interactions. A growing population increases resource consumption, leading to the increase in the production and exploitation of natural resources. This results in an increase in the generation of waste, which increases emissions, pollutions, as well as climate change (Kanivets *et al.*, 2023). Anthropogenic activities not only impact the health and well-being of humans and animals, but may impact biodiversity conservation and cause environmental degradation, ecological depletion, and economic losses (Chen *et al.*, 2014; Harris, 2010). The impact of human activities on the environment is a complex process requiring a holistic approach to minimise its adverse effects. Kanivets *et al.* (2023:2) state that this can be done by reducing harmful emissions, reducing pollution, and improving waste management. By understanding and managing these activities, sustainable development can be ensured.

Vulnerable areas, in particular, are sensitive to anthropogenic activities. In attempts to aid environmental, ecological, and cultural conservation, a key strategy is the establishment of Protected Areas (PAs) through legislation (IUCN, 2016). PAs restrict human activity in attempt to mitigate biodiversity loss, promote sustainable development, and conserve ecosystems. PAs are formally defined as *“a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”* (IUCN, 2016). PAs also offer additional benefits in that they promote clean water and air, decrease the chances of natural disasters and climate change, as well as increase economic and recreational opportunities.

Declaring an area as a PA, however, is not enough. Each PA is unique in terms of its function, resource use, land ownership, and management authority. As a result, several challenges are faced by PAs. These include poaching, inadequate resources, land development, inadequate governance and management, and human intrusion (Nyaupane *et al.*, 2020). These challenges should be mitigated towards the aim of sustainable development. PAs may have multiple goals that may, according to Borrini-Feyerabend and Hill (2015:175), contradict each other. It is, therefore, important to balance development and conservation efforts. PA

management paradigms have expanded and evolved since the establishment of the first formal PA in the United States of America in 1872 (Yellowstone National Park) (Nyaupane *et al.*, 2020). In 1971, the number of PAs globally increased to 20 054 and in 2020 to 258 608 (IUCN, 2020). As of November 2024, there were a total of 303 309 PAs worldwide covering an area of approximately five million km² (UNEP-WCMC & IUCN, 2024).

Approximately 37% of Namibia's land surface is conserved, with 17% attributed to protected areas and 20.2% to communal conservancies (MET, 2010a). There is a total of 20 state run protected areas, covering an area of 140 394 km². Important species and habitats are conserved in these PAs. These areas are not only important to conserve biodiversity but contributes to the national economic development as well (MET, 2010b). Etosha National Park is (ENP) is one of the largest and oldest national parks in Africa (MEFT, 2024). The park includes a 4730 km² salt pan and is internationally renowned for the conservation of wildlife, namely, elephant, black rhino, cheetah, leopard, black-faced impala, and blue crane (UNESCO, 2024; MET, 2010b). Additionally, ENP is home to 114 mammal species, 400 bird species, as well as fish and reptile species (MEFT, 2024).

As stated earlier, PAs provide economic and recreational opportunities in the form of tourism, and are, therefore, valuable in that regard. Tourism, as an industry, has grown exponentially in recent years (Manzoor *et al.*, 2019; Ocheni *et al.*, 2020; Qin *et al.*, 2018). As reported by the World Travel and Tourism Council (WTTC, 2023), tourism contributed to approximately 7.6% of the global gross domestic product (GDP) in 2022. This percentage is even greater in countries which rely heavily on the contribution of tourism to their economy.

This is found to be true for many African countries. The overall contribution of tourism to Africa's GDP is 4.3%, with a high of 62.1% in the Seychelles, and a low of 1.6% in the Democratic Republic of Congo (UNWTO, 2023). It should be noted that certain countries (Djibouti, Equatorial Guinea, Eritrea, Guinea-Bissau, Liberia, Mauritania, Somalia, and South Sudan), however, had no available data.

The tourism industry accounts for 14.5% of Namibia's GDP (with 3.5% contributing directly to the GDP, and 11.5% indirectly) and is the fastest growing economic sector (MEFT, 2022b). Tourism contributes not only to employment, but the reduction of poverty, the development of rural areas, and an increase in investments in the country as well (Republic of Namibia, 2017). Namibia's protected area system, in particular, is estimated to contribute 3.8% to the Gross National Income (MET, 2010a). The Namibian Ministry of Environment and Tourism (MET, 2019) has found that the number of tourists visiting Namibia per year have increased from 272 000 visitors in 1995 to 1.68 million in 2019. An exponential increase in tourists was observed

pre-COVID19, with a 32% increase in tourists from 2010 to 2019. There was, however, a considerable decrease in tourists from 2019 to 2020, with numbers decreasing from approximately 1.59 million to 169 565 (89.4% decrease) (MEFT, 2020). This number continued to decline to almost zero throughout the year (MEFT, 2020). This decline was a result of lockdown regulations and restrictions placed on travel and tourism at the start of the COVID-19 pandemic. This number has steadily been rising since the ease of these restrictions. A 98.1% increase was observed from 2021 to 2022 demonstrating the steady recovery of their tourism sector (MEFT, 2022a). A total of 461 027 international tourists visited Namibia in 2022 (MEFT, 2022a). A growth in Namibia's African and international tourist market was observed in 2022, indicating the rise in demand for wildlife viewing, scenic excursions, and other tourism related activities (MEFT, 2022a).

This research is set in a context where tourism activities contribute to waste generation, which is of particular concern in Namibian protected areas.

12.2 Problem statement and rationale for the research

The appeal of Namibia's tourism industry is in its distinctive and diverse landscapes and biodiversity. Namibia is home to a wide range of protected areas, covering an estimated 323 180 km² (MCC, 2014). These areas include 19 national parks, one marine protected area, one forest reserve, seven concessions, 33 community forests, 79 communal conservancies, as well as private protected areas.

Tourists tend to frequent unique and fragile environments (Bushell & Bricker, 2017), of which some activities may be detrimental to the environment. With the increase in tourist flows, there is also an increase in deforestation and pollution, the overconsumption of resources, and of particular concern to this study, the generation of waste (Belsoy *et al.*, 2012). The generation of waste by tourists, as stated by Przydatek (2019) and Steg and Vlek (2009), is one of the greatest threats to the sustainability of PAs. Waste places significant pressure on the waste management facilities and services of tourist destinations. Not only does waste cause direct pollution through the contamination of air, water, and soil, but it causes visual or aesthetic impacts as well (Dileep, 2007). The ecotourism experiences of visitors are also influenced by pollution, as cited by Kimaro *et al.* (2015:124), Roos *et al.* (2021:39), and Zajchowski *et al.* (2019:3).

Although the ultimate purpose of a PA is to conserve an area, the success of these conservation efforts relies heavily on the area's effective management (Bhammar *et al.*, 2021; Bushell & Bricker, 2017). Sustainable waste management is, therefore, of utmost importance.

The strategic framework for waste management in Namibia is supported by the Environmental Management Act (*Environmental Management Act 7 of 2007*). The sustainable management of the environment and natural resources is provided for in this Act to mitigate and effectively manage any activities that could damage the environment (*Environmental Management Act 7 of 2007*). According to Kadhila (2019:10), however, many municipalities or cities in Namibia do not have any strategies or policies put in place to effectively manage solid waste. Although there are no pieces of legislation or regulations that solely focus on waste management in PAs, there are certain regulations that allude to waste management within these areas. One piece of legislation, namely the Nature Conservation Ordinance (Ordinance No. 4 of 1975) was amended in 2017 to include the banning of plastic bags in PAs (Government Notice No. 85 in Government Gazette No. 6285, 13 April 2017). Further, Namibia's National Solid Waste Management Strategy (NSWMS) provides for the selection of landfill sites that are at least 1km from PAs (MET, 2017). As can be seen the legal framework that exists is broad, with no detailed SWM regulations related specifically to PAs (MCC, 2014).

The mismanagement of waste results in numerous environmental and health consequences. This is especially true for vulnerable and sensitive environments, like PAs. According to MCC (2014:1), the current state of SWM in Namibia's national parks is inadequate. Although the waste generation rates of these areas are typically low, ineffective management continues to pose a threat to the environment. There are numerous challenges faced by these parks, which are outlined in the MCC (2014) report, and include irregular waste collection, the absence of waste separation facilities, animal scavenging, waste burning, large transport distances and costs, and a lack of awareness programmes.

Despite these concerns, there is limited formal research conducted on waste management within national parks in Namibia. Furthermore, there is no published research on waste management in Namibian PAs from a behavioural perspective. It is recognised that human behaviour plays a crucial role in responsible waste management in PAs (Roos *et al.*, 2023). Due to the rapid increase in waste generation and the subsequent impact on the natural environment, the importance of understanding waste behaviour has become apparent.

By understanding waste management in PAs, as well as the waste behaviour of individuals within PAs, efficient decision-making may be made regarding sustainable waste management. Furthermore, this research may highlight aspects for possible intervention that would have the most impact when attempting to positively change behaviour towards effective waste management. Behaviour is conceptualised and defined in a number of ways through different models and theoretical frameworks. This research is grounded on the TPB, which attempts to understand and predict social behaviours (Ajzen, 2011).

The TPB suggests that behaviour is influenced by determinants, where the dominant determinant of behaviour will also be addressed in this study. By knowing which determinant has the greatest effect on behaviour, one may guide initiatives towards the successful adoption of positive waste behaviours. Previous research related to the TPB has been found to be advantageous in studying waste-related behaviours (Armitage and Conner, 2001; Huffman *et al.*, 2014; Razali *et al.*, 2020). The majority of TPB research has, however, been focussed on household-related waste behaviour. Limited research has been done on the TPB to determine waste-related behaviour in South African PAs (Harper *et al.*, 2022; Roos *et al.*, 2021). This research suggests that behaviour plays an important role towards determining waste management practices within PAs, especially in the developing country context. These authors suggest further research on waste management behaviour in other PAs in South Africa and elsewhere in Africa.

This research focused on waste management behaviour in a Namibian protected area, namely Etosha National Park (ENP). ENP's long-term mission in the larger PA network of Namibia is to achieve *“the effective management and sustainable use of biodiversity to develop and enhance socio-economic benefits through the development of appropriate opportunities, especially tourism, for present and future generations, locally, nationally and internationally”* (MET, 2007).

Towards the achievement of this mission, the Etosha Management Plan (EMP) identifies certain strategic objectives. Of relevance to this study is the sustainable use of biodiversity, the utilisation and development of opportunities for sustainable tourism, as well as the restoration and maintenance of ENP as an international symbol of conservation and tourism (MET, 2007). With approximately six tonnes of waste being produced per week in ENP, ineffective SWM has been found to be a major problem (MCC, 2014). The challenges faced by the park reflect the challenges of other PAs in Namibia, as mentioned above (MCC, 2014).

To gain a holistic understanding of waste management in ENP, it is essential to consider not only tourist waste, but non-tourist waste as well. Furthermore, to improve the effectiveness of PA management, some authors have cited participation of certain stakeholders, such as staff, as an important aspect of developing management strategies (Allen *et al.*, 2019; Luyet *et al.*, 2012). By including staff in the decision-making processes, several benefits were identified. These included improved communication, buy-in and support from staff, as well as strategies that are context-specific (Allen *et al.*, 2019; Stringer *et al.*, 2006). For this reason, waste-related behaviour by tourists and staff were considered for the purposes of this research.

12.3 Research aim

The aim of this research is to explore SWM behaviour in Etosha National Park, Namibia. For this purpose, an adapted version of the Theory of Planned Behaviour (TPB) was applied to understand the underlying factors influencing waste-related behaviour, with the objective of identifying challenges and opportunities for improvement.

12.4 Research objectives

In order to achieve the research aim, three key research objectives have been identified and formulated:

- **Research objective 1:** Developing an adapted version of the Theory of Planned Behaviour (TPB) which is suitable towards understanding waste management behaviour within Etosha National Park;
- **Research objective 2:** Applying the adapted TPB framework to determine the underlying factors (constructs) influencing waste behaviour in Etosha National Park; and
- **Research objective 3:** Exploring opportunities and challenges towards waste management in Etosha National Park.

12.5 The Theory of Planned Behaviour framework

The Theory of Planned Behaviour (TPB), developed by Icek Ajzen in 1985, is a psychological framework used to predict and explain human behaviour in specific contexts. The theory posits that an individual's intention to engage in a behaviour is the most important predictor of whether they will actually do so (Ajzen, 1991; Razali *et al.*, 2020). This intention is influenced by three key factors:

- **Attitude** toward the behaviour: The individual's positive or negative evaluation of performing the behaviour.
- **Subjective norms:** The perceived social pressure from others to perform or not perform the behaviour.
- **Perceived behavioural control:** The individual's belief in their ability to perform the behaviour, which is influenced by past experiences and anticipated obstacles.

The TPB is a more complex theory, compared to other behavioural models such as the Model for Environmentally Responsible Behaviour (ERB) and the Theory of Reasoned Action (TRA). An adapted version of the TPB was selected as the more appropriate framework to explore the research aim. The TPB framework has been adapted and amended over time to include additional factors (Chen & Tung, 2014). Some of these factors include situational factors,

awareness, moral norms, consequences of actions, and individual willingness, among others (Alhassan *et al.*, 2018; Chen & Tung, 2014; Ghani *et al.*, 2013; Kumar, 2019; Pakpour *et al.*, 2014; Razali *et al.*, 2020; Tonglet *et al.*, 2004). The explanatory power of the TPB towards understanding behaviour is greatly increased by adding these factors.

Research objective 1 of this study required the development of an adapted version of the TPB which is suitable towards understanding waste management behaviour within Etosha National Park (as discussed in Chapter 3).

12.6 Delineation of the research scope

The research explored solid waste management (SWM) behaviour in Etosha National Park (ENP) in Namibia. No other protected areas (PAs) other than ENP were included in the research.

Solid waste management is concerned with *solid waste* only and does not include any liquid wastes or sewage. The research focused on *general* solid waste (also referred to as municipal solid waste or MSW), which excluded *hazardous* waste management.

Literature suggests a number of frameworks towards exploring waste-related behaviour. The researcher chose to develop and apply an adapted version of the TPB for this research and specifically focused on the following constructs of the TPB framework, namely attitude (A), awareness (AW), subjective norm (SN), perceived behavioural control (PBC), intention (I), situational factors (SF), perceived moral obligation (PMO), and perceived policy effectiveness (PPE). These constructs were determined based on *self-reported* behaviour of *tourists* and *staff*. No other stakeholder groups were involved in the research. It should be noted that *self-reported* behaviour may be subjective and may not necessarily be an accurate representation of actual behaviour. Observations of waste management practices were done to supplement self-reported behaviour.

The research was conducted during 2022 to 2024, with on-site data collection being undertaken from the 28th of April 2023 to the 2nd of May 2023. Tourist responses were collected from the most popular and occupied main camp, Okakuejo Camp, while staff responses were collected from Okakuejo Camp, Olifantsrus Camp, Namutoni Camp and Galton Gate staff camp.

12.7 Limitations related to the research scope

The research scope is delineated in Section 1.6 above. This research was limited to the geographical area of Etosha National Park (ENP). The research specifically focused on self-

reported waste-related behaviour of tourists and staff. It should be noted that the waste management behaviour of participants was context-specific, especially with regards to the behaviour of staff. The results can, therefore, not as easily be replicated or generalised to other PAs. Only general solid waste was considered in this study, excluding liquid and hazardous waste.

12.8 Potential contribution of the research

This thesis contributes to the growing field of research focused on waste management in PAs, especially from a behavioural perspective.

Scant research has been conducted on this topic in the Southern African context. South African publications since 2019 include research on waste-related behaviour in a marine protected area (Harper *et al.*, 2022), and a private nature reserve (Roos *et al.*, 2021). No published research specifically addressing waste management within conservation or protected areas in Namibia could be located in the public domain. However, the Waste Management Implementation Plan for the Mudumu Landscape in Namibia (MET, 2014) offers valuable background information on waste management practices in selected communal conservancies, national parks, and community forests. The protected area management plans of Namibian national parks also provide some guidance on waste management in these PAs. Insights can also be drawn from existing studies on municipal solid waste management in Namibia by Croset (2014), Mughal (2014), Schioldborg (2014), Ndhlovu (2018), Kalonda and Govender (2021), Nambuli *et al.* (2021), Kadhila and De Wit (2022), as well as Zeriapi and Awofolu (2022). However, these studies primarily focus on municipal solid waste management, including waste characterisation, opportunities and challenges, the impacts of illegal waste disposal, community-based approaches, the livelihood impacts of informal waste reclamation, and waste management in informal settlements. The findings are largely limited to urban centres such as Windhoek, Swakopmund, Tsumeb, Keetmanshoop, Ondangwa, Ongwediva, Oshakati, Katutura township, and the Katima Mulilo Town Council.

Furthermore, most of the waste-related behavioural research focuses on household waste behaviour (Bortoleto *et al.*, 2012; Davis & Morgan, 2008; Pakpour *et al.*, 2014; Visschers *et al.*, 2016). The focus of these studies is also generally on developed countries, with limited research performed in developing countries, and even less research performed in Namibia. With the increasing negative effects of waste in PAs it is important to determine what factors may be most beneficial in attempting to influence and, to ultimately improve waste management behaviour. To this end, an extended version of the Theory of Planned Behaviour was designed for this study. By including additional constructs that have not been accounted

for, this research attempts to improve the predictive ability of the theory. The nature of a PA is complex, with various unique factors influencing waste management. By adapting the TPB to include these factors, waste-related behaviour in PAs can be more accurately understood.

This research aims to do this by attempting to identify the dominant determinant of waste behaviour in ENP. Additionally, it is expected that this research may aid decision-making regarding waste management in PAs and highlight areas for improvement.

12.9 Structure and outline of the thesis

This thesis consists of six chapters as outlined in Figure 1-1 below. This chapter (Chapter 1) provides an introduction with a brief background to the study, including the rationale, aim and scope of the study, and the limitations and potential contribution of the research. An extensive review of the literature is found in Chapter 2. The chapter discusses relevant literature based on waste and waste management in both the global and Namibian context. More precisely, the limited literature related to waste management behaviour in PAs was explored. This included theories used to determine environmental behaviour. Chapter 3 outlines the process and rationale for adapting the TPB framework for the purposes of this research. The research methodology used in this study is found in Chapter 4. Chapter 5 presents the results of the data collection, and the analysis thereof. The sixth and final chapter provides conclusions of the main research findings, as well as any recommendations drawn from the conclusions.

Chapter 1: Introduction	• Background to the study • Problem statement • Research aim • Limitations of the study • Contribution of the research
Chapter 2: Literature Review	• Review of previous literature regarding waste management behaviour in PAs with a focus on the TPB and other related elements.
Chapter 3: Developing an Adapted Version of the Theory of Planned Behaviour	• The process and rationale for adapting the Theory of Planned Behaviour is discussed in this chapter • The history and description of each element is also discussed
Chapter 4: Methodology	• All aspects of the research methodology are discussed, including data collection and data analysis methods
Chapter 5: Results and Discussion	• Data is presented and analysed in this chapter
Chapter 6: Conclusions and Recommendation	• Conclusions drawn from the data and recommendations

Figure 12-1: Outline and summary of chapter contents

As shown in the figure above (Figure 1-1), Chapter 2 provides an overview of applicable literature related to waste management behaviour in PAs and an introduction to the TPB.

CHAPTER 2 LITERATURE REVIEW

13.1 Introduction

This chapter aims to examine existing literature to contextualise waste management behaviour in protected areas (PA) through the application of the Theory of Planned Behaviour (TPB). The literature used in this study was mainly accessed from Google Scholar and the North-West University (NWU) Library repository. Official government and other organisation documents were also consulted. Keywords/phrases were used individually, or in combination, to search for relevant literature. These included “*Theory of Planned Behaviour*”, “*waste*”, “*tourist waste*”, “*waste management*”, “*waste behaviour*”, and “*protected areas*”. Searches related to the TPB in a waste management context yielded a variety of results, although when searching for the application of the TPB specifically related to PAs, minimal literature was found.

This is especially true when searching for research specifically related to Namibia (where the TPB was applied), which did not yield any results. No published research specifically addressing waste management in conservation or protected areas in Namibia is available in the public domain. However, the *Waste Management Implementation Plan for the Mudumu Landscape in Namibia* (MET, 2014) and the *National Strategy on Solid Waste Management in Protected Areas – Namibia* (MCC, 2014) provides valuable background information on waste management within selected communal conservancies, national parks, and community forests. Existing studies on municipal solid waste management in Namibia, such as those by Croset (2014), Mughal (2014), Schioldborg (2014), Ndhlovu (2018), Kalonda and Govender (2021), Nambuli *et al.* (2021), Kadhila and De Wit (2022), and Zeriapi and Awofolu (2022), offer further insights. These studies primarily focus on waste characterisation; opportunities and challenges for solid waste management; the impacts of illegal waste disposal; community-based approaches; the livelihood effects of informal waste reclamation; and waste management within informal settlements. However, their findings are limited to urban areas, including Windhoek, Swakopmund, Tsumeb, Keetmanshoop, Ondangwa, Ongwediva, Oshakati, Katutura township, and the Katima Mulilo Town Council in Namibia.

The literature review, therefore, focussed on exploring background information on waste management in Namibia. These searches provided information on different aspects of municipal solid waste (MSW) management in certain towns and municipalities in Namibia. This included information on the types of waste produced and how it is handled by the municipalities. It also highlighted differences in the quality of waste services between

municipalities, giving a general overview of the state of waste management in Namibia. Additionally, the management plans of Namibia protected areas were examined. Management plans exist for Bwabwata National Park, Khaudum National Park, /Ai-/Ais Hot Springs Game Park, Tsau//Khaeb (Sperrgebiet) National Park, Mangetti National Park, Mudumu National Park, Namib Naukluft Park, Skeleton Coast National Park, and Etosha National Park. These plans were reviewed to determine whether strategies for solid waste management were included, as well as which aspects were provided for. This was done to determine how SWM is integrated into the management of PAs in Namibia, if at all.

13.2 Solid waste generation and management in the global context

Solid waste is generated from a variety of sources, including municipal, construction and demolition (C&D), commercial, as well as industrial activities (Croset, 2014; Ferdous *et al.*, 2021). The amount and types of waste produced is, however, context specific. Developed countries are found to produce more waste than developing countries. This is because of an increase in urban growth, which is associated with an increase in the production of waste (Karak *et al.*, 2012). Additionally, economic growth, industrialization, and population growth also influence the amount of waste produced. This can be seen with the difference in waste generation per capita between high-income countries (HICs) and low-income countries (LICs). HICs produce approximately 1.5 kg/capita/day, whereas LICs produce 0.40 kg/capita/day (Sharma & Jain, 2020). It is estimated that waste generation globally (as of 2017) totals 20 billion tonnes annually (Maalouf & Mavropoulos, 2023). Figure 2-1 below indicates the breakdown of sources for global waste generation.

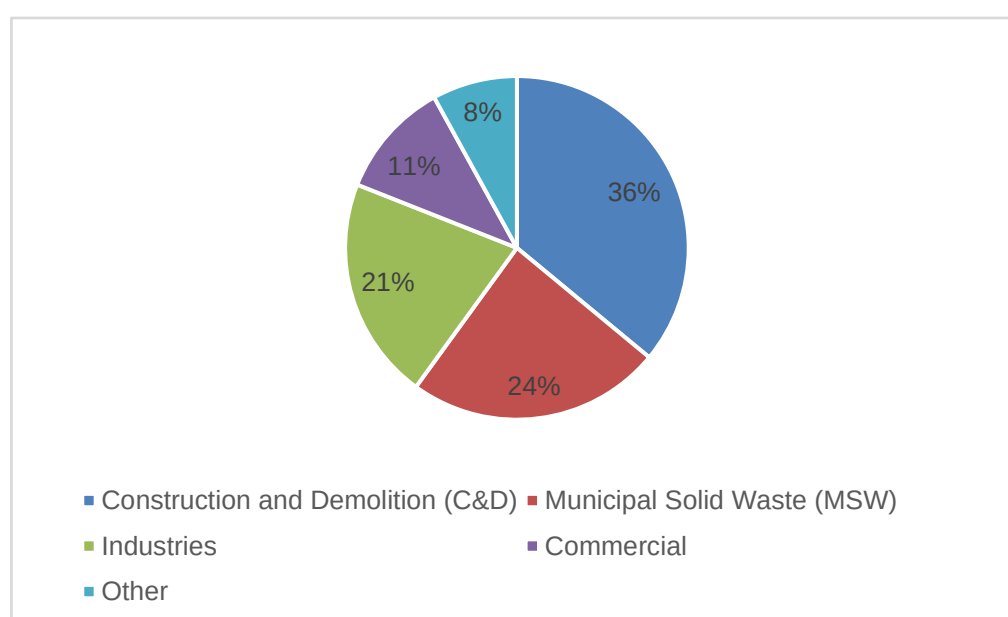


Figure 13-1: Breakdown of global waste sources (Adapted from: Ferdous *et al.*, 2021)

The generation of MSW, also referred to as general waste, is of particular concern to this study. Generally, MSW constitutes organic waste, paper waste, plastic waste, glass waste, metal waste, and other waste (Sharma & Jain, 2020). The types of waste included in the definition of MSW may, however, differ between regions. High-income countries produce more paper, metal, and glass waste, while low-income countries produce more organic waste (Nanda & Berruti, 2020). According to Karak *et al.* (2012:1511), developing countries do not often separate their waste, leading to the inclusion of all waste produced by a municipality, resulting in waste contamination. MSW can be further categorized into recyclable waste, organic waste, toxic waste, and hazardous waste.

The data regarding the amount and types of waste generated globally may, however, be inaccurate due to inconsistencies in the reporting of waste between regions. This can be due to a lack of standardized methods of waste characterization, as well as a disagreement of terminologies and categories of waste (Maalouf & Mavropoulos, 2023). Despite this disagreement, many scholars agree that the effective management of solid waste is of great concern (Karak *et al.*, 2012; Kaza *et al.*, 2018; Nanda & Berruti, 2020; Shah *et al.*, 2021).

MSW accounts for around two billion tonnes of the annual global waste produced, of which only 33% is managed effectively (Gautam & Agrawal, 2021; Shah *et al.*, 2021). Waste management includes the collection, disposal, and treatment of waste. Similar to the divide in types and amounts of waste generated between HICs and LICs, this divide also exists in the management of waste (Nanda & Berruti, 2020). The rate of waste collection is found to be higher in HICs (96%), when compared to LICs (39%) (Kaza *et al.*, 2018). Sharma and Jain (2020:918) attribute this divide to waste collection being seen as an urban service.

There are various methods adopted worldwide when it comes to the disposal and treatment of an area's waste. Globally, waste is managed in the following ways (listed from most to least used) (Kaza *et al.*, 2018):

- Landfilling (7.7% sanitary landfills, 4% controlled landfilling, and 25% are unspecified);
- Open dumping (33%);
- Recycling (13.5%);
- Incineration (11%);

- Composting (5.5%); and
- Other (0.3%).

LICs, however, rely mainly on open dumping as their main form of waste management, where 93% of their waste is dumped. HICs in contrast rely on sanitary landfilling (39%), recycling (29%), and incineration (22%) (Kaza *et al.*, 2018). Landfilling is the least desirable form of waste management, however, it is most widely used as it is the most economical option (Sharma & Jain, 2020). Various negative environmental effects are associated with landfilling. These include leachate, the release of toxins, and an increase in greenhouse gases. Certain waste, such as tyres, plastic, glass, C&D waste, and fly ash, have the potential to be valuable resources, but the majority of these wastes are landfilled (Ferdous *et al.*, 2021). Recycling as an alternative waste management option has been adopted by many HICs. This option can save resources, reduce the release of pollutants, and save landfill space (Shah *et al.*, 2021). There are several challenges faced by developing countries in the implementation of a successful Solid Waste Management Plan (SWMP). These include a lack of infrastructure, a lack of trained professionals and awareness programmes, inadequate waste services, and the attitude of the community towards waste (Shah *et al.*, 2021). Although the majority of MSW is generated in developed countries, the state of waste management in developing countries poses a particular threat.

13.3 Solid waste generation and management in Africa

As with other developing areas, pressure is placed on Africa's waste generation by the growth in population, urbanisation, a growth in the middle class, and a change in the habits of consumption and production (UNEP, 2018). Reliable and up-to-date waste data is heavily lacking in Africa, constraining effective waste management. This is due to many African countries not recognising waste data as important indicators when managing and planning for waste (UNEP, 2018). It must, therefore, be noted that the following data is estimated (where there is a lack of comprehensive data) and based off urban areas (due to waste data being non-existent in rural areas) (Hoornweg & Bhada-Tata, 2012; UNEP, 2018; Scarlat *et al.*, 2015). MSW generation was estimated to be 125 million tonnes per year (in 2012), of which 81 million tonnes of this total was generated in Sub-Saharan Africa. Per capita waste generation is spatially dependant with a high of 2.98 kg/capita/day in the Seychelles, and a low of 0.09 kg/capita/day in Ghana. Waste generation averages at 0.78 kg/capita/day in Africa, compared to a global average of 1.24 kg/capita/day. According to Scarlat *et al.* (2015:1269), Egypt, Nigeria, and South Africa are seen as "hot spots" of waste generation in Africa. As can be seen in Figure 2-2 below, more than half of MSW generated is organic waste, followed by plastic waste (Hoornweg & Bhada-Tata, 2012).

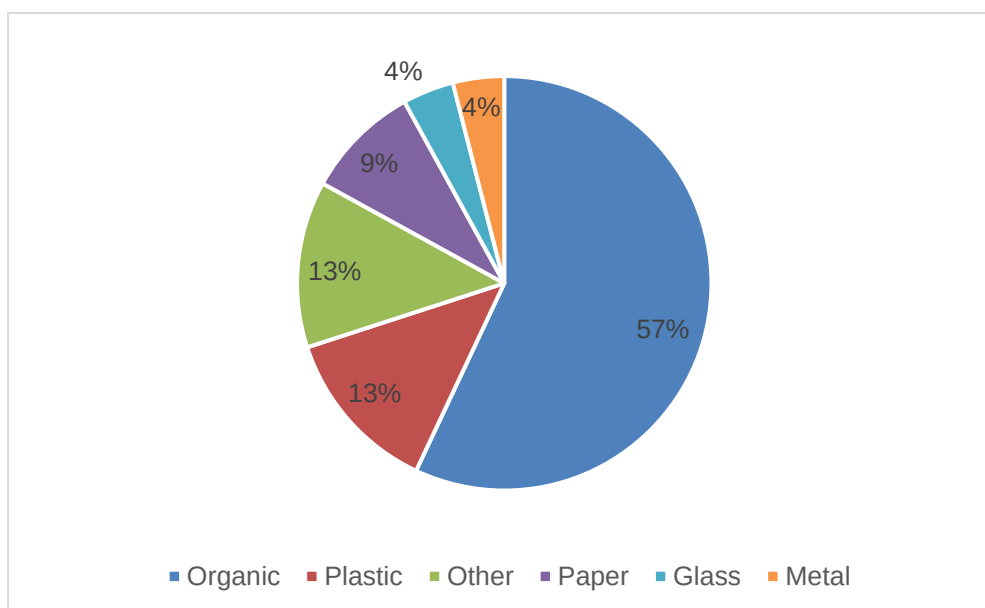


Figure 13-2: Municipal Solid Waste (MSW) composition in Sub-Saharan Africa (adapted from: UNEP, 2018)

According to the United Nations Environment Programme, World Conservation Monitoring Centre & International Union for the Conservation of Nature (UNEP-WCMC and IUCN, 2016:14), Africa deals with an array of regional environmental issues, including illegal trade in wildlife, low access to clean forms of energy, weak environmental governance systems, loss of biodiversity, inadequate waste management practices, and climate change and variability. Waste management is identified as a particularly complex problem, where waste is typically disposed of without concern for the environment. Only 40-50% of waste is reported to be collected and disposed of (UNEP, 2018), of which 47% of waste is reported to be disposed of in open dumps, 29% in sanitary landfills, 9% is burned, 4% is recycled, and 2% is incinerated.

Additionally, the Africa Review Report on Waste Management (UNECA, 2009) and the Africa Waste Management Outlook (UNEP, 2018) identifies the following as growing concerns: (1) A lack of waste management infrastructure in rural African areas; (2) the existing infrastructure and current land use planning methods are unable to cope with the rising urban growth in Africa; (3) there is a gap between waste management legislation and regulations, and current practice; (4) a lack of enforcement of legislation and regulation; (5) a lack of public awareness; and (6) corruption, conflict, and political instability.

13.4 Solid waste generation and management in Namibia

The trend of Namibia's waste generation and management follows a similar pattern to that of other developing countries. Approximately 0.5 kg of waste is produced per capita per day in Namibia, ranging from 0.33 kg/capita/day in low-income areas to 0.68 kg/capita/day in high-income areas. Waste volumes being generated in Namibia are estimated as there is a lack of an integrated waste data management system (MEFT, 2021). Solid waste generation can range from 75 to 550 kilotonnes per year, with the types of waste produced per year being characterised as follows:

- Paper – 46000 tonnes
- Plastic – 36000 tonnes
- Glass – 29000 tonnes
- Metals – 11000 tonnes

Although the amount of waste produced is relatively low for a country of Namibia's size, there are challenges unique to Namibia that constrain waste management. Waste collection and management is highly varied throughout the country, with areas outside of urban areas having rudimentary or no management systems. In urban areas, there is an average household waste collection rate of 70% (highest rate – 88.9%, lowest rate – 20.5%) (MEFT, 2021). The cost of waste transport is relatively high due to the large transport distances between main centres, increasing waste management costs (MCC, 2014). In addition to this, there is only one proper landfill site located 11km southwest of Windhoek at Kupferberg landfill (Ntesa & Hauptfleisch, 2014). As a result of this, dumpsites are generally used for waste disposal, which are often not correctly controlled or managed (Mughal, 2014). Due to these reasons, it is estimated that 69% of waste is dumped in Namibia, whereafter it is burned or buried. Waste management policies have been implemented in some major cities, such as in the Swakopmund Municipality, although many of the smaller cities lack any such policies (Kadhila & de Wit, 2022).

Some private contractors provide containers for waste disposal in Namibian towns, who then collect recyclables from these containers (Mughal, 2014). Only one Material Recovery Facility (MRF) is found near Windhoek operated by a private company, Rent-a-Drum (Croset, 2014). The majority of the sorted, recyclable waste is then sold to South Africa. Twenty percent (20%) of the collected waste can, however, not be recycled and ends up in the landfill (Croset, 2014). Additionally, the Recycle Namibia Forum (RNF) provided recycling igloos (as recycling collection points) to areas throughout Namibia in hopes of raising awareness for recycling

(RNF, 2023). It was concluded that the public was reluctant to participate in proper waste separation and that these projects would benefit from increased education to the public. RNF has also hosted recycling/upcycling competitions, information sessions, and clean-up campaigns.

Tourism generates an additional source of MSW which adds to the challenges of waste management (Arbulú *et al.*, 2015). With Namibia being a tourism destination, and most tourism depending on or located in PAs, these trends of waste management can be especially detrimental to the environment in PAs.

The relationship between tourism and the production of MSW is very rarely investigated (Arbulú *et al.*, 2015; Comerio *et al.*, 2022). This is despite the fact that the tourism sector is a significant generator of waste. Existing research is often context-specific, thus there are variations in generation rates and other variables between studies (Abdulredha *et al.*, 2018). These differences may be attributed to factors such as: tourism type, the number of tourists, tourist behaviour, and the effectiveness of waste management infrastructure. Certain patterns are, however, present in the findings of these studies. Studies by Arbulú *et al.* (2016); Estay-Ossandon & Mena-Nieto (2018); Martins and Cró (2021); Mateu-Sbert *et al.* (2013); and Oribe-Garcia *et al.* (2015) concluded that an increase in tourist flows increased MSW generation, sometimes doubling that of the local population (Shamshiry *et al.*, 2011). This increase in waste is a seasonal phenomenon, with greater volumes being attributed to an increase in tourist flows (Mateu-Sbert *et al.*, 2013; Shamshiry *et al.*, 2011). The impact that these wastes have are not only evident during this seasonal period, but the months following them as well. Tourist waste is collected, transported, and treated with general MSW. Tourist waste is, therefore, classified as an additional source of MSW (Arbulú *et al.*, 2016), and no specific figures exist for most tourism activities (Diaz-Farina *et al.*, 2020). The quantity and types of waste generated are also dependant on the type of tourist activities.

Waste is either generated through the production or consumption of products during tourism activities. These activities provide for hospitality (accommodation and dining/catering), entertainment, and other tourism undertakings (these may include camping, hiking, shopping, water sports, fishing, and safari, among others). Through these activities, single use/disposable waste, packaging waste, and food waste are often produced. Wastes produced can either be biodegradable or non-biodegradable. Biodegradable waste includes food waste, paper, and cloth, whereas non-biodegradable waste includes plastics, tin, glass, batteries, crockery, rubber, and metals (Dileep, 2009).

The hospitality sector generates the majority of wastes in most tourism destinations (Diaz-Farina, 2019; Pham Phu *et al.*, 2019; Sealey & Smith, 2014). MSW generation per guest room is reported to be significant, although the amount varies between studies. Literature suggests that MSW collection per guest room per day can range from 0.9kg to 13kg (Abdulredha *et al.*, 2018; Losanwe, 2013; Pirani & Arafat, 2016). Food waste is found to be the most prevalent in the hospitality sector, accounting for approximately half of the waste collected. Wang *et al.* (2021b:451) estimated that tourists and the hospitality sector produce more food waste than households in tourism destinations.

The seasonal increase in waste results in these destinations being underequipped, placing pressure on their waste management facilities and infrastructure. This sentiment is reflected in studies by Chen *et al.* (2005); Ezeah *et al.* (2015); and Murava and Korobeinykova (2016), which cite overloaded landfill sites, inefficient infrastructure, and unsustainable SWM practices to be the results of increased tourist flows. Whether intended or not, the environment is unavoidably changed either during the tourism process or to advance tourism. Tourism may be beneficial to the environment, although the negative impacts, especially waste production, are often a cause for concern (Dileep, 2007). For this reason, the sustainable collection, transportation, processing, and disposal of MSW holds particular significance in tourist destinations.

13.5 Waste management in protected areas

Waste management in PAs are a critical feature of environmental conservation and protection. As stated above, waste is often a by-product of tourism activities. The degrading effect that waste has on the environment, and especially PAs, has been cited by many authors (Dunjić *et al.*, 2017; Harper *et al.*, 2022; Mihai, 2013; Morrison-Saunders *et al.*, 2019; Przydatek, 2019; Roos *et al.*, 2022; Steg & Vlek, 2009). The effective and sustainable management of this waste is, therefore, a priority in these vulnerable areas. The responsibility of waste management in PAs fall under the general jurisdiction of the area and are predominantly governed by the legal framework adopted by a region (Przydatek, 2019). Although the degrading effects of waste are known, Dunjić *et al.* (2017:146) point out that landfilling, ineffective waste treatment, and mixing waste are still the most traditional forms of waste management. This is especially true for developing countries, who often do not have the available funding, infrastructure, or knowledge to effectively manage their waste. The responsible and sustainable management of waste in PAs can, therefore, not be understated. Alternative methods and policies based off concepts such as “zero waste” and the “waste hierarchy” are encouraged to improve waste management.

Both waste and improper waste management can lead to environmental, social, and economic impacts that are detrimental to PAs.

13.5.1 Examples of waste management practices in Namibian protected areas

A study by Amputu *et al.* (2014) studied the solid waste management practices of establishments in the Greater Sossusvlei Namib Landscape. Domestic, solid waste (plastic, paper, cardboard, glass, metal, and organic waste) formed the majority of waste produced and was found to be generated by support staff and tourists. Industrial, hazardous, and agricultural waste was also generated by some establishments (included lodges, management, and farming establishments). In terms of managing their waste, fifteen of the twenty establishments separated their waste on-site in clearly labelled bins. It was, however, unclear if the waste was combined after the initial separation and taken to dump sites. From these, three establishments burned the separated waste. Twelve establishments had on-site dump sites for non-recyclable and burnable waste, with two transporting their waste to an off-site dumpsite. The leftover waste was either reused, with two establishments re-using their organic waste as compost or animal feed or recycled in Windhoek (only ten establishments transported their recyclable waste to Windhoek).

MET (2014) suggested a waste management implementation plan for the Mudumu landscape. Plastic and glass contributed the most to solid waste, with metal, paper, and organic waste also being produced by residents and institutions in the area. The majority of residents and institutions bury their waste in holes, excavating new holes when the previous one is filled. To reduce wind-blown waste, paper and plastic is typically burned. Some bars in the area simply dump their waste near their place of business. Organic waste is only composted by some institutions. Waste produced by some lodges are stored in drums, whereafter it is buried in a dedicated area. Recyclable waste is sometimes removed and taken to recycling companies.

The protected area management plans on Namibia's national parks provides additional context. These management plans describe the objectives, principles, and strategies for the overall management of national parks in Namibia. The framework for developing these plans alludes to the following regarding waste management:

“The disposal of waste is often problematic in remote areas, and the volume of waste will grow as the use of the parks increases. Solid waste should not be disposed in a park, and it should be transported to a managed waste management site on the periphery or nearby town. Strategies must therefore be specified for waste management, sewerage and toxic waste in a park” (MET, 2011:6).

Plans exist for nine PAs, where waste management is outlined in six. These include Bwabwata National Park (BNP), Khaudum National Park (KNP), Mudumu National Park (MNP), Namib Naukluft Park (NNP), Skeleton Coast National Park (SCNP), and Etosha National Park (ENP). Table 2-1 outlines the aspects of solid waste management, which are provided for in the PA management plans (MET, 2007; 2013a; 2013b; 2013c; 2013d; 2013e).

Table 13-1: Aspects of solid waste management provided for in the Namibian protected area management plans

Waste management principle/activity	Namibian National Parks					
	Bwabwata National Park	Khaudum National Park	Mudumu National Park	Namib Naukluft Park	Skeleton Coast National Park	Etosha National Park
Removal of waste from park to formal sites	Yes	Yes	Yes	Yes	Yes	Yes
Waste storage facilities	Yes	Yes	Yes	Yes	Yes	Yes
Waste disposal sites	Yes	Yes	Yes	No	No	No
Remediation of waste disposal/storage facilities	Yes	Yes	Yes	No	No	Yes
Separation at source	Yes	Yes	Yes	No	No	Yes
Recycling	No	No	No	Yes	Yes	Yes
Re-use	No	No	No	Yes	Yes	No
Waste minimisation	Yes	Yes	Yes	Yes	Yes	Yes
Waste transportation	Yes	Yes	Yes	Yes	Yes	Yes
Waste collection	No	No	No	Yes	Yes	No

Waste management principle/activity	Namibian National Parks					
	Bwabwata National Park	Khaudum National Park	Mudumu National Park	Namib Naukluft Park	Skeleton Coast National Park	Etosha National Park
"take-in, take-out" principle	No	No	No	Yes	Yes	Yes
Education and awareness	No	No	No	No	No	No
Composting	Yes	Yes	Yes	Yes	Yes	No
Responsibility of waste removal	Yes	Yes	Yes	Yes	Yes	Yes
Monitoring programme	Yes	Yes	Yes	No	No	Yes
Environmental impact assessment for all waste developments	No	No	No	No	No	Yes
Development of environmental management plans for all developments	Yes	Yes	Yes	No	No	Yes
Development and enforcement of waste management procedure	Yes	Yes	Yes	No	No	Yes
Enforcement of waste management practices	No	No	No	Yes	Yes	Yes

The situation in Namibian protected areas highlights several critical gaps in waste management practices that could undermine the effectiveness of their protected area management plans. While the inland parks (BNP, KNP, and MNP) and coastal parks (NNP and SCNP) follow similar strategies, the uniformity of these plans fails to consider the unique challenges and opportunities presented by each park's specific context. This lack of adaptability may overlook local environmental, logistical, and cultural factors that influence waste generation and management. For example, the absence of recycling provisions in the coastal parks is particularly concerning given the heightened risk of marine debris in these areas. The current approach of transporting all non-biodegradable and recyclable waste to authorised landfills represents a missed opportunity to reduce environmental harm, such as marine pollution, and to promote a circular economy.

Another significant oversight is the lack of initiatives to educate and raise awareness among tourists and staff about sustainable waste practices. Education plays a critical role in fostering responsible behaviours, such as proper waste segregation, reduced littering, and compliance with park policies. Without awareness campaigns or training, the infrastructure and strategies outlined in the plans may be underutilised, limiting their effectiveness. Moreover, this absence of behavioural interventions risks increased environmental damage, as improper waste disposal or non-compliance could harm the delicate ecosystems these parks aim to protect.

The focus of the protected area management plans on structural aspects of waste management, such as storage, minimisation, and transportation, further reveals a neglect of strategies aimed at influencing behaviour. Long-term sustainability depends not just on the availability of facilities but also on changing attitudes, perceptions, and motivations regarding waste management. Behavioural change, supported by targeted education, is essential to ensure the effective and sustained use of the available systems. The lack of education and recycling efforts particularly weakens the potential of these parks to serve as models of sustainable waste management.

Addressing these gaps will require tailored and context-specific approaches to waste management. Each park's management plan should be adjusted to reflect its unique needs, such as tourist density, ecosystem type, and waste generation patterns. Coastal parks should prioritise the introduction of recycling initiatives to mitigate marine debris and align with global efforts to reduce plastic pollution. Education and awareness campaigns, including workshops, signage, and interactive sessions, should be developed to empower both staff and tourists to engage with waste management practices responsibly. Integrating principles of behavioural psychology, such as the TPB, can help design interventions that address attitudes and perceived control over waste-related actions. By adopting these measures, Namibian

protected areas can foster sustainable waste practices that align with their broader conservation goals and set a positive example for regional and global waste management.

13.5.2 Waste management in Etosha National Park, Namibia

Published literature on waste management in ENP is limited. A 2014 baseline report for the National Strategy on Solid Waste Management in Protected Areas, detailed the state of waste management in Namibian PAs (MCC, 2014). This report provided some background to waste management in ENP.

Waste is generally collected daily from the camps and transported to a waste collection vehicle, whereafter it is taken to a designated disposal site (either within or outside the park). Sites are located at Ombika, Halali, Tsumeb, Namutoni, Kamanjab, and Outjo. A large proportion of this waste is recyclable, although it is not sorted and typically ends up at the disposal site. The waste at disposal sites is generally burned, although it is not always supervised leading to wind-blown waste. At the time of the report, there was no demand for recyclable waste. With the closest recycling facility located in Windhoek (approximately 420 km from Ombika Gate), and with a lack of an operational vehicle fleet, waste separation was not considered viable. Further, it was determined that there were not enough bins available, leading to litter in staff areas. Litter was also found in camp sites as a result of animal access.

Improvements to ENP's waste management system were highlighted in online articles. These included the establishment of a solid waste management team consisting of volunteers in 2021 (NWR, 2023) and the construction of a mobile recycling system by Rent-A-Drum at the Ombika Gate in 2023 (NWR, 2023). The purpose of the recycling system was to support the community based at Ombika, allowing them to sort the waste and sell the recyclables back to Rent-A-Drum. In addition, the recyclable waste collected during The National Clean-up Day (16 September 2023) was transported out of the park. Training was also offered to volunteers.

Despite the praise the park has received regarding these advancements, there are also many criticisms. One article stated that the bins were overflowing and that there was litter found all around the park (New Era Live, 2019). The picnic spots, in particular, were claimed to look like "dumpsites". This reporter expressed the importance of leaving a good impression and offering a satisfactory experience to tourists. Not only the staff, but top administrators should be responsible for solving these problems. Overflowing bins in the park are often mentioned in online reviews and blogs. Reviews on a travel website, Tripadvisor, have noted that not only tourists but staff contribute to overflowing bins, with the collection of this waste being infrequent.

13.6 The impacts of waste on protected areas (PAs)

As previously stated, waste is an inevitable by-product of human activity, which directly and indirectly affects the environment and people surrounding it. The following sub-sections describe the impacts that waste may have on PAs.

13.6.1 The impacts of waste on the receiving environment and biodiversity

Waste impacts the PA ecosystem in many ways, threatening conservation and preservation efforts and disrupting the balance of ecosystems. Water, air, and soil pollution are commonly associated with improper waste management. Waste decomposition is a source of environmental pollution resulting from indiscriminate waste dumping.

Liquid leachate is produced from decomposing waste, posing a threat to local surface and groundwater systems (Alam & Ahmade, 2013; Ololade *et al.*, 2019). The disposal of waste may contaminate water sources within a PA, leading to water shortages and a reduction in water quality (Leung *et al.*, 2018). This can be especially detrimental in arid environments (Aljaradin & Persson, 2012). Polluted water sources affect the salinity and siltation of the water, which could harm the fauna and flora within a PA through the change in soil and water composition (Belsoy, 2012). Wildlife in PAs may also be impacted by consuming polluted water.

Littering, which is an ever-present and common occurrence in tourist destinations, often results in water and soil pollution in PAs. Not only does litter affect the nutrient composition of soil and water, but it endangers wildlife, releases gas into the air, and causes disease as well (Kariminia *et al.*, 2013; Rodríguez-Rodríguez, 2012). Litter may be dispersed in the PA, harming wildlife if they mistake this waste as food. The natural habitat of wildlife may also be degraded, disrupting their homes and feeding ground. This may lead to a decline in the population of some species. Not only does waste impact the ecosystem of a PA, but the climate as well.

The uncontrolled dumping of waste is the cause of many environmental pollutants. The improper disposal of waste is a source of excess gas in the atmosphere, causing air pollution. Decomposing waste produces methane through the anaerobic respiration of bacteria. This gas is a known contributor to the greenhouse gas effect and climate change (Alam & Ahmade, 2013). Other gasses produced by dumping include CO₂, CH₄, and N₂O (Ackerman, 2012). The air may also be polluted by improper incineration and open burning. Gases formed by these processes include SO₂, N₂O, HCL, CO, CO₂, dioxins, furans, and other greenhouse

gasses (Vergara & Tchobanoglous, 2012). Climate change affects the temperature and precipitation in PAs, which can disrupt ecosystems and habitats (Aljaradin & Persson, 2012).

Vegetation in PAs mitigate climate change through the absorption of carbon. As stated previously, however, waste can lead to the loss and degradation of vegetation, which can aggravate climate change (Mansourian *et al.*, 2009). Climate change as a result of an increase in waste can affect wildlife in PAs as well. With the changes in temperature and precipitation, wildlife will seek out areas with more favourable conditions. This can lead to changes in the types of species in habitats that are not equipped to protect them (Mansourian *et al.*, 2009).

13.6.2 The impacts of waste on health and the receiving communities

Individuals who might be affected by waste include children, waste workers, communities who live close to waste management facilities, and communities who live in areas with no sustainable waste management (Alam & Ahmade, 2013). According to Mateu-Sbert *et al.* (2013:2591), residents are the most affected by the negative impacts of waste as tourists only stay a short while.

Health risks may either be direct or indirect. Direct risks are associated with workers who handle the waste and waste pickers (Alam & Ahmade, 2013). These individuals are seldom protected from direct contact with waste that could be hazardous to their health (Vergara & Tchobanoglous, 2012). Indirect risks are associated with disease from mismanaged waste. Improper waste management (mixing of waste streams, open dumping sites, and waste burning) cause a variety of negative health impacts. A study by Alam and Ahmade (2013:167) found that health problems arose from the mixing of hazardous waste and industry waste with MSW. Some of these include chemical poisoning, low birth weight, congenital malformations, cancer, neurological disease, nausea, and vomiting. Furthermore, dumped waste and stagnant water (liquid leachate) form a breeding ground for insect and rodent vectors which may spread disease (cholera, dengue fever, malaria, typhoid fever, and many other diseases) (Abubakar *et al.*, 2020; Vergara & Tchobanoglous, 2012).

13.6.3 Aesthetic and economic impacts of waste

Tourism destinations have aesthetic value (Hatton, 2002). Waste detracts from the attractiveness of an area. The attractiveness of an environment is crucial to the visitor experience, where improper waste management has negative impacts. Managing tourist waste in tourism destinations has the unique challenge of designing policies to effectively manage MSW, while preserving the image and attractiveness of the area (Arbulú *et al.*, 2015).

Landfills and waste management sites can also detract from the natural beauty of an area and may deter visitors. This not only affects the environment, but the economy as well.

Waste affects the structure, functioning, and capacity of ecosystems. This may hinder an ecosystem's ability to provide services, which may lead to a decline in the economic value of a tourist destination (Arabi & Nahman, 2020). It is well known that there are several factors affecting a visitor's choice in tourism destination (Arabi & Nahman, 2020; de Araújo & Costa, 2006; Krelling *et al.*, 2017; Roos *et al.*, 2022). Inefficient waste management is one of these factors that affects a visitor's experience which, in turn, impacts tourism revenues. A study by Leggett *et al.* (2014) found that tourists were willing to spend more money, and travel further to more attractive environments. A reduction in a destination's revenue comes not only from a decrease in tourism, but in the costs associated with environmental clean-up as well (Krelling *et al.*, 2017; Przydatek, 2019). To avoid revenue losses, tourist destinations often expend resources for clean-up operations. The financial expenditure for these operations is substantial. These effects are, however, most commonly experienced in coastal areas.

To counteract these negative impacts, effective MSW systems must be put in place. Legal requirements are one of the ways a country can ensure compliance with waste legislation and regulations. A lack of policies and frameworks impedes MSW management.

13.7 Namibian legal framework for waste management

An important aspect of waste management is an effective legal framework guiding the prevention, treatment, and disposal of waste (Ruppel & Ruppel-Schlichting, 2022). Waste is managed on a national and regional level through laws, regulations, and policies. Table 2-2 below highlights pieces of legislation and frameworks related to the environment and solid waste management in Namibia.

Table 13-2: Existing waste legislation and framework in Namibia

Legislation/framework	Relation to waste management
Environmental Management Act No. 7 of 2007	<i>"3 (1) (h) the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term must be adopted to reduce the generation of waste and polluting substances at source..."</i> <i>"3 (1) (i) the reduction, re-use and recycling of waste must be promoted"</i>

Legislation/framework	Relation to waste management
	<i>“5 (4) A person may not discard or cause to be discarded waste or dispose of it in any other manner except –</i> <i>(a) at a disposal site declared or approved by the Minister in terms of this section...”</i> <i>“27 (1) The Minister, after following the consultative process referred to in section 44, may list, by notice in the Gazette, activities which may not be undertaken without an environmental clearance certificate.</i> <i>(i) waste and sewage disposal; chemical treatment...” (EMA, 2007:7).</i>
The National Solid Waste Management Strategy	<i>“This National Solid Waste Management Strategy is important to ensure that the future directions, regulations, funding and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders” (MET, 2017:1).</i>
Local Authority Act 23 of 1992	This states that the local authority has the responsibility and commitment to ensure that waste management activities are carried out effectively (LAA, 1992).
Pollution control and Waste Management Bill of 1999	<i>“An Act to promote sustainable development... to prevent and regulate the discharge of pollutants to the air, water and land; to make provision for the establishment of an appropriate framework for integrated pollution prevention and control; to regulate noise, dust, and odour pollution; to establish a system of waste planning and management...” (MET, 1999:5).</i>
Solid Waste Management Policy: The City of Windhoek	<i>“The City of Windhoek is committed to continue providing an efficient waste management service and in order to achieve this, the City of Windhoek has adopted the following principles governing the SWM Policy as stipulated below:</i> <i>• Integrated Waste Management Hierarchy</i> <i>• Sustainable Development</i> <i>• Sustainable Consumption & Cleaner Production (SCCP)</i> <i>• Polluter Pays Principle</i>

Legislation/framework	Relation to waste management
	• <i>Duty of Care</i> • <i>Best Practical Environmental Option (BPEO).</i> <i>“The vision of the SWM Policy encompasses the concepts of integrating all required waste management activities based on the minimisation of pollution and waste across various sectors, as well as the management of waste activities in accordance with the Principles of the Integrated Waste Management Hierarchy. Through the SWM Policy, the City of Windhoek aims to maintain control over all waste management activities within its area of jurisdiction, including industrial, business, institutional and household levels” (City of Windhoek, 2010:2&3).</i>
Waste Management Regulations (Republic of Namibia, 2011)	The regulatory framework to enforce and promote Windhoek’s Solid Waste Management Policy (Ruppel & Ruppel-Schlichting, 2022).
Pollution Control and Waste Management Policy of 2003	<i>“...the set of principles and guidelines that determine how non-hazardous and potentially hazardous wastes are, generated, transported, handled and disposed of in the Republic of Namibia” (MET, 2003:7).</i>
The Public and Environmental Health Act No. 1 of 2015	<i>“51. A local authority must ensure –</i> <i>(a) that all waste generated within its local authority area is -</i> <i>(i) collected;</i> <i>(ii) disposed of; and</i> <i>(iii) recycled,</i> <i>in accordance with the requirements of all laws governing the management of the different waste streams;</i> <i>(b) efficient, affordable and sustainable access of the collection, disposal and recycling of waste to the community;</i> <i>(c) for reasons of health safety and environmental protection that waste collection is done in an appropriate manner; and</i> <i>(d) that approved receptacles of waste must be kept in</i>

Legislation/framework	Relation to waste management
	(i) a clean and hygienic condition to prevent the breeding of flies or other health risk; and (ii) accordance with requirements of laws governing a particular waste stream. (3) A person or local authority engaged in activities contemplated in subsection (1) or (2) must ensure that the waste generated on the premises concerned is kept and stored– (a) under conditions that causes no harm to human health or damage to the environment; and (b) in accordance with applicable laws. 53. (1) Waste must only be disposed of at a waste disposal site, including an incinerator approved by the local authority concerned. (3) A waste disposal site must be – (a) adequately fenced off to prevent illegal entry and windblown litter; and (b) kept at all times in the manner as to prevent fly breeding or other public health risk. (4) A person may not burn waste either in a public or private place or at a waste disposal site” (The Public and Environmental Health Act No. 1 of 2015:36).
Polluter Pays Principal	“Transfers the burden of the cost for integrated and therefore environmentally and socially responsible waste management to the polluter in terms of costs associated with the rehabilitation of the natural environment and human health caused by the pollution” (Ruppel & Ruppel-Schlichting, 2022:224).
Duty of Care	“The duty of care principle requires every generator of waste to be responsible for the fate of their waste as soon as it has been generated” (Ruppel & Ruppel-Schlichting, 2022:224).
Park Management Plans	The park management plans are an instrument for waste management in Namibia’s protected areas.

Of particular significance to this study are the Environmental Management Act (EMA) No. 7 of 2007 and the National Solid Waste Management Strategy (NSWMS) of 2022. Waste management in Namibia is primarily promoted by the EMA. This Act sets out principles related to the management of the environment as a whole. Principles related to waste management are, however, also provided for. As stated in Table 2-1 above, waste should be managed in a way that causes the least damage to the environment, while also reducing pollution and the amount of waste generated (EMA, 2007).

Ruppel and Ruppel-Schlichting (2022:42) suggests that legislation regarding Solid Waste Management (SWM) is lacking in Namibia, with the absence of a specific waste act. Furthermore, standards for disposal are generally absent for municipal waste management. In 2017, the National Solid Waste Management Strategy (NSWMS) was developed. The general aim of this strategy is to improve the management of waste in Namibia. Several priorities or objectives are identified, namely strengthening institutional, organisational, and legal frameworks regarding SWM, promoting the reduction, reuse, and recycling of waste, improving waste collection and management systems, and implementing municipal waste disposal standards (MET, 2017; Ruppel & Ruppel-Schlichting, 2022).

The concept of the waste hierarchy is also alluded to in both the EMA and NSWMS. The waste hierarchy, illustrated in Figure 2-3 below, prioritises waste avoidance and recycling, with disposal being the least desirable option.

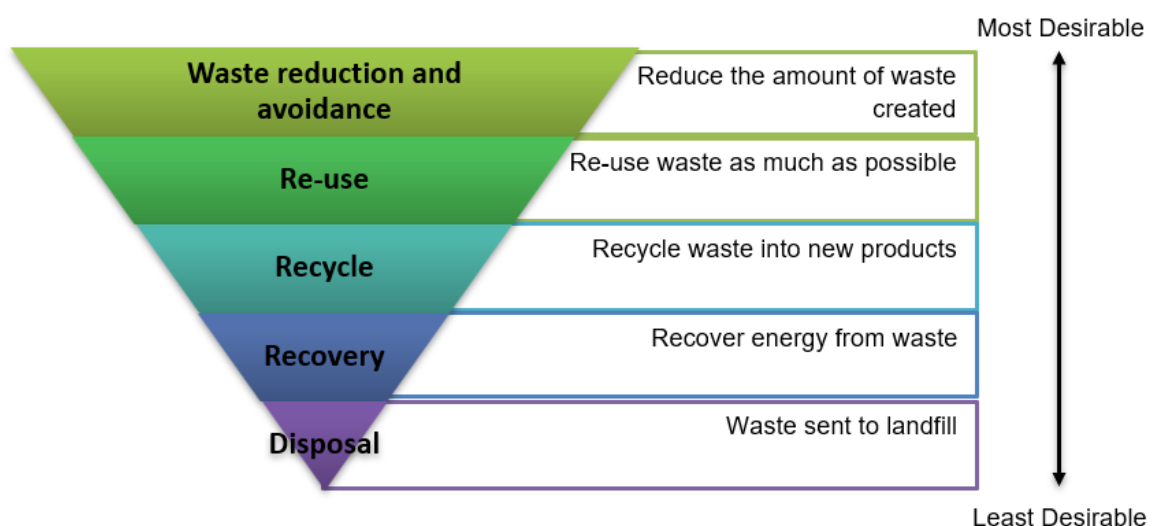


Figure 13-3: The Waste Management Hierarchy (adapted from: DEA, 2011)

Several private organisations and NGOs currently operate in Namibia with the aim of realising the NSWMS. Some of these are Rent-A-Drum (which is a privately owned company operating a sorting facility near Windhoek), Enviro-Fill (which manages the Swakopmund solid waste disposal site) and Recycle Namibia Forum (which coordinates projects promoting the waste management hierarchy) (MET, 2017).

It must be noted that legal requirements alone do not prevent inefficient waste management, and that human behaviour plays a major role towards more responsible waste management.

13.8 Understanding waste management behaviour

Improving waste management not only relies on economic and legal tools, but individual behaviour as well (Cecere *et al.*, 2014). When studying pro-environmental behaviours specifically, studies have focussed on the importance of individual motivations (Barr *et al.*, 2001; Cecere *et al.*, 2014; Gilli *et al.*, 2018).

There are various underlying factors that influence behaviours related to responsible waste management. The adoption of sustainable waste management practices requires considerable time, effort, and resources, suggesting the need for both extrinsic and intrinsic motivations at the individual level (Gilli *et al.*, 2018; Roos *et al.*, 2021). Extrinsic motivation is the belief that if an individual performs a behaviour, they will receive an external reward. These motivations are due to external pressures, which may either be economic or in search of social appraisal (Gilli *et al.*, 2018). In contrast, the rewards from intrinsic motivations come from the behaviour itself rather than an external reward. These motivations may be altruistic in that an individual will perform a behaviour in pursuit of personal satisfaction, or to improve the well-being of others (Gilli *et al.*, 2018). Some motivations are, however, more complex. One example is social norms, which can be both extrinsic (to gain the approval or respect of others) and intrinsic (to achieve a good self-image) (Cecere *et al.*, 2014).

Analysing these motivations and the interactions between them can reveal what incentivises an individual to perform a behaviour. In some cases, extrinsic motivations can have the opposite effect of decreasing an individual's intrinsic motivations (Cecere *et al.*, 2014). Individuals will weigh the costs and benefits before participating in a behaviour.

A study by Cecere *et al.* (2014:165) found that when analysing incentives for waste reduction and recycling specifically, it is often more complicated as there are generally low rewards and high costs. The importance of non-pecuniary motivations is, therefore, emphasized (Berglund, 2006; Brekke *et al.*, 2010; Cecere *et al.*, 2014; Chen *et al.*, 2018; Hage *et al.*, 2009). The following section outlines some of the theories that attempt to explain human behaviour.

13.9 Theories applied to understand and predict behaviour

Behaviour is conceptualised and defined in a number of ways through different models and theoretical frameworks. The Model of Environmentally Responsible Behaviour (ERB), The Theory of Reasoned Action (TRA), and the Theory of Planned Behaviour (TPB) are three such frameworks. A common idea between these three frameworks is that the individual is cited as the source of behaviour. With this being said, external factors have been found to influence behaviour to varying degrees (depending on the individual and framework). Individual agency is, therefore, an important aspect of these frameworks.

13.9.1 The Model of Environmentally Responsible Behaviour (ERB)

First conceptualised in 1987 by Hines, Hungerford and Tomera, the Model of Environmentally Responsible Behaviour (ERB) aimed to foster the development of behaviours or habits that promote environmental responsibility (Hines *et al.*, 1987; Osbaldiston *et al.*, 2003). Environmental education is, therefore, the ultimate goal of this model. A number of variables were said to influence an individual's motivation when it came to the adoption of ERB's. These included the intention to act, as well as other personal and situational factors (attitudes, locus of control, knowledge, and sense of personal responsibility) (Akintunde, 2017; Chiu *et al.*, 2014; Hines *et al.*, 1987). Figure 2-4 below displays the Model of Environmentally Responsible Behaviour (Hines *et al.*, 1987).

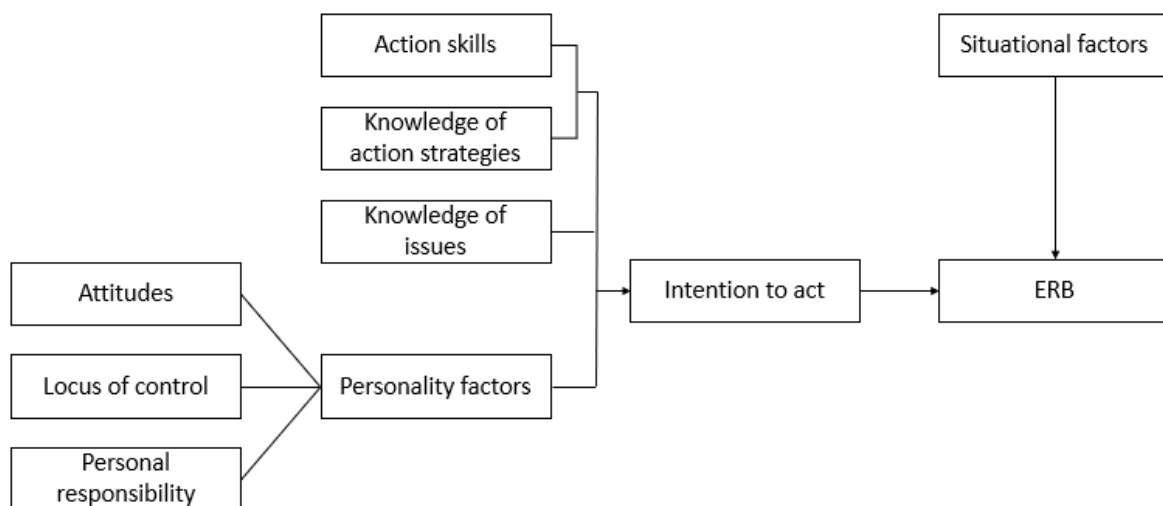


Figure 13-4: A schematic representation of the Model of Environmentally Responsible Behaviour (adapted from: Hines *et al.* 1987)

For these behaviours to be successfully adopted, however, the variables would need to interact. The intention to act, alone, does not motivate an individual to adopt a behaviour. For example, individuals who have an internal locus of control, a positive attitude towards an environmental problem, and a strong sense of duty towards the environment will be more likely to act. These behaviours would, however, have to be consistent and persistent (Osbaldeston *et al.*, 2003). According to Pan *et al.* (2018:3) this model was found to be too simplistic and other more complex models were proposed.

13.9.2 The Theory of Reasoned Action (TRA)

Where the Model of ERB was used to describe the environmental actions of individuals or organisations (Sivek & Hungerford, 1990), The Theory of Reasoned Action (TRA), as well as the Theory of Planned Behaviour (TPB) provided a framework to understand the attitude-behaviour relationships that attempted to predict certain behaviours (Conner & Armitage, 1998). The TRA and TPB are, therefore, cognitive theories. According to the TRA, intention is cited as the greatest predictor of whether an individual will engage in a behaviour (LaCaille, 2020). Intention, in turn, is influenced by an individual's attitude and the pressure placed on them by society (Figure 2-5).

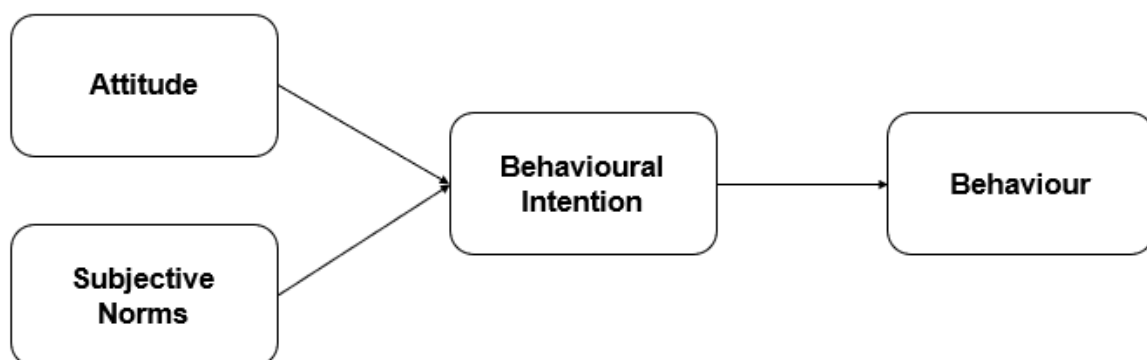


Figure 13-5: A schematic representation of the Theory of Reasoned Action (adapted from Ajzen, 1991)

It can, therefore, be said that this theory is guided by two beliefs (Sarver, 1983): (1) beliefs regarding an individual's preconceived consequences of their actions weighed against the expected value of these actions, and (2) the beliefs of an individual regarding society's approval or disapproval of their actions in combination with their compliance to that action. It should be noted, however, that this theory only deals with volitional behaviours, i.e., behaviours that are fully under one's control (Forward, 1997). The TPB attempts to address this limitation.

13.9.3 The Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) assumes that an individual will behave in a sensible manner by taking into account all the available information, as well as consider the consequences of their actions (Ajzen, 2005).

The Theory of Planned Behaviour (TPB), which builds on the work of the TRA, includes perceived behavioural control (PBC) as one of the determinants of behaviour (in addition to attitude and subjective norms). Human behaviour, according to Ajzen and Schmidt (2020:17), is guided by three fundamental beliefs: (1) beliefs regarding the consequences of an individual's behaviour, (2) beliefs about what is expected from important others, and (3) beliefs about the ability to perform a certain behaviour. These three elements, namely, attitude (A), subjective norms (SN), and perceived behavioural control (PBC), influences an individual's intention to engage in a behaviour. Behavioural intention, as described by Ajzen (1991), entails the motivational factors or willingness of individuals to engage in a behaviour. Consequently, cognitive self-regulation is an important aspect of this theory (Ajzen, 1991:181). A schematic representation of Ajzen's (1989) theory can be found in Figure 2-6 below.

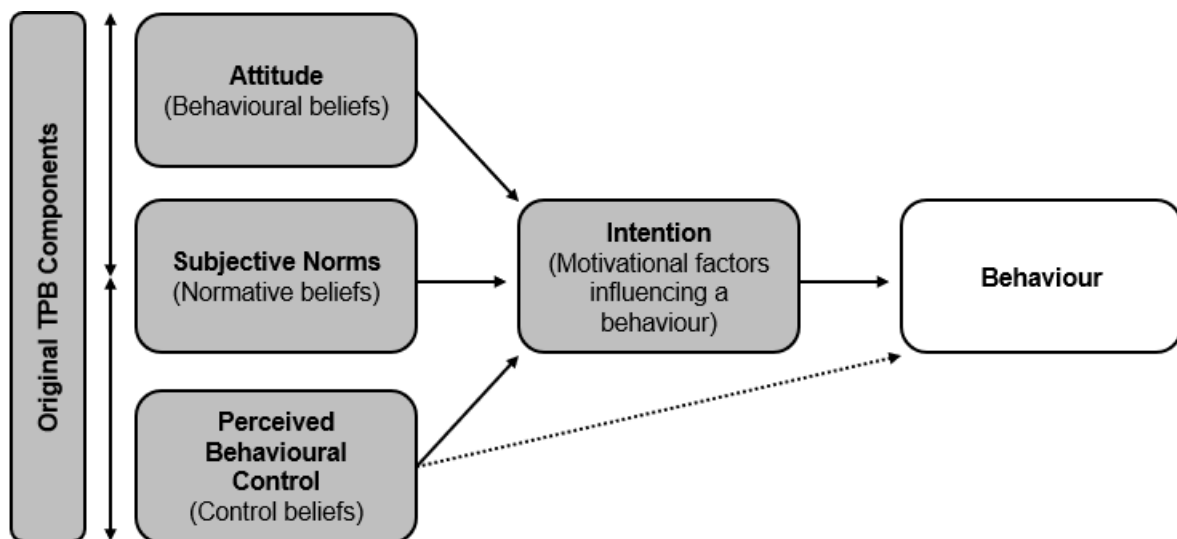


**Figure 13-6: A schematic representation of the Theory of Planned Behaviour
(adapted from: Ajzen, 1991)**

An in-depth review and discussion of the TPB can be found in Chapter 3 of the thesis.

13.10 Conclusion

This chapter highlights waste and waste management in the global, regional, and Namibian context. This provided insight into the current waste management processes that can be expected. National legislation and regulations surrounding waste management in Namibia was also discussed. To orient the research design and methodology, the TPB framework was introduced. Lastly, it was determined that little research was conducted on waste behaviour in the PA context, leading to an examination of literature regarding the application of the TPB to waste behaviours.

CHAPTER 3 DEVELOPING AN ADAPTED VERSION OF THE THEORY OF PLANNED BEHAVIOUR

14.1 Introduction

This chapter expands upon the discussion of the Theory of Planned Behaviour (TPB) found in Chapter 2. This chapter focusses on **Research objective 1**, which is to *develop an adapted version of the TPB which is suitable towards understanding waste management behaviour within Etosha National Park*. An extensive analysis of this theory is found in this chapter, as well as a discussion of the process of adapting the theory for this research. The chapter starts with a brief overview of the TPB framework, detailing its purpose, importance and history. Thereafter, the reasoning for adapting the model will be discussed, as well as the significance thereof. The adapted version of the TPB framework developed for the purposes of this research is provided in this chapter. This research makes a novel contribution by expanding the TPB framework to better understand waste management behaviour within the context of protected areas.

14.1.1 Overview of the Theory of Planned Behaviour (TPB)

Developed by Icek Ajzen in 1985, the *original* TPB framework attempts to predict and understand planned human behaviour in varying contexts (Ajzen, 1985). As discussed in Chapter 2, behaviour is best predicted by intention, which is influenced by three constructs (Ajzen, 1991; Manstead & Parker; 1995):

1. **Attitude:** The positive or negative evaluation of a behaviour, which are *behavioural beliefs*.
2. **Subjective norms:** The social pressure to perform a behaviour, which are *normative beliefs*.
3. **Perceived behavioural control:** The perceived difficulty of performing a behaviour, which are *control beliefs*.

Intention to perform a behaviour is the basis of action. A stronger intention leads to a higher probability of the behaviour occurring (provided that attitude, subjective norms, and perceived behavioural control are favourable) (Ajzen, 2020).

The TPB is one of the most widely used psychological models for predicting human behaviour across multiple behaviours and contexts (Ajzen, 2011). It has successfully predicted health behaviours (Caputo, 2020; Willis *et al.*, 2020), environmental behaviours (Ghani *et al.*, 2013; Ioannou *et al.*, 2013), consumer behaviours (Han & Stoel, 2017; Saricam & Okur, 2019),

educational practices (Lapkin *et al.*, 2015; Wang *et al.*, 2015), to name a few (Ajzen, 2020; Bosnjak *et al.*, 2020). The strength of the TPB is not only in its ability to predict behaviour, but also its potential to guide behavioural change. Cheung *et al.* (1999:587) determined that the TPB provides insights into the factors driving behaviour, which could guide behaviour change interventions. The TPB can be adapted to different behaviours, cultures, and contexts. The flexible nature of the theory allows for the inclusion of additional constructs (Conner & Armitage, 1998).

14.1.2 History of the theory

The TPB was developed to address behaviours that one may not have complete control over and acts as an extension of the Theory of Reasoned Action (TRA). The TRA only considered attitude and subjective norms as adequate predictors of behavioural intention over which individuals have complete volitional control. Ajzen (1985), however, believed that behaviour was not only controlled by individual will, but by objective and external factors as well. Perceived behavioural control (PBC) was included in the model for this reason. Table 3-1 below provides a schematic representation of the TPB. As with the TRA, intention is at the centre of the model in the TPB and deals with the motivational factors influencing behaviour (Ajzen, 1991).

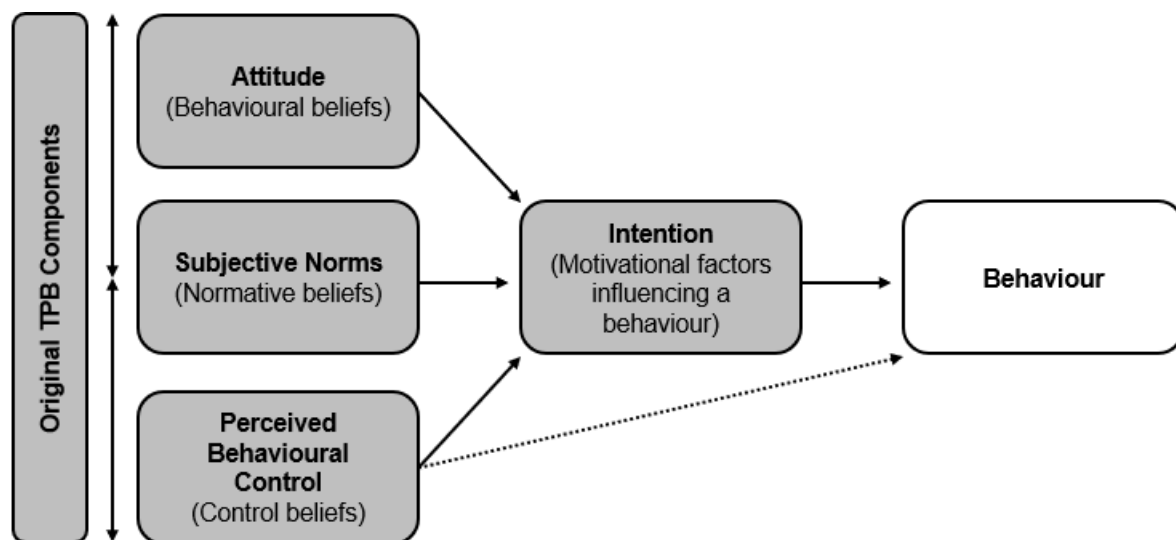


Figure 14-1: A schematic representation of the Theory of Planned Behaviour framework (Adapted from Ajzen, 1991)

14.2 Theoretical background

The sub-sections to Section 3.2 provide an overview of the TPB and explains the key components of the original TPB framework. Sub-section 3.2.2 discusses previous waste-related behavioural studies where the TPB has been applied, as well as the main findings of these studies.

14.2.1 Explanation of the key constructs

The sub-sections below provide a discussion of the three constructs or components which formed the basis of the original TPB framework namely, attitude, subjective norms and perceived behavioural control.

14.2.1.1 Attitude (A)

Attitude (A) refers to an individual's assessment of a behaviour, which can either be positive or negative (Ajzen, 1985). An individual's attitude toward a behaviour is determined by their *salient* or *behavioural beliefs*, where each belief has an associated outcome. According to Conner and Armitage (1998:1433), an individual may have several beliefs regarding a behaviour, but only some of these beliefs will be salient at a particular time. These outcomes are evaluated and assessed according to the strength of the associations. These evaluations contribute to an individual's attitude (Ajzen, 1985). It is known that a positive evaluation of a behaviour increases that individual's intention to engage in a behaviour. This factor entails two components, namely affective (whether performing the behaviour is enjoyable or not) and instrumental (whether the behaviour will be beneficial or harmful to the individual) evaluations of a behaviour (Rhodes & Courneya, 2003).

14.2.1.2 Subjective Norms (SN)

Subjective norms (SN) include the perceived societal pressure placed on individuals to engage in a behaviour (Yadav & Pathak, 2017). This pressure usually stems from observing the behaviour of significant others. These significant others include family, friends, as well as colleagues. There are two components to this factor. These include an injunctive component (the belief of an individual whether significant others expect one to perform a behaviour), as well as a descriptive component (the actual performance of behaviour by significant others) (Ajzen, 2020; Rhodes & Courneya, 2003). These components combined with an individual's motivation to comply with these pressures, results in *normative beliefs* (Conner & Armitage, 1998). It can, therefore, be said that SN is directly proportional to an individual's normative beliefs and their motivation (Ajzen, 2020).

14.2.1.3 Perceived Behavioural Control (PBC)

Perceived Behavioural Control (PBC) refers to the *control beliefs* of individuals, i.e., the factors that either hinder or promote the performance of a behaviour (Ajzen, 2020). PBC has two components, namely self-efficacy (how easy or difficult it is to engage in a behaviour), and controllability (perceived control over the performance of an action) (Rhodes & Courneya, 2003). Additionally, an individual's confidence in their ability to perform a behaviour successfully influences intention. According to Ajzen (1991:181), PBC not only influences intention, but directly influences behaviour as well. This is owing to the fact that PBC measures an individual's ability to overcome the barriers towards participating in a behaviour. According to Conner and Armitage (1998:1431), the relationship between these control beliefs and behaviour is found to be more complex than other factors. Individuals tend to engage in behaviours that they have more control over, whereas engagement is hindered when there is no control. It can, therefore, be said that as PBC increases, so does the performance of a behaviour, if intention is held constant. Furthermore, when used to predict intentions, PBC strengthens the influence of A and weakens SN (Bosnjak *et al.*, 2020).

14.2.2 Previous waste-related studies and findings using the TPB

The TPB has been applied more readily to the environmental science field in recent years, proving valuable in predicting and changing environmental behaviour (Si *et al.*, 2019). When looking at waste management specifically, the majority of research studied recycling or source separation behaviours, with a focus on household, food, construction and demolition, and electronic waste (Fan *et al.*, 2019; Si *et al.*, 2019; Mak *et al.*, 2018; Wang *et al.*, 2020; Zhang *et al.*, 2019). Table 3-1 below highlights the finding of some authors in relation to the relationship between TPB and waste management.

Table 14-1: Previous research findings regarding the relationship between the Theory of Planned Behaviour (TPB) and waste behaviours

Author	Theme	Findings
Brown <i>et al.</i> (2010)	Tourist littering behaviour in Mt Field National Park, Tasmania.	Behavioural beliefs were found to have the greatest persuasion potential in a communication intervention. Specifically, individuals who picked up litter (compliers) were more likely to do so in the presence of people who do not (non-compliers). Setting a good example for others was, therefore, the greatest determinant.

Author	Theme	Findings
Chen and Tung (2010)	Recycling intentions of consumers in Taiwan.	A, SN, moral norm, and consequences of recycling were positively related to recycling intentions, while PBC was statistically insignificant.
Ghani <i>et al.</i> (2012)	Waste separation at source participation (staff of Universiti Putra Malaysia, Serdang, Selangor).	This study found that attitude had the strongest correlation with intention to separate waste, followed by PBC. Situational factors and SN had the smallest correlation, considered insignificant in influencing intentions.
Ioannou <i>et al.</i> (2013)	Household recycling intentions in the Greater Athens Area, Greece.	A and PBC had the greatest statistical significance towards recycling intentions when using the original TPB factors, whereas A and past recycling behaviour was most significant using an extended TPB.
Heidari <i>et al.</i> (2018)	Waste separation at source (university students in Ferdowsi University, Iran).	Motivation was found to be the greatest indicator of waste separation intention, followed by moral obligation. Furthermore, attitude towards source separation was found to be influenced by awareness and moral obligation.
Strydom (2018)	Urban household recycling in South Africa.	Awareness, moral values, and situational factors are found to positively influence recycling behaviour. A lack of sufficient knowledge, positive attitudes, subjective norms, and PBC negatively influenced recycling behaviour in South Africa.
Razali <i>et al.</i> (2020)	Household waste separation behaviour in Kuala Lumpur, Malaysian.	A, SN, and PBC all had a positive influence on waste separation behaviour; however, moral norm had the greatest influence on an individual's intrinsic motivation.
Wang <i>et al.</i> (2020)	Household waste sorting in China.	Environmental regulation had the greatest impact on intention, followed by PBC and A.
Esfandiar <i>et al.</i> (2021)	Tourist binning behaviour in Yanchep National Park, Australia.	Personal norms were found to be the greatest determinant of binning behaviour, followed by SN, PBC and awareness of consequences.

Author	Theme	Findings
Roos <i>et al.</i> (2021)	Waste management behaviour of three stakeholders (management authority, owners/managers of commercial properties, and owners of non-commercial properties) in the Sabi Sand Nature Reserve.	Associations were found between intrinsic motivation and intention; A and support; and support and intention. Respondents were found to have a positive attitude towards waste management and intended to implement waste management practices that are responsible.
Cao & Morrison (2023)	Tourist waste sorting intentions in rural destinations.	A, SN, and PBC directly and positively influence sorting intentions, whereas emotional bonding does not.
Harper <i>et al.</i> (2022)	The waste separation at source behaviours of tourist accommodations and diving charts in the Aliwal Shoal MPA.	Waste separation behaviour was positively influenced by A and SN. Participants generally agreed that they participated in waste separation, but this claim was not supported by the waste characterisation and observational data. Challenges and opportunities for waste separation were related to a lack of infrastructure and services, convenience, time constraints, and customer willingness to participate.
Babazadeh <i>et al.</i> (2023)	Waste separation behaviour in Tabriz, Iran.	PBC was found to be the greatest predictor of behavioural intention, followed by moral commitments and PPE.

All studies mentioned above, besides those by Brown *et al.* (2010); Strydom (2018); Roos *et al.* (2021); and Harper *et al.* (2022), suggested changes to the original TPB model. Table 3-2 below highlights the suggested adaptations as proposed by these authors, as well as their reasoning for adapting the TPB.

Table 14-2: Adaptations to the TPB framework in waste-related research

Author	Adaptations to include	Reasoning for adaptation
Chen and Tung (2010)	• Moral norms • Consequences of recycling • Situational factors	• Moral norms: Recycling contains elements of social responsibility and personal morality. • Consequences of recycling: Included to make provision for the cognitive component of attitude. • Situational factors: Acts as a moderator to all other TPB constructs.
Ghani <i>et al.</i> (2012)	• Situational factors	Situational factors: Determined that waste separation behaviour requires a substantial amount of time or effort, which is provided for with the inclusion of situational factors. These authors did, however, find that situational factors were insignificant in influencing waste separation intentions.
Ioannou <i>et al.</i> (2013)	• Demographic factors • Past recycling behaviour • Situational factors • Consequences of recycling	These four additional constructs were included to improve the predictive ability of the TPB framework, based on the suggestions of other studies. It was found that including these constructs increased the percentage of variance to 79%, however only past recycling behaviour was determined to significantly influence recycling intentions.
Heidari <i>et al.</i> (2018)	• Environmental awareness • Moral obligation • Situational factors • Motivation	Environmental awareness and moral obligation were found to positively influence attitudes towards recycling, which would influence intention. Situational factors and motivation were included as they had a positive relationship with recycling intention. All additional constructs improved the explanatory power of the TPB in predicting recycling intentions.

Author	Adaptations to include	Reasoning for adaptation
Razali <i>et al.</i> (2020)	• Moral norm	Established that intrinsic motivation is more influential than extrinsic incentives, which was confirmed through their results.
Wang <i>et al.</i> (2020)	• Environmental regulation • Knowledge • Involvement • Moral obligation	• Environmental regulation: Determined that government regulations, such as policies, information, and incentives, would influence waste sorting behaviour. • Knowledge: Procedural knowledge of waste sorting would increase the control that individuals had over sorting their waste. • Involvement: Referring to the perceived importance and pleasure derived from waste sorting, involvement would also moderate the relationship between PBC and waste sorting. • Moral obligation: Moral responsibility, as with knowledge and involvement, would influence the perceived control that individuals have over waste sorting.
Esfandiar <i>et al.</i> (2021)	• Awareness of consequences • Personal norm	• Awareness of consequences: Determined that a visitor's level of awareness would impact their littering behaviour. Awareness of consequences is said to develop personal norms, which form the motivational basis for littering behaviour. • Personal norm: Personal norms are not considered the same as subjective norms, where personal norms are associated with the individual and not with significant others.
Cao & Morrison (2023)	• Self-identity • Moral norms	• Self-identity: This refers to an individual's perception of their position in society, which motivates behaviour change in line with their internal beliefs and values. Self-identity

Author	Adaptations to include	Reasoning for adaptation
		includes this social and non-rational element excluded from the original TPB. Self-identity is said to influence an individual's moral responsibility to engage in waste sorting • Moral norms: This was included as the authors found that tourists who had strong personal norms would have an increased moral responsibility to sort their waste.
Babazadeh <i>et al.</i> (2023)	• Perceived moral obligation • Perceived policy effectiveness	• Perceived moral obligation: Included to improve the predictive validity of the TPB. • Perceived policy effectiveness: By combining the TPB with the Norm Activation Model (NAM), PPE was added to moderate the influence of other constructs.

14.3 Rationale for adapting the TPB model for this research

Waste management is a complex behaviour driven by many additional factors that may not be accounted for in the TPB model. The purpose of adapting the original framework to provide a more accurate prediction and understanding of waste behaviour, by including additional constructs. Unique factors within protected areas present complexities that necessitate an adaptation of TPB to adequately capture the motivations, constraints, and social influences that drive waste behaviour in these specific contexts.

Protected areas, such as national parks and nature reserves, are unique in that they operate under specific regulatory, environmental, and socio-cultural constraints (Eagles & McCool, 2002). Research shows that environmental attitudes and pro-environmental behaviours are context-sensitive and can be influenced by situational factors such as location, cultural expectations, and perceived social norms (Hines *et al.*, 1987; Stern, 2000). In protected areas, these factors are more pronounced due to policies that limit visitor activities, the presence of wildlife, and strict environmental protection regulations (Ramkissoon *et al.*, 2013; Ramkissoon & Mavondo, 2015). Consequently, behaviours like waste disposal in these areas are likely influenced by additional situational and normative factors that may not be accounted for by the standard TPB framework (Heberlein, 2012). The adapted TPB framework would benefit from further research in different contexts. As mentioned previously, behaviour is highly

subjective and is influenced by a multitude of factors. Testing the framework in different settings could greatly improve its predictive utility and explanatory power (Chen, 2020; Kumar, 2019). The incorporation of other theoretical models, such as the theory of environmental regulation (Wang *et al.*, 2020), and the Norm Activation Model (NAM) (Wang *et al.*, 2021a) have also been attempted to improve the TPB's explanatory power. Additional constructs could also be added in future studies to provide a more comprehensive analysis of waste-related behaviours (Razali *et al.*, 2020).

Another justification for adapting TPB in this context is that visitor behaviours in protected areas are often influenced by an enhanced sense of environmental responsibility or stewardship. This psychological aspect is critical in understanding waste behaviour in such settings, as visitors may feel compelled to act in environmentally friendly ways, often due to the visual impact of waste on natural landscapes or the explicit requests of park management (Al Mamun *et al.*, 2018; Muldoon, 2020). By incorporating constructs which provide for environmental stewardship and perceived impact on the environment, an adapted TPB model can better capture the drivers of responsible waste management behaviour in protected areas (Ramkissoo & Mavondo, 2015).

Moreover, while perceived behavioural control in TPB addresses an individual's self-efficacy regarding specific behaviours, this component may require additional nuance within protected areas. Park regulations, availability of waste disposal facilities, and direct or indirect peer influence among visitors could exert unique influences on perceived control and intention to dispose of waste properly (Han, 2020; Ardoin *et al.*, 2013). Research suggests that in environmentally sensitive settings, the perceived consequences of waste behaviour can significantly affect visitors' actions, often more than individual control beliefs (Schultz *et al.*, 2011; López-Mosquera & Sánchez, 2014).

Lastly, the subjective norms in protected areas are also unique in that visitors may experience a "park-specific" set of social expectations about environmentally responsible behaviour, influenced by signage, ranger presence, or peer actions (Ramkissoo *et al.*, 2012). By modifying TPB to account for these distinct subjective norms, the adapted model can better predict waste management behaviour aligned with the conservation values upheld in protected areas.

In summary, adapting TPB to reflect the contextual factors in protected areas offers a more accurate framework for understanding waste management behaviour. This modification is essential to capture the complexity of human behaviour in sensitive ecological settings and to inform targeted interventions for waste reduction in protected areas.

14.4 Limitations of the original TPB framework

Although the TPB is widely used as a psychological model in predicting behaviour, some critiques and limitations have been identified.

14.4.1 Underestimation of contextual, cultural, and emotional influences

As seen in Table 3-1 above, the dominant determinant of waste behaviour is dependent on the context of the study area and focus of the research. Findings between these studies are not consistent, despite similar research themes. Results vary depending on not only the context, but on individual characteristics and cultural norms as well. The TPB assumes that individuals are homogeneous and base their decisions on the three components of the TPB (A, SN, and PBC). The model does not take into account individual differences between cultures and situations, thereby linearly predicting behaviour (Zhang, 2018). Research and interventions should, therefore, be guided by studies based on specific behaviours and study areas.

Waste generation and waste management varies greatly in different contexts. The physical environment, including the availability or absence of resources and facilities, can affect waste management (Gifford, 2007). The quality of infrastructure can also affect whether people choose to use them or not (Kollmuss & Agyeman, 2002). Not only does the physical environment play a role, but local social norms and influences also impact behaviour. Social norms are defined by Elster (1989:99) as rules of conduct that are “...*shared by other people and partly sustained by their approval and disapproval*”. These social norms are also dependant on context. Tourist areas attract people of varying nationalities, where social norms will differ between individuals. Additionally, demographic variables (age, gender, education, etc.) will also influence pro-environmental behaviours (Li *et al.*, 2019). Lastly, local policies, regulations, and laws will also influence waste behaviours. The state of waste legislation differs between regions. Where there is an absence of clear and strict legislation related to waste management, the motivation to engage in these behaviours may not be as strong (Hage *et al.*, 2009).

Further, the TPB exclusively focusses on rational reasoning, excluding emotions and unconscious cognition (Conner *et al.*, 2013; Sheeran *et al.*, 2013; Sniehotta *et al.*, 2014). Emotional reactions, such as guilt, fear, and regret, are not considered in this theory but may be strong predictors of behaviour. This is especially true for situations which are morally relevant (Kaiser *et al.*, 2005a).

14.4.2 The intention-behaviour gap

The TPB proposes that intention is the greatest predictor of behaviour. Intentions are concerned with the strength and intensity of an individual's motivation to perform a behaviour. Sheeran (2002), however, raises the questions of how accurately intentions predict behaviour and what determines this. It has, however, been acknowledged by Ajzen (1985; 1991) that an individual, despite forming an intention, will not always act upon that intention. These individuals are referred to as “inclined abstainers” (Sniehotta *et al.*, 2014) and are not addressed in this model. Studies by Araújo-Soares *et al.* (2013) and Conner *et al.* (2013), for example, have found that beliefs may be a better predictor of behaviour than intentions. When looking at behaviours which are more complex, such as waste behaviours, studies have found that constructs other than the original TPB factors had a stronger influence (Bamberg & Moser, 2007; Steg & Vlek, 2009). For this reason, the predictive validity of the theory has been brought into question.

As stated by Ajzen (1991; 2020), the TPB is open to adaptation, provided these additional constructs had a significant variance beyond that of the original TPB components and are behaviour specific. A number of studies have included additional constructs that may improve the predictive ability of the theory, especially for waste-related behaviours (Chen & Tung, 2010; Chen *et al.*, 2020b; Fenitra *et al.*, 2021; Heidari *et al.*, 2018; Hu *et al.*, 2021; Kumar, 2019; Wang *et al.*, 2021a).

14.5 Proposed adaptations to the model

An extensive review of literature was conducted with relation to extending and adapting the TPB. Resources from not only waste-related research, but other disciplines, were consulted. These included studies from Chen and Tung (2010); Ghani *et al.* (2013); Heidari *et al.* (2018); Tonglet *et al.* (2004); and Wang *et al.* (2018), among others. These authors used an extended TPB to examine waste-related behaviours. Additional studies, not exploring waste management, included Canova and Manganelli (2020); Chen (2020); Kazaure (2019); and La Barbera and Ajzen (2020); Willis *et al.* (2020). From this review, awareness (AW), situational factors (SF), perceived moral obligation (PMO), and perceived policy effectiveness (PPE) were chosen to be included in the extended TPB used for this research. The reasons for including these four constructs are outlined in Section 3.5.1 to 3.5.4 below and were determined to potentially influence waste management behaviour in a protected area setting. Other factors, such as past behaviour (Tonglet *et al.*, 2004; Xu *et al.*, 2017), behavioural consequences (Chen & Tung, 2010; Davies *et al.*, 2002), positive emotional experience

(Conner *et al.*, 2013), and habit (Ajzen, 2011; Canova & Manganelli, 2020) were not included in the adapted TPB model proposed for this research.

The decision to exclude constructs from the adapted TPB such as those mentioned above, was guided by theoretical and practical considerations. The strength of the original TPB framework lies in its simplicity (Ajzen, 1991). Including too many additional constructs can, therefore, weaken the predictive power of the original TPB constructs and dilute the coherence and theoretical integrity of the framework. As the scope of this research required a framework tailored to waste-related behaviour in Etosha National Park, it was necessary for the framework to be clear and manageable. When adding additional constructs, the framework becomes more complex. Increasing the complexity does not necessarily improve on predictive power but may obscure the link between the constructs and the behaviour being studied (Ajzen, 1991; Conner & Armitage, 1998).

Although previous studies have found that constructs such as past behaviour and habit influence behaviour (Canova & Manganelli, 2020; Tonglet *et al.*, 2004; Xu *et al.*, 2017), these constructs require repeated observations over extended periods of time. Due to a limited timeframe, the temporal effects of constructs such as these could not be captured in this study. Moreover, constructs such as emotional experiences and behavioural consequences can potentially coincide with existing TPB constructs (such as attitude). For these reasons this study focussed on the core TPB constructs, with four additional constructs, to capture the unique, context-specific behaviours in ENP. It is hoped that by doing so, that a consistent and coherent framework can be retained, while improving its predictive capability.

14.5.1 Awareness (AW)

Some studies (Ajzen & Driver, 1992; Davies *et al.*, 2002; East, 1993; Tonglet *et al.*, 2004) believe that attitude (which forms part of the original TPB framework) should be separated into two components. The first component, experiential, is related to the feelings of the individual (discussed in this section), and instrumental, which is based on individual knowledge (Tonglet *et al.*, 2004). Awareness (AW) determines the cognitive component of attitude, measuring the knowledge of the facts and outcomes of performing a behaviour (Fryxell & Lo, 2003; Taufique *et al.*, 2016). It is said that increased environmental awareness and knowledge of environmental issues increases behavioural intentions. Hansla *et al.* (2008:3) and Si *et al.* (2020:2) state that awareness gives an individual a sense of responsibility, encouraging them to perform a behaviour. This, in turn, results in a moral obligation (See Section 3.5.3) to act in a certain way. This has been found by Tonglet *et al.* (2004) and Kumar (2019) to be significant predictors of recycling behaviour. Maichum *et al.* (2016:6) state that awareness will encourage

positive attitudes. Further, environmental knowledge can also be positively influenced by subjective norms (pressure from society to be knowledgeable about environmental information) and perceived behavioural control (knowledge can increase one's control of a behaviour) (Kim *et al.*, 2014; Moorman *et al.*, 2004).

Research from Izagirre-Olaizola *et al.* (2015); Janmaimool & Denpaiboon (2016); Tang *et al.* (2011); and Wu *et al.* (2022) included awareness/knowledge in their research on waste-related behaviour. Awareness was also included as part of the adapted TPB framework developed for this research, as outlined in Figure 3-2 below.

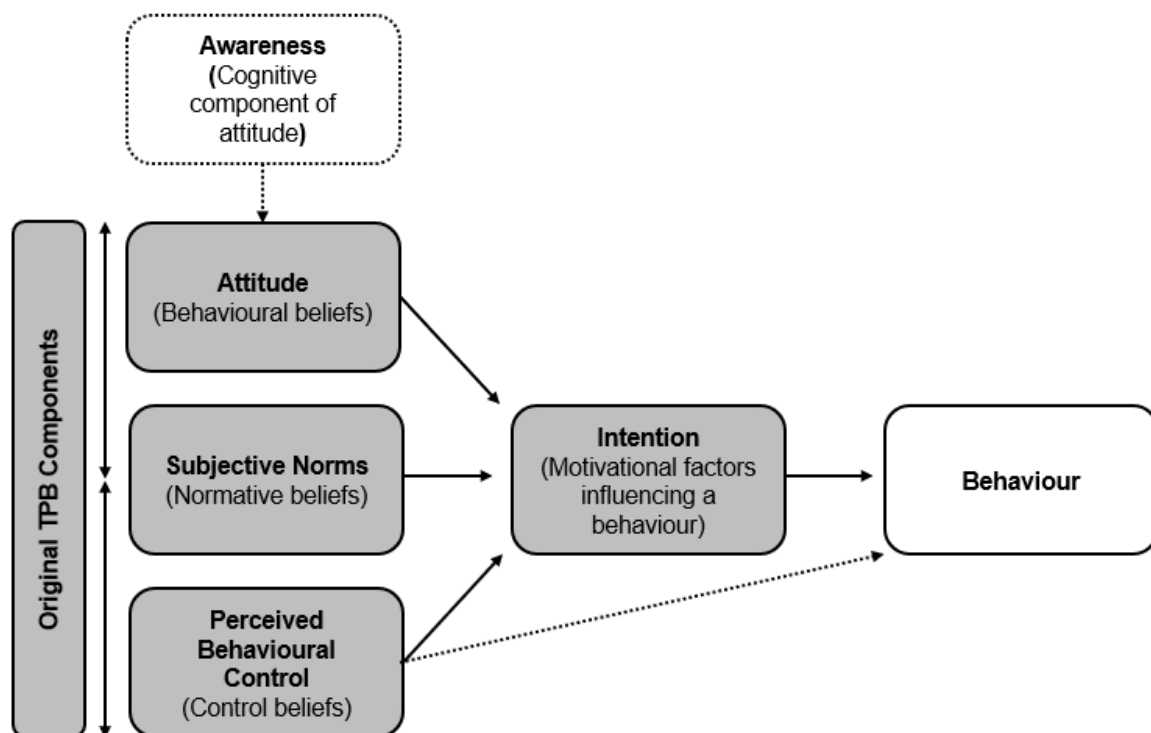


Figure 14-2: Adapting the TPB to include awareness (AW)

14.5.2 Situational factors (SF)

Critiques regarding the concept of perceived behavioural control (PBC) include the potential absence of resources and opportunities that would influence the successful performance of a behaviour (Conner & Armitage, 1998). The inclusion of situational factors is, therefore, suggested. Situational factors, in the context of waste-related behaviour may include the provision of waste bins and waste management information; the availability of transportation,

collection points, and recycling facilities; and the perceived time and space available to manage waste.

Situational factors were suggested by various authors as being influential in an individual's intention to act (Alhassan *et al.*, 2018; Ghani *et al.*, 2013; Razali, 2020). Although an individual may have a positive attitude towards a behaviour, they may not necessarily engage in that behaviour. The adequate performance of a behaviour is either impeded or motivated by these factors. These may include knowledge, lack of time and space, past experiences, cooperation, location, and access to infrastructure and resources, to name a few (Alhassan *et al.*, 2018; Ghani *et al.*, 2013; Razali, 2020; Roos *et al.*, 2021). Inconvenience, and a lack of resources have been found to impede waste management behaviours. Examples of these are a study by Ramayah *et al.* (2012), which found that individuals who do not recycle would be less likely to do so if it was inconvenient, and a study by Ghani *et al.* (2013), which determined that a lack of resources and skills were a barrier to source separation. According to Ioannou *et al.* (2013:2039), situational factors are found to improve upon the basic model of the TPB. Although PBC measures an individual's perception of these factors, a few studies have stated that this component is not an accurate measure of behaviour (Davies *et al.*, 2002; Tonglet *et al.*, 2004).

Boldero (1995); Davis *et al.* (2006); Ghani *et al.* (2013); and Tonglet *et al.* (2004) are amongst the authors who suggest the inclusion of situational factors when applying the TPB towards understanding waste-related behaviour. The adapted TPB framework developed for this research provides for the inclusion of situational factors (as seen in Figure 3-3 below).

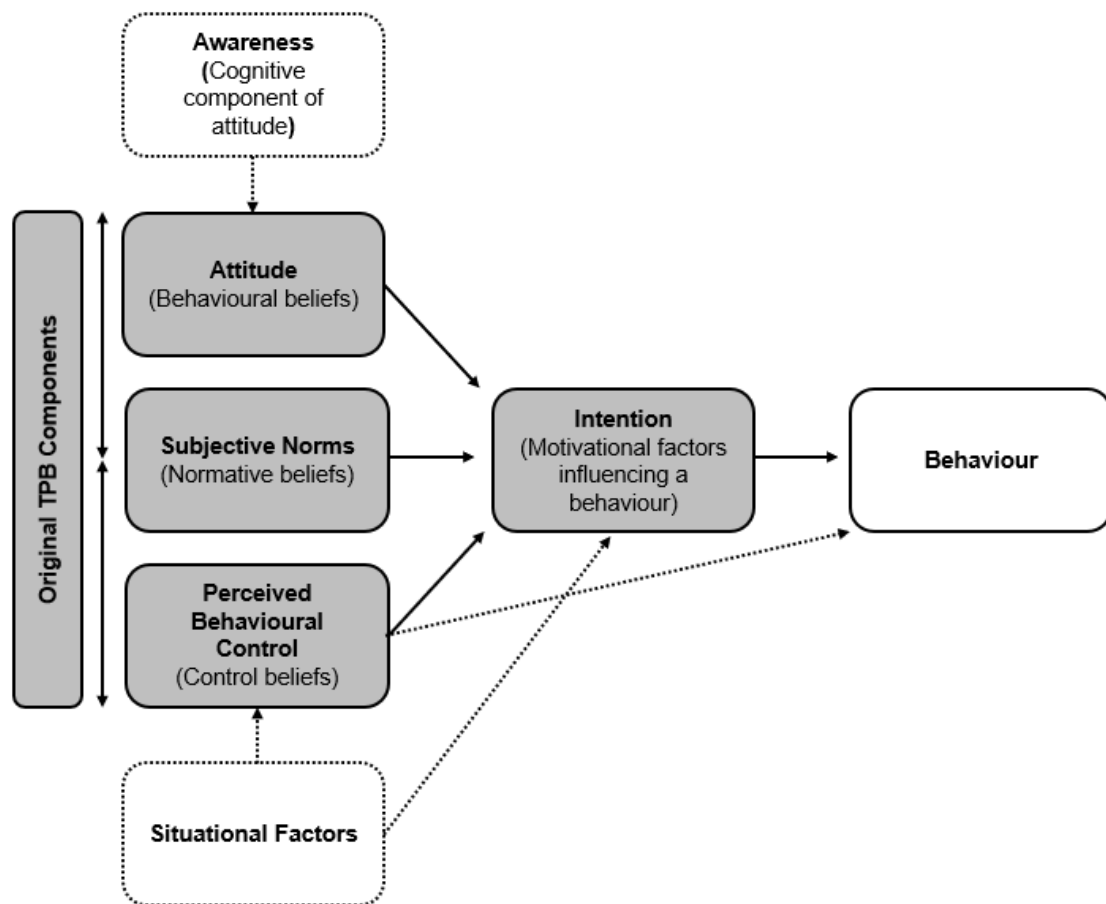


Figure 14-3: Adapting the TPB to include situational factors (SF)

14.5.3 Perceived moral obligation (PMO)

More recently, scholars such as Manstead (2000) and Si *et al.* (2020) have criticised the TPB for overlooking morality as an indicator for behavioural intention. Including moral obligation in the TPB has, therefore, been suggested to improve the interpretive capability and predictive validity of the theory (Si *et al.*, 2020; Ding *et al.*, 2018). Perceived moral obligation (PMO) is defined as the judgement of the moral correctness (or incorrectness) of performing a behaviour (Babazadeh *et al.*, 2023). The greater an individual's sense of responsibility, the more likely they are to engage in a behaviour. An individual may choose to behave morally or immorally when faced with an ethical decision. Previous research by Ajzen (1991), Babazadeh *et al.* (2023), Xu *et al.* (2017), and Zhang *et al.* (2015) found that PMO was an important indicator of an individual's intention to separate their waste. Miafodzyeva *et al.* (2013) and Pakpour *et al.* (2014), specifically, found moral obligation to be the strongest predictor of household waste behaviours. Furthermore, campaigns targeting moral obligation have been found to increase effectiveness of interventions.

Moral obligations in protected areas, such as ENP, could differ from moral obligations in other environments. The environmental, social, and cultural values associated with PAs could explain this differentiation. Protected areas emphasise conservation, and as a result, could bring about a heightened obligation to manage waste responsibly in favour of environmental protection.

Studies suggesting the inclusion of perceived moral obligation in behavioural research include Annamdevula *et al.* (2022); Pakpour *et al.* (2013); Tonglet *et al.* (2004); and Wang *et al.* (2021c). As outlined in Figure 3-4, the adapted TPB framework developed for this research provides for the inclusion perceived moral obligation (PMO).

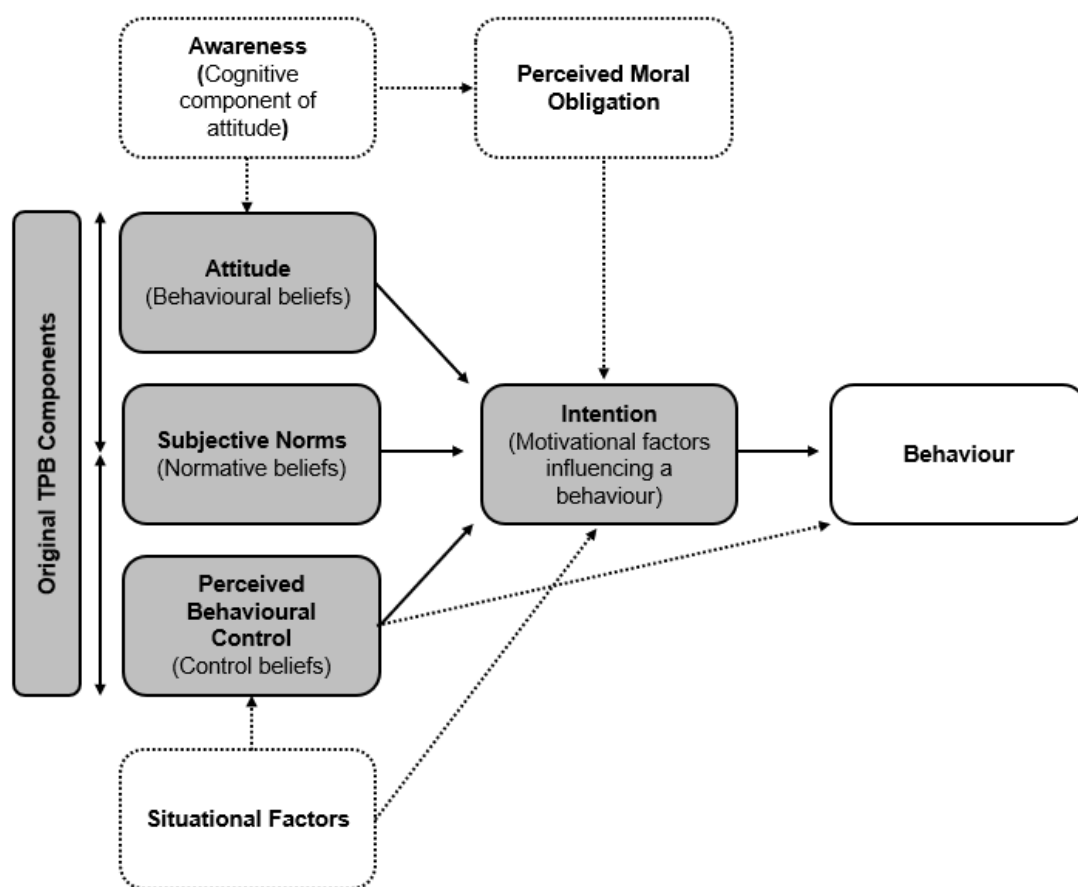


Figure 14-4: Adapting the TPB to include perceived moral obligation (PMO)

14.5.4 Perceived policy effectiveness (PPE)

Perceived policy effectiveness (PPE) refers to an individual's positive or negative evaluation of the coherence, sufficiency, and facilitation of policy measures (Wan *et al.*, 2014a). These evaluations are motivational in that when a policy is perceived to be effective, an individual

will be more likely to conform to the policy. PPE has also been found to moderate the influence of other constructs in the TPB in the following ways (Davis *et al.*, 2006; Fiske *et al.*, 1994; MacKenzie & Spreng, 1992; Wan *et al.*, 2014a):

- PPE will positively influence the relationship between attitude and intention;
- PPE will negatively influence the relationship between subjective norms and intention;
- PPE will positively influence the relationship between perceived behavioural control and intention;
- PPE will negatively influence the relationship between moral obligation and intention; and
- PPE will negatively influence the relationship between awareness of consequences and intention.

Studies conducted by Steg and Vlek 2009, Wan *et al.* (2014a), Wan *et al.* (2014b), and Xu *et al.* (2017) concluded that effective policies related to waste management motivates individuals to participate in pro-environmental behaviours.

Policies may include incentivised, regulatory, and educational measures which a government could implement (Wan *et al.*, 2014b). These measures influence and individual's motivation to perform a behaviour. Policy measures could refer to waste management regulations or strategies (with specific provision for PAs), waste separation and recycling initiatives, or staff policies for waste management. Perceived policy effectiveness, in the context of this research, refers to whether the respondents believe that the policies implemented by ENP are effective in facilitating waste management in the park.

Various studies have proposed the inclusion of perceived policy effectiveness to the original TPB model. These include Babazadeh *et al.* (2023); Shen *et al.* (2022); Wan *et al.* (2014b); and Xu *et al.* (2017). As outlined in Figure 3-5, the adapted TPB framework developed for this research provides for the inclusion perceived policy effectiveness (PPE).

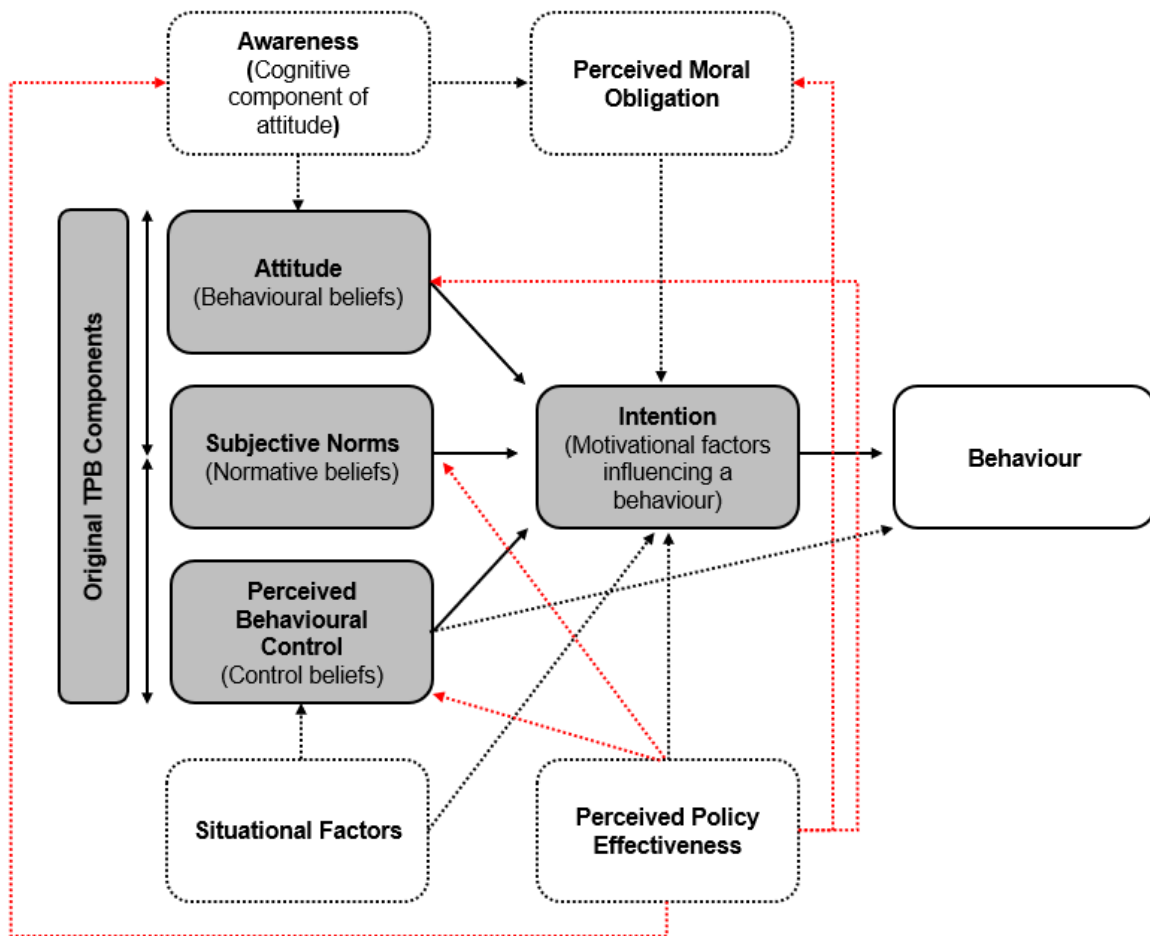


Figure 14-5: Adapting the TPB to include perceived policy effectiveness (PPE)

14.5.5 The adapted TPB framework developed for this research

To summarise, the adapted TPB framework developed for this research has added four additional constructs to the original TPB framework, namely – awareness (AW), situational factors (SF), perceived moral obligation (PMO) and perceived policy effectiveness (PPE) as outlined in Figure 3-5 above.

Although different authors have suggested the addition of one or two of these constructs to the TPB, there has not yet been an adapted version of the TPB framework which have incorporated all four of these additional constructs in waste-related behavioural studies. Additionally, this is the first research which has applied this model towards understanding waste-related behaviour in the protected areas context, globally.

Specific statements related to each of these TPB constructs (See Figure 3-5) were gleaned from literature and adjusted to suit the scope and context of this research. These statements

were incorporated into survey questionnaires as deliberated on in Chapter 4 and outlined in Section 3, Annexure A.

14.6 Implications and applications of the adapted TPB framework

The theoretical and practical implications for adapting the TPB framework is outlined in this section. Theoretical implications detail how adapting the framework can improve the theory's predictive and explanatory capabilities. Practical implications, alternatively, highlight how these adaptations can be used practically in real-world settings.

14.6.1 Theoretical implications

By incorporating additional constructs or components into the TPB framework, this research may provide a new perspective on waste management behaviour not previously studied. Ajzen *et al.* (2011) acknowledges the fact that the TPB is not a complete theory and does not provide an exhaustive explanation of behaviour. Adapting the TPB framework to include additional elements—such as awareness, situational factors, perceived moral obligation, and perceived policy effectiveness—has several theoretical implications. These adaptations help to expand the TPB by addressing limitations that arise in complex behavioural contexts like waste management in protected areas. The key theoretical implications are outlined in the sub-sections 3.6.1.1 to 3.6.1.6 below.

14.6.1.1 Enhanced ability to predict waste-related behaviour

Integrating factors like awareness, situational influences, and perceived moral obligation can increase the TPB's predictive validity for behaviours in context-specific settings, such as protected areas. As mentioned above, research suggests that situational and moral considerations often heavily influence behaviours that have environmental consequences (Kaiser *et al.*, 2005b). By expanding TPB to include these elements, researchers can capture a wider range of motivations and constraints, providing a more accurate picture of behaviour in settings where people are expected to act in environmentally responsible ways.

14.6.1.2 Broader conceptualisation of social influence

In the original TPB, subjective norms are limited to the perceived social pressures from significant others. By including perceived moral obligation, the adapted model allows for a broader view of social influences, capturing internalised social values or personal moral standards that individuals may follow, even in the absence of external pressure. This adaptation is especially relevant for behaviours that are self-regulated by ethical principles,

such as waste management in nature, where individuals might act out of a sense of duty toward the environment (Schwartz, 1977).

14.6.1.3 Consideration of contextual constraints and enablers

As mentioned earlier, situational factors, like the availability of waste facilities, weather conditions, or the presence of enforcement personnel, directly influence perceived behavioural control (Ajzen, 1991). However, specific external conditions that can facilitate or inhibit action beyond an individual's internal control are also introduced. Including situational factors as independent constructs enriches the TPB model by acknowledging how context shapes perceived behavioural control and decision-making processes, particularly in settings where physical or logistical constraints are significant.

14.6.1.4 Integration of policy influence

Adding perceived policy effectiveness recognises the role of institutional influence on individual behaviour. This adaptation implies that people's behaviour can be affected by their beliefs about the effectiveness of rules, regulations, or conservation policies within protected areas. For example, if individuals believe that strict littering regulations are enforced effectively, they may be more inclined to comply (Young *et al.*, 2015). This addition to TPB provides a pathway for examining how policy perceptions interact with personal motivations and contextual factors to shape environmentally responsible behaviour.

14.6.1.5 Inclusion of cognitive and affective determinants through awareness

Awareness, especially of environmental impacts, introduces cognitive and affective elements that are often underexplored in TPB. It suggests that individuals who understand the environmental consequences of waste behaviour may form stronger intentions to act responsibly, as awareness can affect attitudes and perceived moral obligation. Awareness might also interact with other TPB constructs (such as perceived behavioural control) by fostering a sense of responsibility and encouraging proactive behaviour, especially when individuals recognise the ecological consequences of their actions (Bamberg & Möser, 2007).

14.6.1.6 Shift toward a value-belief-norm orientation

The inclusion of perceived moral obligation and policy effectiveness aligns TPB more closely with the Value-Belief-Norm (VBN) theory of environmental behaviour, which emphasises personal norms and moral beliefs as motivators for pro-environmental actions (Stern, 2000).

This blending of TPB and VBN concepts suggests a hybrid model that leverages both theories' strengths, making the adapted TPB framework more versatile in addressing moral and ethical dimensions of behaviour in conservation contexts.

Theoretical modifications to TPB, as proposed here, support the development of context-specific models that are tailored to unique behavioural settings like protected areas. By situating TPB within a framework that considers ecological, regulatory, and social distinctions, this adapted model becomes more suitable for studying environmentally significant behaviour, as it accounts for external factors and moral reasoning that are often integral to sustainable actions in these settings (Klöckner, 2013). By disregarding morality, and other external factors, interventions aimed at changing and improving these behaviours might not have the desired effect.

14.6.2 Practical applications

A major contribution of an extended TPB is its potential ability to inform practical implications related to waste behaviour. By providing for a wider range of constructs or components, waste-related interventions, policies, or programmes may be better suited to the environment that the research was conducted in. It can also focus these interventions on the factors that would be most beneficial to the improvement of waste management and waste-related behaviours.

Adapting the TPB to include additional constructs—such as awareness, situational factors, perceived moral obligation, and perceived policy effectiveness—presents a range of practical applications for waste management interventions in protected areas as discussed in subsection 3.6.2.1 to 3.6.2.5 below.

14.6.2.1 Improved intervention design

Traditional TPB focuses on attitudes, subjective norms, and perceived behavioural control, but these alone may not account for complex environmental behaviours like waste disposal in natural settings (Ajzen, 1991). Including situational factors and policy effectiveness in the adapted model allows for interventions that directly address logistical or contextual barriers to waste management. For instance, situational factors like the accessibility and visibility of waste disposal bins can be strategically modified to improve waste disposal practices. Likewise, awareness campaigns that highlight the impact of litter on local ecosystems can reinforce visitors' understanding of waste's environmental consequences, potentially leading to more consistent responsible behaviour (Bamberg & Möser, 2007). This adapted approach makes it easier to develop targeted solutions that encourage waste disposal, reduce litter, and promote conservation in sensitive environments.

14.6.2.2 Enhanced policy compliance through perceived effectiveness

The addition of perceived policy effectiveness within the TPB framework emphasises the role of policy communication in shaping behaviour. By emphasising policy effectiveness, protected area managers can ensure that visitors are aware of relevant waste policies and their success, increasing compliance (Young *et al.*, 2015). Practically, this might involve well-placed signs detailing the purpose and benefits of waste policies, reinforcing a sense of shared responsibility. Additionally, incorporating feedback systems can make policies more responsive and visible to visitors, thus fostering a positive perception of policy efficacy. This reinforces adherence and helps in maintaining clean, ecologically preserved environments where policy and behavioural expectations are aligned.

14.6.2.3 Promotion of intrinsic motivation through moral appeals

Including perceived moral obligation in the TPB allows waste management strategies to tap into intrinsic motivations by appealing to visitors' values and ethical responsibilities. Research on moral obligation has shown it can significantly influence pro-environmental behaviours, especially when people perceive their actions as ethically aligned with broader social and environmental goals (Schwartz, 1977; Stern, 2000). Through practical application, this could mean using signs or messages that appeal to visitors' moral responsibility toward nature, such as reminders of their role in preserving the park's ecosystem. Conservation area managers can also leverage social norms and role models, such as park rangers or environmentally conscious visitors, to encourage compliance through positive examples. This appeal to ethical duty may motivate visitors to act responsibly, even in the absence of direct oversight, reducing littering behaviours and fostering a sense of stewardship within the protected area (Kaiser *et al.*, 2005b).

14.6.2.4 Enhanced predictive and monitoring tools for behaviour management

Adapting TPB to incorporate situational influences, policy perceptions, moral considerations, and awareness also improves the model's ability to predict and monitor behaviour. Protected area managers can use insights from these expanded TPB constructs to better understand how various factors shape waste behaviours, allowing them to design effective monitoring systems. For example, they might track waste disposal behaviour in relation to the availability of facilities or monitor compliance following policy communication campaigns. Such targeted tracking can guide resource allocation, ensuring that efforts and funding are directed toward the most impactful waste management practices (Klößner, 2013). Regular monitoring also

allows for ongoing adjustments, making waste management strategies more dynamic and responsive to evolving visitor behaviours and area-specific challenges.

14.6.2.5 Long-term behaviour changes and conservation outcomes

Lastly, adapting the TPB for conservation settings fosters long-term behavioural change, promoting a culture of environmental stewardship. Research suggests that when individuals feel a personal moral responsibility, supported by awareness and the perception that policies are effective, they are more likely to maintain positive behaviours over time (Stern, 2000). This is particularly crucial in protected areas, where sustainable behaviour contributes to long-term conservation goals. Additionally, the development of a stewardship ethic can lead to spillover effects, with visitors applying pro-environmental behaviours learned in protected areas to other parts of their lives. Thus, an adapted TPB not only helps address immediate waste management needs but also supports broader conservation outcomes. Neglecting long-term behaviour change and the promotion of environmental stewardship will ultimately lead to unsustainable practices in the future.

14.6.3 Potential negative implications of an adapted TPB model

Extending the TPB framework to include additional constructs beyond that of the original framework could result in several negative implications. As the framework was specifically designed around the three core predictors of behaviour – attitude, subjective norms, and perceived behavioural control – including further factors might compromise the predictive ability and theoretical integrity of the framework (Ajzen, 1991). The influence of these core constructs on intention and behaviour have been extensively studied in multiple disciplines (Bosnjak *et al.*, 2020). It is not known if adding additional constructs will improve upon the explanatory power of the theory or if these constructs will influence behaviour (Ajzen, 1991). Including additional constructs will also increase the complexity of the framework. This could result in methodological challenges, where it may be difficult to measure the additional constructs reliably and consistently.

Second, additional variables may already be explained by an existing construct (as with emotional experiences and attitude), leading to multicollinearity. When two constructs are correlated, it may be difficult to distinguish the influence of the variables on behaviour, resulting in less reliable statistical inferences (Cunningham & Aldrich, 2011).

Lastly, by adding constructs which are specific to a situation, as behaviour is found to be context-specific (Gifford, 2007; Kollmuss & Agyeman, 2002), the findings cannot be

generalised or compared to other studies using the TPB framework. It can, therefore, be difficult to use these conclusions in similar contexts where the added constructs may not apply.

Despite these limitations, adapting the TPB framework for specific research, such as waste-related behaviour in Etosha National Park, remains valuable and advantageous. By extending the framework to include additional context-relevant constructs, researchers can address specific behavioural influences unique to the study area, which may not be captured by the core predictors alone (See Sections 3.6.1 and 3.6.2). While such adaptations may increase complexity, they allow for a deeper understanding of behaviour in the context of a protected area with ecotourism activities, where factors such as environmental awareness, cultural values, or tourism-related norms may play a significant role. Although findings may be less generalisable, they offer targeted insights that can inform tailored interventions and policies, making the framework more applicable and effective for addressing the park's unique waste management challenges. Therefore, an adapted TPB framework provides an opportunity to refine the understanding of waste-related behaviour in Etosha National Park without diminishing the utility of the original model.

14.7 Conclusion

The TPB has been established as a valuable framework for examining and predicting behavioural intentions since its inception in 1985. Despite its criticisms and limitations, this theory has been used in a variety of disciplines including health, consumer, educational, technological, and environmental research. For complex behaviours such as waste management, however, the original TPB components were deemed inadequate. Due to differences in physical, social, and legal environments, it became apparent that additional constructs or components were needed to study waste behaviours.

This research, therefore, proposed an adapted TPB framework which includes awareness (AW), situational factors (SF), perceived moral obligation (PMO), and perceived policy effectiveness (PPE). By extending the original TPB framework, this research attempts to improve the explanatory power of the theory.

The next chapter, Chapter 4, provides a description of the methodology followed in applying this adapted version of the TPB towards exploring waste-related behaviour in ENP.

CHAPTER 4 METHODOLOGY

15.1 Introduction

This chapter introduces the research design used in this study, including the case study and participant selection processes, data collection and analysis methods, methodological assumptions and limitations, and ethical considerations.

15.2 Research design

Developing a research design is an important part of the scientific research process. This provides a structured and methodical approach to the investigation of a research topic. A research design outlines the methods, techniques, and procedures used in a study, providing a blueprint for the research process (Creswell & Cresswell, 2018). The detailed design and its components are specific to the nature of the study, the research question, as well as the needs of the study (Creswell & Cresswell, 2018; Petty *et al.*, 2012a).

This research adopted an exploratory case study design. According to Crowe *et al.* (2011:100), “A case study is a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context”. A case study design enables the use of multiple research tools to thoroughly investigate the phenomenon in question (Ridder, 2017). The case study method involves examining a real-life, contemporary, bounded, or multi-bounded system through detailed, in-depth data collection from multiple sources, leading to a case description and identification of key themes (Creswell & Cresswell, 2018). Exploratory studies are necessary when there is limited knowledge about a topic which is important to explore (Swedberg, 2020).

According to Gustafsson (2017:1), when applied correctly, case studies allow researchers to contextualise a phenomenon using various data sources, such as individuals, organisations, relationships, or communities. Yin (2009) also supports using case studies when the goal is to answer “How” and “Why” questions, or when contextual factors relevant to the phenomenon need to be examined. The approach also allowed for a deeper understanding of the underlying factors influencing waste-related behaviour. To do this, multiple sources of data are collected using both qualitative and quantitative techniques (Crowe *et al.*, 2011).

The advantage of case studies lies in their data-driven nature, grounded in people's experiences and practices, which helps to unravel the complexity of social life. Case studies serve as a rich data source for further analysis, can be action-oriented, and are often more persuasive and relatable due to their proximity to real-life experiences (Krusenvik, 2016).

However, case studies also have drawbacks, such as the potential for a lack of rigour, time-consuming execution, and challenges in conducting them. They are prone to generalisation and technical limitations, such as difficulty in identifying data sources and gaining access. Researchers may face challenges in observing natural situations, leading to the 'observer effect', and case studies are sometimes seen as producing 'soft' data lacking the rigour typically expected in social research (Krusenvik, 2016).

In the case of this research, Etosha National Park (ENP) was selected as the case study to explore waste behaviour in the context of a Namibian protected area. Specifically, this research was driven by the Theory of Planned Behaviour (TPB). Using a theory-led approach may generate knowledge that could be applied to other contexts and behaviours (Crowe *et al.*, 2011). An exploratory case study design was, therefore, employed to gain an in-depth understanding of waste management within the context of ENP, from the perspectives of both tourists and staff. As stated, a case study is especially suited to explore complex and context-specific phenomena, such as waste management behaviour. To ensure a comprehensive examination of the research topic, multiple data sources were used. These included both qualitative and quantitative techniques. In summary, by incorporating multiple sources and collection methods, this research aligns with the requirements of a case study design.

15.3 Research approach

Research can commonly be classified by three approaches, namely the quantitative, qualitative, and mixed method approaches. The quantitative research paradigm is based on positivism and attempts to explain, describe, and predict phenomena through the collection and analysis of numerical or statistical data (Mohajan, 2020). The relationships between variables in this research approach are quantified. Once numerical data is collected and tested, findings may be generalised to predict future phenomena. As data is based on numbers, quantitative research can easily be replicated in other studies (Gray *et al.*, 2007). According to this paradigm, there is only one reality. This is an objective reality, existing independently from human perception, which can be quantified (Kandel, 2020). Relationships between variables can be determined by using quantitative methods, but it cannot determine the motivations or causes of these relationships. Only empirical relationships can, therefore, be established (Stockemer *et al.*, 2019). There are certain phenomena that cannot be quantified, and where the quantitative approach cannot be applied. The qualitative approach is, therefore, better suited to determine the meaning behind quantitative relationships.

The qualitative research approach, in contrast with the quantitative research, is underpinned by the interpretivist paradigm. This paradigm is characterised by multiple realities, where

reality is deemed to be socially constructed (Petty *et al.*, 2012a). According to Blaikie (1993:96), “*Human experience involves a process of interpretation rather than sensory, material apprehension of the external physical world and human behaviour depends on how individuals interpret the conditions in which they find themselves*”. Social reality, therefore, is made up of socially constructed meanings. Social actors seek to understand the world around them. This understanding is not inherently present but must be created (Petty *et al.*, 2012a). Consequently, reality is found to be highly subjective. Furthermore, these meanings are generally formed through the interaction between individuals within a culture or society (Flick *et al.*, 2004).

Qualitative research seeks to interpret the understanding that individuals ascribe to a social problem. This may involve human behaviour or experiences, or other social phenomena. The starting point of this research is the development of an assumption or a worldview, with the possible use of a theoretical framework (Creswell, 2007). Data is collected in the context under study, which can involve both a place and the people in it. Qualitative research generally involves a smaller number of observations or cases that are investigated in-depth. Data generated from this research relies on words to capture perceptions and to convey reality (Grey *et al.*, 2007). The data captured is subjective in nature and can be collected using participant observation, interviews, case studies, and content analysis (Kandel, 2020; Petty *et al.*, 2012b). Qualitative data is analysed inductively, where theories, themes, patterns, or categories are formed. The purpose of this research approach is, therefore, to apply inductive reasoning to explore, understand, describe, change, or explain human behaviour. The knowledge obtained from these observations are context specific. Qualitative research is beneficial in that it attempts to understand the complex nature of human behaviour. Like the quantitative approach, qualitative research can measure the cause of a phenomenon. Quantitative research, however, seeks to answer the “*how often*” question, whereas qualitative answers the “*what*” question (Black, 1994; Malina, 2010). Where phenomena are hard to quantify, such as human behaviour, qualitative research is used.

The third research approach, namely mixed methods research, makes use of, and integrates, both qualitative and quantitative methods. Using this approach, both qualitative and quantitative data is collected, analysed and interpreted simultaneously (Creswell, 2014; Kandel, 2020). By integrating these approaches, the researcher is able to explore the more complicated elements of social phenomena. A mixed methods approach, underpinned by the TPB, was adopted for this study. A mixed methods approach was chosen because it allows for the integration of both qualitative and quantitative data, providing a richer and more nuanced understanding of the research question. By using both qualitative methods (semi-

structured interviews and observations) and quantitative methods (questionnaire with Likert scale questions), the study benefited from the strengths of both approaches. The qualitative methods allowed for the exploration of individual perspectives and in-depth insights, while the quantitative data provided measurable patterns and trends. This combination of methods ensures that the study not only captures the complexity of waste management behaviours but also offers robust, numerically supported findings. Table 4-1 below outlines the research design employed in this study.

Table 4-1: The research design in relation to the research objectives

Research objective	Reason for data collection	Data collection method	Justification for method
Research objective 1: Developing an adapted version of the Theory of Planned Behaviour (TPB) which is suitable towards understanding waste management behaviour within Etosha National Park	<i>A full description of how and why the TPB was adapted is provided in Chapter 3 of this thesis. Section 4.8.1.1. explains how this adapted TPB, and related statements were incorporated into questionnaires.</i>		
Research objective 2: Applying the adapted TPB framework to determine the underlying factors (constructs) influencing waste behaviour in Etosha National Park	To determine (self-reported) waste-related behaviour within ENP.	Questionnaires based on the TPB with levels of agreement measured with a 5-point Likert-scale	The TPB determines factors that influence individual intentions to engage in waste-related behaviours (Ajzen, 1991).
	To determine the dominant determinants/constructs influencing waste-related behaviour within ENP.	Statistical analysis of questionnaire responses	By conducting statistical analyses, one can determine which determinant has the most effect on an individual's intention to engage in a behaviour.
	To observe waste management practices within ENP to supplement self-reported behaviour.	Observations and inquiry	Huffman <i>et al.</i> (2014), Steg and Vlek (2009) and Tonglet <i>et al.</i> (2004) suggest that there are discrepancies between self-reported and actual behaviour. Therefore, self-reported behaviour was supplemented by

Research objective	Reason for data collection	Data collection method	Justification for method
			observed waste management practices.
Research objective 3: Exploring opportunities and challenges towards waste management in Etosha National Park	To explore opportunities and challenges towards changing and improving waste-related behaviour in ENP.	Semi-structured interviews	The opportunities, challenges, and future of waste management in Etosha National Park are inferred from responses during semi-structured interviews. These responses are thematically analysed and considered for making recommendations towards improving waste management in ENP.

15.4 Case study selection

As the name suggests, a case study approach generates knowledge that is context-dependant. According to Widdowson (2011:26), this approach is based on the “*observation and understanding of human behaviour and understanding in context*”. The case study approach has its strengths in that a holistic perspective of a phenomenon can be achieved (Noor, 2008). Furthermore, this provides researchers with an opportunity to study a case close to real-life situations. Case study research is beneficial when a phenomenon is not well understood, and where there is interest in understanding the *how* and *why* of a phenomenon.

The aim of this research was to explore waste management behaviours in a specific context, using the TPB. An exploratory, theory-led case study approach was, therefore, chosen for this study (Petty *et al.*, 2012b). By using this approach, the complexity of the participants’ unique perceptions towards waste management behaviours were studied.

The following case study selection criteria were used:

- The case study area had to be a protected area located in Namibia.
- A case study area where waste management was of significance to the conservation and protection of the environment was required.
- The protected area was needed who have multiple stakeholders involved in waste generation.
- The case study area had to have significant tourist activities to generate significant waste to be of research interest and had to have sufficient tourist numbers to meaningfully engage with during the research.
- The case study area had to have significant staff to participate as research participants.
- The staff had to have an active role in the generation and management of waste.
- The management authority of the case study area had to provide permission and had to be willing to participate in the research.

Based on the criteria set out above, Etosha National Park (ENP) in Namibia was purposively selected as a suitable case study for this research. By selecting a purposive case, data that was most relevant to the purpose of the research could be collected (Edmonds & Kennedy, 2012).

ENP was chosen as a single case study, with sub-cases (camps), where sub-units (tourists and staff) were measured within this single case. Single case studies are advantageous in that they can gain a deeper understanding of a phenomenon (Dyer & Wilkins, 1991). Single case studies can validate psychological theories and are instrumental in exploratory research

(Bao *et al.*, 2017). As this research is context-specific and cannot be replicated in other contexts, the use of multiple case studies could not be considered. Further, this research does not attempt to generalise its findings to other PAs but considers the unique perceptions of participants in a singular setting. Waste management behaviour, as mentioned earlier, has not been widely researched in the context of protected areas. The real-life context in which waste-related behaviour is performed is relevant in understanding the reasons behind these behaviours, and the individuals who perform them. Single case studies, therefore, provide a deeper understanding of cognitive processes (Bao *et al.*, 2017). A mixture of both qualitative (semi-structured interviews and observations) and quantitative (survey questionnaire) data collection methods were used to gain an in-depth understanding of waste management.

ENP holds great importance as a conservation area and tourism destination in Namibia. Tourism brings many benefits to the park, yet it also poses challenges, particularly in waste management, which is a core concern of this study. ENP strives to balance its conservation goals with the demands of tourism, creating a complex scenario for managing waste sustainably. This scenario provided a suitable environment for exploring waste-related behaviour within the context of tourism and conservation.

To ensure the collection of sufficient data, a protected area with sufficient tourist numbers was necessary. ENP draws a large number of both local and international visitors (approximately 250 000 to 300 000) each year who are attracted to the park by its unique habitats and diverse wildlife (Weidlich, 2007). This figure has remained consistent over the years, with international tourists comprising more than 80% of the visitors, many of whom are first-time guests (Kimaro *et al.*, 2015). This was expected to provide the researcher with a robust sample of the tourist population, enabling the study to capture a broad spectrum of behaviours and attitudes toward waste management.

Staff at ENP are employed by the Ministry of Environment, Forestry and Tourism (MEFT) and Namibia Wildlife Resorts (NWR). There are staff houses available for MEFT staff at Okakuejo, Omika, Halali, Von Lindqvist Gate, Otjovasandufontein, and Galton Gate. NWR staff houses are available at Okakuejo, Halali, Namutoni, Onkoshi, and Dolomite. Dependants (mostly family) of MEFT and NWR staff are also housed at Okakuejo, Halali, Namutoni, Von Lindqvist Gate, Otjovasandufontein, and Galton Gate. MEFT and NWR staff are generally responsible for managing the waste at their respective staff houses (MCC, 2014). MEFT's responsibilities are mainly concerned with biodiversity conservation (with a balance between social, environmental and economic benefits), whereas NWR are responsible for tourist activities and facilities within ENP (Kimaro, 2015). These differing responsibilities may result in different perspectives regarding waste management between NWR and MEFT staff. Investigating

multiple perspectives are invaluable in determining the overall condition of waste management in ENP, especially concerning staff who are directly involved with waste-related practices.

The success of this research also depended on the willingness and consent of individuals to participate in questionnaires, observations, and interviews. Official permission was obtained from the management authority of ENP and the Ministry of Environment and Tourism in Namibia, ensuring that the research complied with all regulatory and ethical requirements. Furthermore, all staff and tourist respondents had to be willing to voluntarily participate in the research, providing their informed consent.

15.5 Description of study area

Etosha National Park (ENP) is found in the north-western region of Namibia, covering an area of 22 935 km² (Kimaro *et al.*, 2015). This makes the Park the second largest national park, and number one tourist destination in Namibia. ENP was proclaimed as a game reserve in 1907 and in 1967 was officially named as a national park (Mannetti *et al.*, 2017). The Park became a tourist destination in the 1950's as an attempt to combat poaching in the area (Dieckmann, 2003).

The name of the park was derived from the Etosha Pan, which is a large saline seasonal depression covering 23% of the park (Berry *et al.*, 1997). This unique landscape, as well as its wildlife, are what make ENP a popular tourist attraction. The wildlife in the park consists of various mammal, bird, reptile, amphibian, and fish species, some of which are endangered (MET, 2007; Mannetti *et al.*, 2019). Table 4-2 highlights some of the key features that ENP provides (MET, 2010b). An extensive list of all natural resources in ENP are found in the Etosha Management Plan (MET, 2007).

Table 15-2: Key features of Etosha National Park (MET, 2007; MET, 2010b)

Categories	Key features
Natural landscape	Salt pans and lakes, waterholes, veld with some hills.
Vegetation	Biomes: Nama Karoo, saline and dwarf shrub savannah, lakes and salt pans, and tree biomes. Types of vegetation: Karstveld Pans, Mopane Shrubland, Western Kalahari, Dwarf Shrubland, Etosha Grass, Western Highlands, North-Eastern Kalahari Woodlands, Cuvelai Drainage.
Wildlife	Animal species: Elephant, white rhino, black rhino, lion, giraffe, black-faced impala, Hartmann's zebra, blue wildebeest, springbok, gemsbok, Damara dik-dik. Bird species: Lappet-faced Vulture, Woolly-necked Stork, Carp's Tit, Hartlaub's Spurfowl, Ruppell's Parrot, Meyer's Parrot, White-tailed Shrike, Grass owl.
Tourism	Photography, birdwatching, game viewing, camping, field tours, night drives.

Figure 4-1 provides a map of ENP. Approximately 15% of the park is open to tourists, where there are six camps available for accommodation. These include the Dolomite, Halali, Namutoni, Olifantsrus, Onkoshi, and Okakuejo Camps. There are nine camps with staff accommodation (camps) in Okakuejo, Ombika Gate, Halali, Namutoni, Von Lindqvist Gate, Onkoshi, Dolomite, Otjovasandifontein, and Galton Gate (MCC, 2014). Okakuejo is the largest camp at the park and consequently generates the most amount of waste. It was estimated that overnight tourists and staff generate 1 kg/person/day, and day visitors 0.5 kg/person/day (MCC, 2014). In 2013, approximately six tonnes of waste were generated per week at ENP. It should be noted that these estimates are speculative.

Namibia Wildlife Resorts (NWR) and the Ministry of Environment, Forestry and Tourism (MEFT) are responsible for waste management within the park; however, the responsibilities of various waste management activities are vague and not explicitly outlined in the protected area management plan. Generally, NWR collects waste from their staff houses and tourist areas, with MEFT collecting waste from their own staff houses. It is unclear who is responsible for further waste management activities, with a lack of cooperation between MEFT and NWR (MCC, 2014). It is also not clearly outlined in the Etosha Management Plan (MET, 2007). In this plan, it only states that MEFT is responsible for monitoring waste management and the approval of waste management facilities (MET, 2007).

15.6 Selection of Etosha National Park camps

ENP was selected as a single case study, where four sub-cases (camps) were identified. By purposively selecting sub-cases within a case, it allows the researcher to thoroughly focus on a phenomenon (Schoch, 2020). As previously stated, Okakuejo Camp is the largest tourist camp in ENP and was, therefore, selected to collect tourist responses. This camp is centrally located and is often the first stop for tourists before they travel to other camps in the park. Additionally, the largest amount of waste is generated in this camp. It was, therefore, chosen as an appropriate representation of tourist waste management behaviour. Staff responses were collected from Okakuejo Camp, Olifantsrus Camp, Dolomite Camp, and Galton Gate Camp (located in the West of ENP). Staff houses were situated close to tourist facilities at Okakuejo Camp, Olifantsrus Camp, and Dolomite Camp, whereas no tourist facilities were available at Galton Gate Camp (apart from a check-in point). There were varying numbers of staff who worked at each camp. These four camps were, therefore, chosen to ensure that adequate responses were recorded. Only the central and western areas of ENP were considered in this study. During the time of data collection, the eastern areas of ENP were deliberately omitted from the study due to safety concerns. These concerns stemmed from a combination of factors, including the area's relative remoteness and distance from the central areas of ENP, and the potential risks associated with human-wildlife interactions. Whereas the central and western areas are more frequented and are well-developed with established camps and transport networks, the eastern regions of the park are less accessible. Limited accessibility and transport distances result in fewer emergency response capabilities, which could pose risks to both researchers and visitors. Given these considerations, the decision to omit the eastern regions was made to ensure the safety of both the research team and participants while maintaining the integrity of the study. Instead, data collection was focused on areas where tourists and staff were more concentrated, ensuring a representative sample without compromising security.

15.7 Participant selection

As mentioned previously, the inclusion of multiple stakeholders is important in understanding waste behaviours within a PA. Purposive sampling allows the researcher to select participants that are knowledgeable on a topic or have an experience in a certain phenomenon (Etikan *et al.*, 2016). Tourists visiting the Park and ENP staff were purposively selected as potential research participants, based on their ability to provide rich information on waste management behaviour and waste management practices in the park. Furthermore, these participants each contribute to the waste production at ENP and were considered for this study.

Staff employed by the Ministry of Environment, Forestry and Tourism (MEFT), as well as Namibia Wildlife Resorts (NWR) working in the park were considered. Staff members were selected according to their availability, willingness, and snowball sampling (through referrals). Tourists were approached through opportunistic sampling (also referred to as “intercept sampling”) (Etikan *et al.*, 2016). In this context, researchers take advantage of an opportunity to interact with participants as they become available, without prior arrangement (Gaddis, 2018). No minors were approached for participation in the research. Further information on distribution of the questionnaire is provided in Section 4.8.1.3 below.

Not all potential respondents agreed to participate in the research. Actual participation of these two groups of potential participants (staff and tourists) depended on their willingness to take part in their research, as well as their provision of informed consent.

Purposive sampling is a non-probability sampling method, used in qualitative or mixed-methods studies, that focusses on a specific phenomenon (Robinson, 2014). Participants are selected based on specific criteria, decided upon by the researcher. When selecting participants purposively, the following guidelines are applied. Participants should (1) be knowledgeable about the context being studied, (2) be willing to participate, and (3) make provision for multiple perceptions (Rubin & Rubin, 1995).

Several steps were taken during the recruitment process to ensure that the tourists selected for the study met the set criteria. Firstly, a sufficient level of knowledge about the study’s context was required—specifically, waste management practices in ENP. Prior to their participation, tourists were informally questioned to gauge their awareness of park regulations, disposal systems, and their individual experiences with waste management during their visit. Those individuals who possessed relevant knowledge, either through their direct interaction with waste management practices or by spending significant periods of time in ENP, were invited to participate in the study. By doing so, the researcher was ensured that the participant could provide meaningful insights into the topic. Secondly, tourists were only included if they were willing to participate and engage meaningfully in the research. The researcher ensured that all participants were fully informed about the objectives and contribution of the research. Furthermore, the informed consent process was conducted transparently to ensure participants were aware of their rights and the study’s purpose. Participants were, therefore, only selected if they expressed genuine interest in sharing their experiences. Lastly, the researcher aimed to include a broad spectrum of tourists to ensure that diverse perspectives were captured. Tourists from various backgrounds were included—both local and international, as well as those with various levels of experience (such as first-time visitors and those with repeat visits to ENP).

Purposive sampling can create a deeper understanding of complex social processes, such as waste-related behaviour, while also making provision for similarities and differences among participants (Robinson, 2014). According to Raj and Thapa (2015:5), *“the goal of purposive sampling is not to randomly select units from a population to create a sample with the intention of making generalisations (i.e., statistical inferences) from that sample to the population of interest.”* Instead, the intent of purposive sampling is to focus on the characteristics of the population of interest, in order to adequately answer research questions. The sample size is generally small and is not representative of the whole population being studied (Raj & Thapa, 2015). Results obtained from using this sampling method can, therefore, not be generalised to the larger population.

Representative sampling, in contrast, is generally used in quantitative research and is a *“scaled-down version of a population, capturing its characteristics”* (Grafström & Schelin, 2014:277). The purpose of this method is to adequately reflect the larger population in terms of its diversity. It is a probability sampling method, where every individual in a study’s population has a known or equal chance of being included in the study (Omair, 2014). Representative sampling, however, suffers from numerous non-sampling errors, impacting the accuracy of the results (Shirani-Mehr *et al.*, 2015). These errors, according to Goel *et al.* (2015:3), are problematic when evaluating attitudes related to social issues.

The intent of this research was not to obtain a representative sample of tourists and staff at ENP, but to obtain a sample that was large enough and with enough variation, to conduct adequate data analysis.

15.8 Data collection

Data was collected concurrently, by means of a questionnaire with a structured survey section (Section 3, Annexure A) and interviews guided by two structured open-ended questions (Section 4, Annexure A). Self-reported behaviour often overestimates actual/observed behaviour. This has been found to be especially true with waste-related behaviours (Chao & Lam, 2011; Harper *et al.*, 2022; Huffman *et al.*, 2014; Steg & Vlek, 2009; Tonglet *et al.*, 2004). Response bias is common with self-reported behaviours, highlighting the need for determining the actual behaviour of participants.

Observations of actual waste management practices within ENP were, therefore, used to supplement self-reported behaviour gathered through the survey questionnaire and interviews (a component of **Research objective 2**). Although the study used interview and questionnaire tools, it is important to note that formal checklists were not used during the observational component of

this research. As stated, the observations made in ENP were designed to complement other data collection methods, offering a general understanding of waste management practices in context. These observations were conducted informally, rather than using a strict, checklist-based approach.

15.8.1 Structured survey questionnaires

Questionnaires are a data collection tool, consisting of several statements or questions, used to obtain information from respondents based on a topic of interest (Ranganathan & Caduff, 2023). The contents of the questionnaire align with the research objectives. A questionnaire can be used in both qualitative and quantitative research. According to McGuirk and O'Neill (2016:247), questionnaires in qualitative research aim to gather original information from individuals, specifically information on their behaviour, social interactions, experiences, perceptions, and awareness of events. Overall, this type of data collection aims to demonstrate and predict human behaviour. The ability of questionnaires to extract this type of data is one of its advantages.

Questionnaires can either be structured, or semi-structured. *Semi-structured questionnaires* do not restrict the responses of participants and allow the participants to answer freely (Ranganathan & Caduff, 2023). The questions are open-ended, where themes may emerge from the responses. *Structured questionnaires*, in comparison, have a pre-defined set of responses from which a participants can choose (Roopa & Rani, 2012). The questions are, therefore, close-ended are presented uniformly to all participants. Structured questionnaires benefit from being easy to administer, with less discrepancies (Taherdoost, 2022).

Structured survey questionnaires were, therefore, chosen by this study to assess the subjective perceptions of participants. Questionnaires were based on the TPB, with the aim of evaluating which determinants are most influential in deciding to participate in sustainable waste management within ENP.

Although structured survey questionnaires have the benefit of being able to be conducted in a shorter time frame, it does not capture detailed responses or information (Kuter & Yilmaz, 2001). Open-ended questions offer the option of a less structured response, eliciting opinions, perceptions and experiences from participants (McGuirk & O'Neill, 2016). For this reason, two open-ended questions were included at the end of the questionnaire to gather in-depth information on the opportunities and challenges towards waste management in ENP (**Research objective 3**).

15.8.1.1 Developing the questionnaire

A questionnaire with survey-style (Section 3, Annexure A) and open-ended questions (Section 4, Annexure A) was developed in English. The questionnaire opened with an explanation of the background to the study, detailing the purpose of the research. Additionally, information related to informed consent was also made available (refer to Section 4.8.1.4 and Section 1; Annexure A).

Section 1 of the questionnaire provided a background to the study, highlighting informed consent. **Section 2** requested basic socio-demographic variables such as age, gender, nationality, level of education, and occupation from participants to provide an understanding of the representative nature of participants (Section 2, Annexure A).

The **third section** of the questionnaire contained close-ended, structured statements to which participants had to indicate their level of agreement with a Likert-scale. These statements were based on the TPB constructs, namely: behavioural practice (B1-7), awareness (AW1-6), attitude (A1-7), subjective norms (SN1-6), perceived behavioural control (PBC1-3), situational factors (SF1-7), intention (I1-7), perceived moral obligation (PMO1-4), and perceived policy effectiveness (PPE1-3) (Table 4-3; Section 3, Annexure A). Previous international and national studies (see Table 3-1 and Table 3-2) informed the statements. The statements were, however, adapted to suit the aim and scope of the study, as research on waste management behaviour using the TPB in the protected areas context is very limited (Harper *et al.*, 2022; Roos *et al.*, 2021) (as discussed in the literature review in Chapter 2).

Table 15-3: TPB statements included in the questionnaire

Code	Statements	Reference
Behaviour/practice statements		
B1	I regularly manage my waste in a responsible manner when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B2	I always attempt to reduce the amount of waste I produce when visiting/at the staff village in ENP	Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
B3	I often separate my waste when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B4	I often dispose waste in the appropriate recycling bins when visiting/at the staff village in ENP	Ghani <i>et al.</i> 2013; Nomura <i>et al.</i> , 2017; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017

Code	Statements	Reference
B5	I always attempt to store my waste in an environmentally friendly manner when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B6	I always attempt to avoid littering when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B7	I have a high involvement in responsible waste management activities when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Wang <i>et al.</i> 2020
Awareness statements		
AW1	I am aware of how to avoid the generation of waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW2	I am aware of how to reduce my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW3	I am aware of the option to re-use my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW4	I am aware of how to recycle my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW5	I am aware of how to dispose of my waste responsibly when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW6	I am aware of waste management initiatives in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
Attitude statements		
A1	Responsible waste management is a pleasant experience when visiting/at the staff village in ENP	Ioannou <i>et al.</i> 2013; Si <i>et al.</i> 2020; Wang <i>et al.</i> 2020
A2	Responsible waste management is a useful practice when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Ioannou <i>et al.</i> 2013; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
A3	Responsible waste management is beneficial to the environment	Ioannou <i>et al.</i> 2013; Razali <i>et al.</i> 2020
A4	My feelings towards waste management are favourable	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Ioannou <i>et al.</i> 2013
A5	Responsible waste management would create a clean environment	Issock, 2020; Razali <i>et al.</i> 2020; Yadav & Pathak, 2017; Xu <i>et al.</i> 2017

Code	Statements	Reference
A6	Responsible waste management aids in environmental protection and conservation of resources in ENP	Issock, 2020; Razali <i>et al.</i> 2020
A7	Responsible waste management should be promoted in ENP	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Nomura, 2017
Subjective norm statements		
SN1	My family thinks I should manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN2	My friends think I should manage my waste responsible when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN3	My colleagues think I should manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN4	My supervisor/manager expects me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN5	The community surrounding ENP expects me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN6	ENP's staff expect me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Strydom, 2018; Ghani <i>et al.</i> 2013
Perceived behavioural control statements		
PBC1	The decision to manage my waste responsibly is completely up to me when visiting/at the staff village in ENP	Mak, 2018; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Si <i>et al.</i> 2020
PBC2	Responsible waste management is an easy task when visiting/at the staff village in ENP	Nomura <i>et al.</i> , 2017; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Tonglet <i>et al.</i> 2004; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
PBC3	If I wanted to, I could manage my waste responsibly when visiting/at the staff village in ENP	Mak, 2018; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
Situational factor statements		

Code	Statements	Reference
SF1	Responsible waste management is possible because there is sufficient space available in ENP	Ioannou <i>et al.</i> 2013; Nomura <i>et al.</i> , 2017; Mak, 2018; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SF2	Responsible waste management is possible in ENP because I have enough time	Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Ioannou <i>et al.</i> 2013
SF3	Responsible waste management is possible in ENP because I have adequate knowledge	Ghani <i>et al.</i> 2013
SF4	Responsible waste management is possible in ENP because waste management is enforced	Ghani <i>et al.</i> 2013
SF5	Responsible waste management is possible in ENP because there is enough infrastructure (bins)	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Issock, 2020; Stoeva & Alriksson, 2017
SF6	Responsible waste management is possible in ENP because there is adequate information	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Issock, 2020; Stoeva & Alriksson, 2017
SF7	Responsible waste management is possible in ENP because there are adequate resources	Alhassan <i>et al.</i> , 2018; Issock, 2020; Stoeva & Alriksson, 2017
Intention statements		
I1	I intend to manage my waste responsibly when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I2	I intend to reduce the amount of waste I produce when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I3	I intend to re-use waste that I have generated where possible when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I4	I intend to separate my waste for recycling purposes when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I5	I intend to dispose of my waste in a responsible manner when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I6	I intend to stop littering when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I7	I intend to participate in ENP's waste management programmes (if any)	Wan <i>et al.</i> 2014a
Perceived moral obligation statements		
PMO1	I have a moral obligation to manage my waste responsibly when visiting/at the staff village in ENP	Chen & Tung, 2010; Heidari <i>et al.</i> 2018; Xu <i>et al.</i> 2017

Code	Statements	Reference
PMO2	I have an obligation to future generations to manage my waste responsibly when visiting/at the staff village in ENP	Ioannou <i>et al.</i> 2013
PMO3	I think that it is my duty to manage my waste responsibly when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Si <i>et al.</i> 2020; Xu <i>et al.</i> 2017
PMO4	I would feel guilty if I didn't manage my waste responsibly when visiting/at the staff village in ENP	Heidari <i>et al.</i> , 2018; Razali <i>et al.</i> 2020; Si <i>et al.</i> 2020;
Perceived policy effectiveness statements		
PPE1	The waste management facilities provided by ENP are sufficient	Wan <i>et al.</i> 2014a; Xu <i>et al.</i> 2017
PPE2	ENP promotes responsible waste management and its benefits	Wan <i>et al.</i> 2014a; Xu <i>et al.</i> 2017
PPE3	In terms of responsible waste management, I would recommend ENP to others	Chuang <i>et al.</i> 2018

A 5-point ordinal, Likert-scale was used to determine the level of agreement of participants regarding the statements (where 1 indicated a high level of disagreement, and 5 indicated a high level of agreement).

The last section of the questionnaire (**Section 4**, Annexure A) had two open-ended questions, namely:

- *Please state any barriers or challenges to waste management seen or experienced in Etosha National Park.*
- *Please state any opportunities for waste management that can be implemented at Etosha National Park.*

These questions were used to guide interviews with staff and tourists as explained in Section 4.8.2.

15.8.1.2 Piloting the survey questionnaire

A pilot study forms part of a larger investigation and is an important component of a study's design (Connelly, 2008). A small-scale version of the main study is conducted to test the efficiency and quality of the study before the main study proceeds. Through a pilot study, any deficiencies may be identified. This process may be conducted for any aspect of the research design.

For this research, a pilot study was conducted to test the feasibility and understandability of the questionnaire before being distributed to participants. The questionnaire was piloted by two staff

members and three students at the North-West University (NWU). Valuable insight into the suitability, and validity of the questionnaire and its contents was gained, and suggested revisions were made to the questionnaire (mostly phrasing of questions to improve clarity). The results of this pilot study were not included in the results of this research.

15.8.1.3 Distributing the survey questionnaire

The data collection phase took place during a site visit to ENP from 28 April to 2 May 2023, where face-to-face administered questionnaires were distributed to both tourists and staff. As explained earlier, tourists were approached at Okakuejo Camp (only), through opportunistic sampling. Staff from Okakuejo Camp, Olifantrus Camp, Dolomite Camp, and Galton Gate Camp were selected using snowball sampling. Senior staff members and management were engaged first, who then referred other employees.

15.8.1.4 Obtaining informed consent

To ensure research was conducted ethically, consent was obtained from all stakeholders involved in the research. Permission to conduct research at ENP was obtained from the Ministry of Environment, Forestry and Tourism, as well as from the Etosha Ecological Institute and Etosha Management. All staff and tourists were informed of the purpose of the study, and it was explained that their participation was completely voluntary and anonymous. Furthermore, participants were informed that they had the right to withdraw from the study at any time.

15.8.2 Semi-structured interviews

Interviews are described by Sewell (2001:1) as “*attempts to understand the world from the participant’s point of view, to unfold the meaning of people’s experiences, [and] to uncover their lived world prior to scientific explanations*”. Interviews are, therefore, commonly used to gather information on the perspectives, attitudes, and perceptions of reality through the direct interchange with individuals or groups.

Interviews can either be structured, semi-structured, or unstructured. *Structured interview* questions are pre-determined, standardised, and are asked in the same order for each participant (Mueller & Segal, 2014). Questions are typically designed to gather specific information. *Semi-structured interviews*, however, are structured around the research interest (de Vos *et al.*, 2011). Combining both structured and unstructured methods, semi-structured questions are predetermined but are also flexible in its line of questioning and allow for in-depth discussions. Lastly, *unstructured- or in-depth- interviews* are seen as an extension and formalisation of a conversation (de Vos *et al.*, 2011). The researcher is interested in understanding the participant’s

perceptions of an experience, without having specific questions. Questions are not predetermined and can be different for each participant (Zhang & Wildemuth, 2009).

Accordingly, semi-structured interviews were used in this research, where pre-determined questions were used to explore the topic of interest. As explained in Section 4.8.1.1, the last two questions of the questionnaire consisted of two open-ended questions that were used to guide interviews with staff and tourist participants (see Section 4, Annexure A). These questions were used to address **Research objective 3** of this research (exploring opportunities and challenges towards waste management in Etosha National Park).

Interviews were conducted either after- or during- the course of participants completing the structured survey questionnaire. Interviews were conducted in English and Afrikaans, depending on the participant's preference. The duration of the interviews varied (not exceeding ten to fifteen minutes) and was dependent on the amount of information that the participant had to share. The information was recorded manually by the researcher, whereafter it was entered into the dataset.

15.8.3 On-site observations

Observational research involves gathering information on participants or a phenomenon by observing them in their natural environment (Creswell & Cresswell, 2018). These observations, which can include activities, behaviours, or interactions, are documented by a researcher. The purpose of this type of research is to gain a deep understanding of the natural behaviours of individuals, or their interactions with the environment they are in. There are two main types of observational research which include direct observations and participant observations (Yin, 2018). *Direct observations* are when the researcher is a passive observer and does not influence the setting in any way (Yin, 2018). The purpose of direct observation is to obtain an accurate representation of behaviours in a real-life setting. *Participant observations*, in contrast, are when researchers involve themselves in the natural environment of the participants, actively participating in a setting (Yin, 2018). The researcher engages in the activities or behaviours of a group to gain an insider's perspective, providing rich and in-depth data.

Direct observations were conducted in this study, maintaining objectivity. Observations were supplemental to the data collected through questionnaires and interviews, and conducted to achieve the following:

- Determining the waste management infrastructure available in ENP (both staff and tourist areas,
- Observing waste management practices or behaviour of tourists (international and national), as well as staff, and

- Determining the sustainability of these practices by observing impacts on the environment (pollution, aesthetics, etc.).

The intention of the observations was to supplement self-reported behavioural data gathered through surveys and interviews. The observational data did not relate to any separate research objective. According to Fix *et al.* (2022:2), questionnaires and interviews are often biased as a result of the nature of self-reported responses and may differ from actual practice.

Furthermore, data obtained is limited to the level of detail provided by participants. The observations documented in this study provided an “insider perspective” of the waste management situation and practices within ENP. The study did not include long-term observations and were, therefore, considered “snapshot” observations. This provided insights into the range of waste-related behaviours in a shorter period of time.

A less formal, unstructured approach was implemented throughout the course of the fieldwork. This is typical for studies that use observations to supplement other data by providing additional information about a subject (Yin, 2018). This type of unstructured observation has no predefined criteria and allows for the open-ended exploration of behaviours. Although no formal tool or checklist was used to guide the observations, the field notes provided for the development of themes and patterns related to the natural situation of waste management in ENP. A deeper understanding of the observed behaviours could be provided using this approach, allowing for a more flexible, context-specific analysis. It is acknowledged that the lack of formal tools could lead to concerns related to the credibility and reliability of the observations. The observations were intended to complement questionnaire and interview data and aimed to observe waste management behaviour in the most natural and authentic setting (recognising the inherent variations in how waste is managed throughout ENP). By doing this, an additional layer of context was given to the self-reported data, rather than providing exhaustive observations.

Future studies may benefit from incorporating a more structured observation tool, such as a checklist. This would allow for the systematic recording of observation data, which could be compared across different settings. For the purposes of this research, however, the informal observation process provided useful context to the natural setting of waste management in the park.

15.9 Data analysis

Qualitative research explores the complexity of social phenomena and how individuals understand their social reality. The data collected during qualitative research is usually visual, or in the form of written texts. The type of approach one takes to analyse qualitative data relies on

numerous factors. The main factor is the consideration of the overall aim of analysis, i.e., what information one wants to extract from the data. Qualitative data analysis involves describing and summarising the data generated during research. This may include determining relationships between variables, relating behaviour to demographic characteristics, or determining the implications that the data has on policy or practice (Lacey & Luff, 2001). The following paragraphs describe the analysis techniques used to analyse the data collected.

15.9.1 Analysis of responses to survey questionnaires

The survey questionnaire consisted of a socio-demographic section and a section measuring TPB constructs, as well as two open-ended questions (the analysis of which is outlined in section 4.9.2). The data gathered from the questionnaire was primarily quantitative in nature, with a focus on Likert scale statements.

A 5-point Likert scale was used to measure the participants level of agreement to each statement under a TPB construct. Likert scales, according to Boone and Boone (2012:2), consist of a series of statements that are used to quantitatively measure a personality trait or characteristic. These statements provided numerical data, from which patterns and trends were identified from the responses.

Likert scale data is measured on an ordinal scale. Responses are ranked, where the distance between ranks cannot be measured (Sullivan & Artino, 2013). Ranks are assigned numbers which indicate the order of responses. The responses from this research's questionnaire (based on the TPB constructs) were, therefore, given codes/labels to simplify data analysis (1 – strongly agree; 2 – agree; 3- neutral; 4 – disagree; 5 – strongly disagree). This scale allowed for the quantification of self-reported behaviour towards waste management in ENP, facilitating the analysis of these behaviours across different groups (i.e. tourists and staff). Although Likert scale data is measured on an ordinal scale, the analysis thereof is done using interval measurement scale techniques (Boone & Boone, 2012). The analysis of these statements was conducted using appropriate statistical methods, ensuring the reliability of the findings, from which meaningful conclusions could be drawn.

The IBM SPSS software package was used to analyse questionnaire responses of both tourists and staff. After the responses were assigned codes, they were entered into the dataset for each item, where columns represented the survey questions (constructs), and rows represented participants. Once all responses were entered, the data was validated to ensure that there were no invalid or missing cases. This was done by producing frequency tables for each construct, which is a method commonly used to validate ordinal data using SPSS (Cunningham & Aldrich,

2011). Frequency tables are a measure of distribution, found in descriptive statistics, and are used to summarise and describe data in a concise manner (Nick, 2007). Frequency tables were compiled for both the responses of the TPB responses and the socio-demographic responses. In addition to the frequency, the average (mean) of responses were also determined. Descriptive statistics such as these, however, cannot characterise data on its own (Sullivan & Artino, 2013). For this reason, further testing is needed.

The data gathered from the questionnaire was primarily quantitative in nature, with a particular focus on Likert scale questions. These questions provided numerical data, which were then subjected to statistical analysis to identify patterns and trends in the responses. The Likert scale allowed for the quantification of attitudes and behaviours towards waste management, facilitating the analysis of the strength and direction of these attitudes across different groups (e.g., tourists, staff). The data analysis for these questions was conducted using appropriate statistical methods, ensuring that the findings were reliable and could be used to draw meaningful conclusions.

15.9.1.1 The influence of TPB constructs on the responses of tourists and staff

It is assumed that tourists and staff would respond differently to statements based on the TPB constructs. Instead of making statistical inferences from descriptive statistics alone, the practical significance of these differences was analysed. To determine this, a *Student's t-test* was conducted.

In particular, an *independent-samples t-test* was used. This method compares two sample means from two independent groups to determine if there is a significant difference (Cunningham & Aldrich, 2011). In this study, the test was used to determine if there was a difference in the responses of tourists and staff towards the TPB constructs. To determine whether the difference is statistically significant, the *two-sided p-value* is considered. If the p-value is less than 0.05, it will indicate a significant difference between the two groups (Field, 2024). The p-value is calculated to ensure that the differences in the means are not due to chance, but rather a real effect (Cunningham & Aldrich, 2011). This value, however, does not indicate the practical effect of this difference. A difference is practically significant if it is large enough to have an effect in practice. To determine practical effect, the *Cohen's d* value is considered. The effect sizes are as follows: (a) $d=0.2$: small effect, (b) $d=0.5$: medium effect, and (c) $d=0.8$: large effect (Ellis & Steyn, 2003). Determining whether there was a significant and practical difference in responses between staff and tourists did not form part of the objectives of this research. The results, however, provided a statistical insight into the differing perspectives of these participants.

15.9.1.2 Reliability analysis

The internal consistency or interrelatedness of the responses was measured next, using Cronbach's Alpha. According to Vaske *et al.* (2017:163), there are certain psychological concepts that are not directly observable and must be inferred from survey responses. Cronbach's Alpha determines the extent to which survey questionnaire items (statements) reliably measure the same construct. Values are measured on a scale from 0 to 1, although a negative α value can exist when items are not positively correlated (Tavakol & Dennick, 2011). A value of 0.7 or above is generally considered acceptable. A value below 0.7, therefore, may indicate a poor correlation between items. When human dimensions are researched, values between 0.65 and 0.80 are considered acceptable (Vaske *et al.*, 2017). By determining reliability, the estimated measurement error can also be calculated. As the reliability of a construct increases, the measurement error will decrease.

A high alpha value, however, does not always indicate a high level of internal consistency. The value will also be affected by the number of items measuring a construct. The greater the amount of inter-related items, the higher the Cronbach alpha value. Further, the value will be higher if the items are homogeneous or unidimensional. The three factors affecting alpha values are, therefore, inter-correlations, the number of items, and dimensionality (Tavakol & Dennick, 2011).

Cronbach alpha was calculated for each TPB construct, namely behaviour, awareness, attitude, subjective norms, perceived behavioural control, situational factors, intention, perceived moral obligation, and perceived policy effectiveness. According to Tavakol and Dennick (2011:53), the internal consistency of a scale should be determined before other analyses can be done. This to ensure the validity of the test or scale.

15.9.1.3 Associations between TPB constructs

Regression analysis determines the relationships between variables. There are two types of regression analysis, namely, simple linear regression and multiple linear regression. *Simple regression* measures the amount of influence that an independent variable has on a dependant variable (George & Mallery, 2016). *Multiple regression analysis* is an extension of single regression. It is used when there is one dependant variable and two or more independent variables. The purpose of multiple regression is to estimate how the independent variables influence changes in the dependant variable, by developing a prediction or regression equation (Cunningham & Aldrich, 2011).

Before conclusions can be drawn from this analysis, it is important to ensure that there is no risk of multicollinearity. The test of multicollinearity determines if there is a correspondence between two independent variables in a multiple regression analysis, undermining their statistical significance (Shrestha, 2020). This test produces a *tolerance* value and a *variance inflation factor* (VIF) (Hair *et al.*, 2013). A tolerance value below 0.20 and a VIF above 5 indicates a risk of multicollinearity.

This research used a multiple regression analysis to understand how certain constructs influence an individual's intention to participate in waste management behaviour. Intention/behaviour is, therefore, the dependant variable used, whereas the independent variables were awareness, attitude, subjective norms, situational factors, perceived moral obligation, and perceived policy effectiveness.

Multiple regression determines the adjusted *R Square* value, which represents the amount of variance in the outcome variable, as explained by the model (Field, 2024). R^2 is multiplied by a 100 to express this value as a percentage, determining if the percentage of variance in the dependant variable can be explained by the independent variables. It was, therefore, determined if the constructs used in this study improved upon the original TPB framework by calculating the proportion of variation before and after the additional variables were added. It also determined whether the proposed constructs were the best fit for examining waste-related intentions and behaviour in the study's context.

To determine the relationship between each individual construct, the *Pearson Correlation Coefficient* was then determined. The Pearson's correlation coefficient (r) is used to test if there is a statistically significant/linear relationship (be it positive or negative) between two or more categorical variables (Schober, 2018). The strength of this relationship is also measured. The magnitude and direction of the correlation is, therefore, determined. The correlation coefficient ranges between +1 and -1, where a value of 0 indicates no correlation. It should be noted that the interpretation of these values in literature is inconsistent (Schober, 2018). Values ranging from ± 0.70 to ± 1 generally suggest a strong correlation; between ± 0.40 to ± 0.69 a moderate correlation; and between ± 0.30 and ± 0.39 a low correlation (Alsaqr, 2021). A weak or negligible correlation between variables have a value below ± 0.29 . Variables that are positively correlated are directly proportional, whereas variables that are negatively correlated are inversely proportional. This research used the Pearson's correlation coefficient to understand how each TPB construct is influenced by another construct. The Pearson's correlation was used to get a sense of the relationships between the constructs (Field, 2024).

Thereafter, the significance of these associations was established. This was done by calculating the *p-value* (probability value) for each construct. This value determined if the association between the dependant and independent variables were statistically significant. A *p-value* less than or equal to 0.05 is considered significant. The variable(s) that significantly influence or predict the dependant variable, as well as those that do not, were established.

The degree of influence was also determined, as not all factors will adequately predict the dependant variable. To determine this, the *beta coefficients* (β) are calculated and examined. Beta coefficients measure the weight of the influence between the dependant and independent variables. The larger the coefficient value (ranging from 0 to 1), the greater the influence. Through this, the TPB construct(s) that have the greatest influence on waste management behaviour in ENP were identified. It should also be noted that TPB constructs rarely exhibit large correlation values, even when they are carefully assessed (Ajzen, 2011). Studies have found the correlation between TPB constructs varies between studies and ranges from 0.40 to 0.70 (Armitage & Conner, 2001; Cheung & Chan, 2000; Kor & Mullen, 2011; Sheeran, 2002). This was even true for the correlation between intention and behaviour.

Having an adequate sample size is important for regression analysis. For studies using the Theory of Planned Behaviour, a sample size of 80 is considered acceptable (Francis, 2004). This study had a total of 75 participants (57 tourists and 18 staff). According to George and Mallery (2016:211), sample sizes below 50 calls into question the validity of regression results. It was, therefore, necessary to combine tourist and staff responses, to determine meaningful correlations between the TPB constructs.

15.9.2 Analysis of on-site observations and semi-structured interviews

Data from on-site observations and semi-structured interviews were analysed using thematic analysis (TA) which is a widely used technique for analysing qualitative data (Terry *et al.*, 2017). TA can be applied to a variety of theoretical frameworks and research designs (Braun & Clark, 2012). This analysis technique involves the systematic identification and interpretation of themes or patterns found within data. This allows for large volumes of data to be examined with relative ease.

This process starts with the researcher immersing themselves in the data. From data immersion, codes are developed. Coding refers to the concept of attempting to represent the effect that participants perceptions have on the nature of the phenomenon being studied (Williams & Moser, 2019). A code may be a label (numbers, words, or phrases) that is assigned to textual or observed data. These codes group together similar concepts, categories or ideas found within the data.

Codes are developed to better analyse large amounts of data. For these reasons, thematic analysis was chosen to analyse observation and interview data.

There are two types of coding techniques that can be applied to data, namely *priori coding* (codes are developed prior to data analysis and applied to the data) and *emergent coding* (the data informs the development of codes) (Blair, 2015; Stemler, 2001). This study utilised emergent coding, which was done manually (not using any computer software). From these codes, themes and patterns were identified for interpretation (guided by the research question). In particular, the opportunities and challenges towards waste management in ENP were inferred from semi-structured interviews and on-site observations. Furthermore, Stemler (2001:1) states that inferences may be made, validating other data collection methods. In the case of this study, the results from the questionnaires were compared to observation and interview data.

In addition to identifying themes and patterns, frequency tables were created to provide a structured representation of the prevalence of these themes within the data. Frequency tables allow for a quantitative perspective on qualitative findings, highlighting how often specific themes emerged across the semi-structured interviews and on-site observations. By organising the data in this way, the analysis could identify dominant and recurring issues related to waste management opportunities and challenges in ENP. This not only supports a more comprehensive interpretation of the themes but also aids in comparing results with other data sources, such as the questionnaire results, to validate the study's findings.

15.10 Methodological assumptions and limitations

Methodological assumptions are defined as the aspects of research that the researcher and other scholars accept as being true, but cannot prove (Simon & Goes, 2013). This may be in regard to the research design, research participants, theoretical frameworks, and other aspects of the study. The assumptions of this study are discussed below:

- **Honesty of participants:** It was assumed that participants (staff and tourists) would answer the questionnaires and interview questions truthfully and factually (to their understanding). To counteract the possibility of dishonest responses, participants were assured that their responses would be kept confidential, and participation was anonymous. Furthermore, the nature of the questions was not sensitive, which was assumed to have motivated participants to answer more honestly. As mentioned previously, observations were used to supplement self-reported responses by investigating the actual behaviour of participants (to determine whether the self-reported and actual behaviours align).

- **Level of understanding:** The questionnaire was phrased in English. It might be true that some of the tourist and staff participants are not fluent in English. However, all participants were approached and greeted in English and asked whether they would be able to complete the questionnaire in English. It was, therefore, assumed that the participants understood the questions (which were phrased in English). Questionnaires and interviews were either further explained to participants who did not understand some questions or were translated (mostly to Afrikaans for local tourists and staff) where possible.
- **Sampling bias:** To prevent sampling bias, all potential participants who met the selection criteria (i.e. able-bodied tourists and staff older than 18, who willingly agree to participate in the research and provide consent) were included in the research. As purposive sampling was used, it was assumed that participants were knowledgeable—and were able to provide multiple perspectives—regarding waste management in ENP.

Methodological limitations refer to the barriers or constraints faced throughout the research process that are out of the researcher's control (Simon & Goes, 2013). These limitations may affect the research process and results of the study. The limitations of this study can be found below:

- **Participant response rate:** Response rates from tourists, and especially staff, were lower than expected. Approximately 120 tourists were approached, where only 57 individuals were willing to participate (47.5%). All MEFT senior staff and management who were approached agreed to participate in the study. NWR management based at Okakuejo were, however, not. Managerial staff approached approximately thirty staff members, where only thirteen were willing to participate (43.3% participation rate). This excluded the senior staff and management that participated, with a total of 18 staff participants. It was not the intent of this research to obtain a representative sample (as discussed in section 4.7), however, the number of participants can impact the type of statistical analyses that can be done.
- **Limited access to staff:** A significantly smaller number of staff were willing to participate in data collection than anticipated at the onset of the research. This was found to be due to some staff members being wary of non-local researchers or being wary to disclose information which may (or may not) place the ENP within a negative light. Furthermore, communication with some staff members were found to be challenging (due to language barriers). For these reasons, limited access to staff were found to be a constraint. Snowball sampling, where senior staff were asked to communicate with employees, was used to attempt to increase participation from these individuals. However, staff remained

reluctant to participate and many used delay tactics, promising to participate, but never getting back to the researcher. Staff responses were analysed for variance—where limited variability between staff responses were identified—indicating that saturation may have been reached. With the small sample size, it was not possible to conduct further meaningful analyses (besides the frequency and mean). Accordingly, staff and tourist data were combined. Although these statistical analyses could not be conducted separately for staff and tourist data, the responses still provided meaningful insights to a field that has received limited to no research.

- **Willingness of tourists to participate:** There were tourist who were approached who were not willing to participate in the study. Many international tourists were part of tour groups, who may not have had the time or freedom to participate (due to the schedules of these tour groups).
- **Time constraints:** Since data had to be collected during a certain period (during a field visit to ENP), the amount of time spent distributing questionnaires and conducting interviews and observations was limited. Due to this, only a certain number of participants were able to be included in the study. A longer time period is suggested for future studies to include more participants.
- **Data collectors:** As data was collected by two researchers only, limits were placed on the number of individuals that could be approached per day. An increase in the number of data collectors is therefore proposed.
- **Study area:** Data was only collected from certain camps within the park (excluding Namutoni Camp, Halali Camp, and Onkoshi Camp). Future studies should focus on including all camp sites within the park to achieve a more holistic view of waste management behaviour in ENP.
- **Effect of sample size and low reliability in statistical analysis:** The reliability or internal consistency of the TPB constructs were affected by the small sample size. Certain constructs, such as PBC, were removed from further and more complex statistical analysis. It is suggested that future studies include more participants to improve the reliability values.

15.11 Ethical considerations

This study applied for ethics approval through the Faculty of Natural and Agricultural Sciences Research Ethics Committee (FNAS-REC) (ethics number: NWU-01470-22-A9). The guideline

of the FNAS-REC was adhered to, to ensure that the study was ethically conducted. A research ethics permit from the Namibian Commission for Research Science and Technology was obtained prior to conducting the research. A letter of support was also obtained from the Ministry of Environment, Forestry and Tourism. The permission and consent of participants was obtained, and their confidentiality protected. The nature of the study was explained to each participant, where they were ensured of their anonymity. Further, it was communicated to all participants that their involvement was voluntary, with the option of withdrawing their participation at any time. No incapacitated adults or minors were included in this research.

15.12 Conclusion

A qualitative research approach was used in this study with the aim of understanding waste management behaviour in Etosha National Park. Structured survey questionnaires, on-site observations, and semi-structured interviews were utilised as data collection methods. These methods were deemed appropriate to determine the unique views, perceptions, and behaviours of both staff and tourists in relation to waste management within the park.

The next chapter, Chapter 5, provides the results and discussion of the research findings.

CHAPTER 5 RESULTS AND DISCUSSION

Chapter 5 presents the research findings along with an in-depth discussion of the results. Section 5.1 provides an overview of the socio-demographic characteristics of the respondents, offering context to the study's participant profile. In Section 5.2, the analysis of the structured survey responses is introduced, encompassing a comprehensive summary and interpretation of the survey data. This section includes the results of reliability testing, an analysis of the differences in responses between respondents, an examination of correlations between constructs and the outcomes from the multiple regression analysis. Section 5.3 then explores respondents' perspectives on the opportunities and challenges associated with waste management in Etosha National Park (ENP), drawing from insights gathered through semi-structured interviews.

16.1 Socio-demographic information of research participants and implications for the research

The basic socio-demographic information of tourist respondents is outlined in Table 5-1 below, while the information of staff respondents is outlined in Table 5-2.

16.1.1 Basic socio-demographic information of tourist respondents

A total of 57 tourist respondents participated in the research. Their basic socio-demographic information, such as age, gender, nationality, level of education and occupation is provided in Table 5-1 and discussed in the sub-sections below.

Table 5-1: Basic socio-demographic information of tourist respondents participating in the research (n = 57)

Variables	Frequency (n)	Percentage (%)
Age		
18-25	7	12,28
26-35	15	26,32
36-45	9	15,79
46-55	7	12,28
56-65	11	19,3
Older than 65	8	14,04
Gender		
Male	27	47,37
Female	30	52,63
Non-binary	0	0
Other	0	0
Prefer not to say	0	0

Variables	Frequency (n)	Percentage (%)
Nationality		
Namibian	11	19,3
SADC (Southern African)	15	26,32
African	0	0
International	31	54,39
Highest level of education		
No formal education	0	0
Primary education	0	0
Secondary education	7	12,28
Tertiary education	22	38,6
Postgraduate education	28	49,12
Occupation		
Unemployed	1	1,75
Retired	11	19,29
Full-time students	3	5,26
Management and Administration	6	10,52
Healthcare and Medical Services	4	7,02
Education and Training	6	10,52
Military and Protective Services	3	5,26
Finance and Economics	4	7,02
Technical and Engineering	5	8,77
Science and Research	1	1,75
Information Technology (IT)	2	3,51
Media and Communication	1	1,75
Tourism	1	1,75
Public and Social Services	1	1,75
Agriculture and Farming	1	1,75

16.1.1.1 Age

A substantial portion of the respondents (26.32%) fell between the ages of 26 and 35. This demographic typically represents individuals who are at the beginning of their professional journeys, often characterised by their engagement with contemporary environmental issues, including sustainable waste management. Their higher representation may indicate a proactive interest in responsible environmental practices, particularly in the context of a national park that draws both tourism and local community interactions (Babaei *et al.*, 2015). This age group is often more influenced by social norms and peer behaviours, which are critical components of TPB, potentially enhancing their commitment to effective waste management strategies (Ajzen, 1991).

This was similar to the findings of the Tourist Statistical Report of Namibia (MEFT, 2022a). In this report, it was found that the majority of visitors to Namibia fell between the ages of 30 and 39

years (22.20%). This was attributed to Namibia offering a variety of tourism, adventure, and other activities catered towards individual, group, and family interests. This cohort typically possesses significant life experience and professional knowledge, also playing an important role in intergenerational transmission of values, attitudes and pro-environmental behaviours (Grønhøj & Thøgersen, 2009). Their perspectives on waste management behaviours may be informed by years of observing ecological impacts and participating in conservation efforts (Grønhøj & Thøgersen, 2009).

The presence of mid-career professionals (15.79% aged 36 to 45) is also noteworthy. This group is often characterised by stability and established values regarding environmental stewardship (Swami *et al.*, 2011).

Interestingly, the study includes a significant number of respondents aged 65 and older (14.04%). While many in this age group may be retired, their continued engagement reflects a commitment to environmental issues that can contribute to knowledge transfer and advocacy for sustainable practices (Vaske & Kobrin, 2001). Their lived experiences and historical perspectives on waste management may enrich the study findings.

The participation of respondents aged 18 to 25 (12.28%) and those aged 46 to 55 (also 12.28%) represented almost a quarter of the research respondents. Only individuals 18 years or older were allowed to participate in the research. Younger individuals (18 to 25) are likely to bring fresh perspectives and a strong awareness of current trends in waste management and sustainability, often driven by educational initiatives or social movements (Seyfang & Haxeltine, 2012). This age group also represented a smaller percentage of visiting tourists in Namibia, where 13.3% of tourists were aged 20-29 (MEFT, 2022a). It is worth noting that the Tourist Statistical Report was based on the entirety of 2022. In contrast, the data of this research was collected over a week period at the end of April 2023. Tourists predominantly visit Namibia during September to December (53.10%) (MEFT, 2022a). The age profile could change based on the time of year that data was collected in (taking into account holidays and seasonality).

The balance across these age groups offers a unique opportunity to explore how varying perspectives and experiences shape self-reported waste management behaviours. By integrating insights from both younger and older respondents, the research can better understand the collective attitudes, subjective norms, and perceived control over waste management practices within Etosha National Park.

16.1.1.2 Gender

The gender distribution among the respondents ($n = 57$) in this study reveals an almost equal representation, with 27 males (47.37%) and 30 females (52.63%). This relatively balanced male-to-female ratio is noteworthy, as it suggests a diverse range of perspectives and experiences that can enrich the findings related to self-reported waste management behaviour in Etosha National Park. This gender representation differs from the overall tourist gender profile of Namibia, where the predominant gender category were males (59.2%) (MEFT, 2022a). Gender differences, according to Collins and Tisdell (2002:135), are not an important indicator for travel patterns as most tourists travel in groups. Gender-related differences do exist when looking at the reasons why these individuals travel. Gender breakdowns are, therefore, dependant of the nature of the tourism destination. The Tourist Statistical Report includes all forms of tourists (visiting for holiday and business purposes, and visiting relatives or friends), whereas this research is focussed only on a destination that receives mainly nature-based tourists.

The near parity in gender representation of this research is significant for several reasons. First, gender can influence attitudes and behaviours related to environmental management and sustainability. Research has indicated that women often express higher environmental concern and are more likely to engage in pro-environmental behaviours compared to men (Xia & Li, 2023). The presence of both genders allows for a balanced understanding of how differing perspectives from both genders shape waste management behaviours in the protected areas context.

Furthermore, the TPB posits that individual behaviour is influenced by attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). In this framework, gender differences may affect each of these constructs. For instance, women may have more favourable attitudes towards sustainability and waste management due to socialisation processes that emphasise caregiving and environmental stewardship (Echavarren, 2023). Conversely, men may bring different experiences and perspectives to the study, particularly regarding traditional roles in resource management or economic considerations related to waste management (Mukoni, 2015).

16.1.1.3 Nationality

The nationality distribution among respondents reveals that the majority were international participants from outside of Africa, accounting for 54.39% ($n = 31$) of the total. In contrast, fifteen respondents were from Southern Africa (26.32%), and eleven were from Namibia (19.30%). This differs from the overall tourist statistics for Namibia. The majority of tourists who visit Namibia are from Africa (55.40%), followed by Europe (33.60%) (MEFT, 2022a). The top five tourist markets for 2022 were South Africa, Angola, Germany, Zambia, and Botswana respectively.

The diverse national backgrounds may lead to a variety of attitudes and beliefs regarding waste management, influenced by differing cultural norms and experiences with environmental policies (Bonera *et al.*, 2017). This diversity can enhance the richness of the study findings by incorporating a wide range of perspectives on waste management practices. The association between nationality and responsible tourism is further discussed in Section 5.2.1.2.

The involvement of respondents from Southern Africa (26.32%) and specifically Namibia (19.30%) is particularly relevant, as these individuals may have first-hand experience with local environmental challenges and waste management issues. Their insights can provide valuable context for understanding the specific challenges faced in Etosha National Park, where local issues and challenges, economic activities, and community dynamics intersect with waste management practices. This local knowledge is essential for identifying the challenges and opportunities of current waste management practices and for designing effective interventions that resonate with the community.

16.1.1.4 Level of education

The educational background of the respondents ($n = 57$) reveals a strong emphasis on higher education, with 28 individuals holding postgraduate degrees (49.12%), 22 possessing tertiary education (38.60%), and seven having secondary education (12.28%).

The predominance of respondents with postgraduate education potentially indicates a higher level of knowledge and awareness regarding environmental issues and sustainability practices. Individuals with advanced degrees often engage in critical thinking and are more likely to be informed about the complexities of waste management, environmental policies, and ecological impacts (Shephard, 2010).

In contrast, the seven respondents with only secondary education (12.28%) may represent a segment of the population that could benefit from targeted educational initiatives. Their perspectives are essential for understanding barriers to effective waste management and the need for accessible information and training.

16.1.1.5 Occupation

The tourism respondents represent a diverse range of occupations across several broad fields, reflecting a balanced distribution between professionals in management, healthcare, technical fields, and education.

Fifteen respondents (26%) are either retired or not in formal employment, accounting for eleven individuals who are retired, three full-time students and one stay-at-home mother. The Management and Administration category, which includes two administrators, three managers, and one management officer, makes up approximately 10% of the total respondents. The Healthcare and Medical Services field is another notable area, represented by four professionals: two doctors, one doctor's assistant, and one psychologist. These respondents account for about 7% of the total group. The Education and Training sector is represented by six individuals (10%), including four teachers and two coaches. In terms of Military and Protective Services, there are three respondents (5%): one person in the armed forces, one fire brigade commander, and one Health, Safety, and Environmental (HSE) officer. The Finance and Economics field comprises four respondents (7%): one auditor, one economist, one financial analyst, and one financial consultant. The Technical and Engineering category includes five respondents (9%) who are involved in various specialised roles: one engineer, one carpenter, one geophysicist, one quantity surveyor, and one technical advisor. A smaller segment of the group works in Science and Research, with one respondent who is a chemist (about 2%), while two respondents were IT consultants (4%), and one respondent (1.75%) were in the Media and Communications sector and another respondent was a tour leader, representing the Tourism sector. Finally, the Public and Social Services sector included three individuals: one humanitarian, one UN official, and one volunteer worker, making up 5% of the total respondents.

16.1.2 Basic socio-demographic information of staff respondents

A total of 18 staff members participated in the research. Their basic socio-demographic information, such as age, gender, nationality, level of education and occupation is provided in Table 5-2 and discussed in the sub-sections below.

Table 5-2: Basic socio-demographic information of staff members participating in the research (n = 18)

Variables	Frequency (n)	Percentage (%)
Age		
18-25	2	11,11
26-35	7	38,89
36-45	5	27,89
46-55	3	16,67
56-65	1	5,56
Older than 65	0	0
Gender		
Male	14	77,78
Female	4	22,22

Variables	Frequency (n)	Percentage (%)
Non-binary	0	0
Other	0	0
Prefer not to say	0	0
Nationality		
Namibian	16	88,89
SADC (Southern African)	1	5,56
African	0	0
International	1	5,56
Highest level of education		
No formal education	1	5,56
Primary education	5	27,78
Secondary education	3	16,67
Tertiary education	7	38,89
Postgraduate education	2	11,11
Occupation/role within ENP		
Management	3	16,67
Administration	2	11,11
Operational	4	22,22
Research and Conservation	2	11,11
Security	2	11,11
Tourism	2	11,11
Supervision and Enforcement	3	16,67

16.1.2.1 Age

The age distribution of the staff respondents within Etosha National Park reveals that the majority of respondents (38.89%) were between the ages of 26 and 35, followed by 27.78% who were aged 36 to 45. Three respondents (16.67%) were between the ages of 46 and 55, while 11.11% were younger, between 18 and 25. Only one respondent (5.56%) was aged 56 to 65. The relatively younger workforce, with more than two-thirds under the age of 45, may have implications for the park's waste management behaviour. According to the TPB, younger individuals may exhibit more positive attitudes toward pro-environmental behaviours, as this age group is often more exposed to contemporary environmental education and sustainability efforts (Bamberg & Möser, 2007). Additionally, the younger age cohorts may also experience greater perceived behavioural control, feeling more empowered to engage in proactive waste management practices. This distribution suggests that waste-related interventions could be particularly effective in engaging this demographic, while also emphasising the need for inclusive strategies that cater to all age groups within the workforce.

16.1.2.2 Gender

The gender distribution among the staff respondents of Etosha National Park indicates a significant skew towards male representation, with 77.78% (n=14) of respondents being male and only 22.22% (n=4) female. This disparity may have implications for understanding waste management behaviour of staff within the park, especially when viewed through the lens of the TPB. Research has shown that gender can influence environmental attitudes and behaviours, with some studies suggesting that women may generally exhibit stronger pro-environmental attitudes and greater concern for sustainability (Zelezny *et al.*, 2000). However, in a male-dominated workforce such as this, the social norms and group dynamics, which are crucial elements of TPB, might reflect different priorities or perceptions regarding waste management.

Given that males make up the majority of the workforce represented in this research, waste management strategies and interventions may need to account for this demographic dominance by addressing specific attitudes and behaviours that resonate more with men, potentially focusing on practical, action-oriented solutions (Baraldi *et al.*, 2024). Moreover, including gender-sensitive approaches that consider how female staff can influence or enhance waste-related behaviours could be crucial in creating more balanced and effective waste management interventions.

16.1.2.3 Nationality

The majority of the staff respondents were of Namibian origin, accounting for 88.89% (n=16) of the total respondents, with only one respondent each from Southern Africa and an international location outside of Africa. This strong representation of Namibian nationals is significant within the context of the study on waste-related behaviour, as local knowledge, cultural practices, and national policies likely influence attitudes toward waste management within the park.

The predominantly Namibian staff may share common social and cultural norms regarding environmental responsibility, which could affect their collective approach to waste management. Furthermore, Namibia's national environmental policies and conservation ethos, which emphasize sustainable tourism and biodiversity protection, may further reinforce pro-environmental attitudes among the local staff (Blackie & Tarr, 2000).

16.1.2.4 Highest level of education

The educational background of the staff respondents reveals a diverse range of qualifications, with the largest group (38.89%) having attained tertiary education (n=7). Following this, 27.78% (n=5) had completed only primary education, while 16.67% (n=3) had secondary education.

Notably, 11.11% (n=2) held postgraduate qualifications, and 5.56% (n=1) had no formal education at all.

This distribution suggests that the majority of staff have received at least some formal education, with nearly half having obtained tertiary or postgraduate qualifications, which could positively influence their attitudes and behaviours towards waste management practices. As mentioned earlier, according to the TPB, higher levels of education often correlate with greater knowledge and awareness of environmental issues, which can enhance both attitudes and perceived behavioural control related to sustainable practices (Fransson & Gärling, 1999). Those with tertiary and postgraduate education are more likely to possess the knowledge and skills necessary to understand the environmental impact of waste and may, therefore, be more proactive in adopting and promoting effective waste management strategies.

However, the fact that 27.78% of respondents only had primary education and 5.56% had no formal education highlights the importance of ensuring that educational interventions related to waste management are accessible and comprehensible to all staff members, regardless of their educational background. Tailored educational programmes that simplify complex waste management principles and provide practical, hands-on guidance could help bridge the gap for those with lower levels of formal education (Grodzińska-Jurczak, 2003). These programmes can enhance their perceived behavioural control, making them feel more capable of engaging in proper waste management behaviours.

16.1.2.5 Occupation/role within Etosha National Park

The research participants included a total of 18 staff respondents, representing diverse occupations that contribute to the park's operations.

Management roles accounted for 16.67% of respondents, with two camp managers and one maintenance supervisor. These staff members play a crucial role in overseeing the operational aspects of camp facilities within the park. Their responsibilities include managing resources, staff, and guest services, which would provide them with a good understanding of the waste related issues related to tourism activities, as well as staff infrastructure. Administrative roles constituted 11.11% of the respondents, with two office administrators. Administrative staff are essential for maintaining the efficiency of park operations. They handle documentation, coordinate communication, and support management functions, ensuring that waste management initiatives are effectively implemented and monitored.

Operational roles made up 22.22% of the respondents, with two cleaners, one contractor, and one maintenance staff member. Operational roles are vital for the day-to-day functioning of the park. Cleaners maintain hygiene standards, while maintenance staff ensure that facilities are in good working order. Contractors may be involved in specific projects related to infrastructure and environmental conservation. Their work directly impacts waste management, as proper maintenance can minimise waste generation and promote recycling efforts. Research and Conservation roles accounted for 11.11% of respondents, with one researcher and one veterinarian.

Security and Safety roles also comprised 11.11% of the respondents, with two security guards. Security personnel ensure the safety of both visitors and wildlife within the park. Their role in monitoring human activities can influence waste management behaviours, as they enforce park regulations and promote compliance with waste disposal guidelines (i.e. no plastic bags policy). Tourism roles represented 22.22% of the respondents and included two tour guides. Staff in these roles are directly engaged with visitors and play a crucial part in educating them about sustainable practices, including proper waste disposal. Tour guides can actively promote awareness about waste management during excursions, while wardens help enforce regulations and encourage responsible behaviour among park visitors. Lastly, Supervisory and Enforcement roles accounted for 16.67% of respondents, with one intern and two wardens.

The diverse roles represented by the staff respondents play a significant part in shaping the waste management behaviour within Etosha National Park. Understanding these occupational categories allows for exploration of how various staff perspectives contribute to, and influence, waste-related practices in the park. By engaging with staff across different roles, the research can tap into a wealth of knowledge and experiences that inform best practices for waste management.

In conclusion, understanding the basic socio-demographic characteristics of both tourist and staff respondents is crucial towards exploring waste behaviour in Etosha National Park, especially when applying the TPB framework. Socio-demographic factors such as age, gender, education, and nationality influence individuals' attitudes, perceived behavioural control, and subjective norms—all key components of the TPB model. These characteristics help identify diverse behavioural patterns and the underlying factors that motivate or hinder effective waste management practices.

16.2 Determining the self-reported waste behaviour of tourists and staff of ENP (RO2)

Section 5.2 discusses the responses to the structured questions in the survey questionnaire. These questions were based on the adapted version of the TPB framework, which was specifically

developed for the purposes of this research (as explained in Section 4.8.1.1). These questions were aimed at gathering data on the underlying factors and constructs related to waste behaviour. The responses relied on self-reported data by tourists (n = 57) and staff members (n=18).

16.2.1 Survey responses related to the TPB and waste management

As explained in Chapter 4, a five-point ordinal Likert scale was used to gauge the participants' level of agreement to different TPB constructs related to waste management (*where 1 equals a strong level of agreement and 5 equals a strong level of disagreement*). These constructs included behaviour (B), awareness (AW), attitude (A), subjective norm (SN), perceived behavioural control (PBC), situational factors (SF), intention (I), perceived moral obligation (PMO), and perceived policy effectiveness (PPE).

A frequency table, including the mean and standard deviation, is found in Table 5-3 below and are discussed in sub-sections 5.2.1.1 to 5.2.1.9. In the context of this data, a mean value closer to 1 indicates a strong level of agreement with a given statement, reflecting positive attitudes or alignment with the surveyed opinions. Conversely, a mean value approaching 5 signifies strong disagreement, showing a rejection or negative stance toward the statement. A mean value around 3 suggests a neutral or indifferent response, where respondents neither agree nor disagree. Understanding these mean-value interpretations is essential in gauging the respondents' overall perceptions, particularly in analysing waste management behaviour through the lens of the TPB. These insights can help identify areas where agreement or disagreement is strongest and where interventions might be needed to shift neutral or negative attitudes toward more positive environmental behaviours.

Table 5-3: Frequency table indicating the percentage of tourist- (n=57) and staff (n=18) responses to the TPB-based statements posed on behaviour (B), awareness (AW), attitude (A), subjective norms (SN), perceived behavioural control (PBC), situational factors (SF), intention (I), perceived moral obligation (PMO) and perceived policy effectiveness (PPE)

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
Behaviour/practice statements						
B1: I regularly manage my waste in a responsible manner when visiting/at the staff village in ENP						
Tourists	77,2	19,3	0	3,5	0	1,3
Staff	72,2	22,2	5,6	0	0	1,3
B2: I always attempt to reduce the amount of waste I produce when visiting/at the staff village in ENP						
Tourists	64,9	24,6	3,5	5,3	1,8	1,5
Staff	50	22,2	5,6	5,6	16,7	2,17
B3: I often separate my waste when visiting/at the staff village in ENP						
Tourists	43,86	26,316	12,281	10,526	7,018	2,11
Staff	50,0	22,2	0	11,1	16,7	2,2
B4: I often dispose waste in the appropriate recycling bins when visiting/at the staff village in ENP						
Tourists	63,2	15,8	12,3	3,5	5,3	1,7
Staff	61,1	11,1	5,6	5,6	16,7	2,1

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
B5: <i>I always attempt to store my waste in an environmentally friendly manner when visiting/at the staff village in ENP</i>						
Tourists	63,2	21,1	10,5	3,5	1,8	1,6
Staff	83,3	16,7	0	0	0	1,2
B6: <i>I always attempt to avoid littering when visiting/at the staff village in ENP</i>						
Tourists	89,5	8,8	0	0	1,8	1,2
Staff	77,8	11,1	5,6	0	5,6	1,4
B7: <i>I have a high involvement in responsible waste management activities when visiting/at the staff village in ENP</i>						
Tourists	36,8	14,0	24,6	12,3	12,3	2,5
Staff	61,1	22,2	11,1	5,6	0	1,6
Awareness statements						
AW1: <i>I am aware of how to avoid the generation of waste when visiting/at the staff village in ENP</i>						
Tourists	52,6	22,8	10,5	8,8	5,3	1,9
Staff	61,1	27,8	0	5,6	5,6	1,7
AW2: <i>I am aware of how to reduce my waste when visiting/at the staff village in ENP</i>						
Tourists	59,7	19,3	8,8	8,8	3,5	1,8
Staff	72,2	16,7	5,6	0	5,6	1,5
AW3: <i>I am aware of the option to re-use my waste when visiting/at the staff village in ENP</i>						
Tourists	43,9	10,5	17,5	15,8	12,3	2,4

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
Staff	77,8	11,1	11,1	0	0	1,3
AW4: I am aware of how to recycle my waste when visiting/at the staff village in ENP						
Tourists	42,1	17,5	12,3	22,8	5,3	2,3
Staff	72,2	16,7	5,6	5,6	0	1,4
AW5: I am aware of how to dispose of my waste responsibly when visiting/at the staff village in ENP						
Tourists	56,1	22,8	12,3	8,8	0	1,7
Staff	66,7	22,2	0	11,1	0	1,6
AW6: I am aware of waste management initiatives in ENP						
Tourists	14,0	12,3	21,1	22,8	29,8	3,4
Staff	50	33,3	0	5,6	11,1	1,9
Attitude statements						
A1: Responsible waste management is a pleasant experience when visiting/at the staff village in ENP						
Tourists	36,8	21,1	33,3	3,5	5,3	2,2
Staff	61,1	38,9	0	0	0	1,4
A2: Responsible waste management is a useful practice when visiting/at the staff village in ENP						
Tourists	66,7	15,8	15,8	1,8	0	1,5
Staff	72,2	16,7	5,6	5,6	0	1,4
A3: Responsible waste management is beneficial to the environment						
Tourists	93,0	5,3	1,8	0	0	1,09
Staff	83,3	11,1	5,6	0	0	1,2

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
A4: <i>My feelings towards waste management are favourable</i>						
Tourists	80,7	15,8	0	1,8	1,8	1,3
Staff	72,2	27,8	0	0	0	1,3
A5: <i>Responsible waste management would create a clean environment</i>						
Tourists	86,0	12,3	1,8	0	0	1,2
Staff	88,9	11,1	0	0	0	1,1
A6: <i>Responsible waste management aids in environmental protection and conservation of resources in ENP</i>						
Tourists	84,2	14,0	1,8	0	0	1,2
Staff	88,9	11,1	0	0	0	1,1
A7: <i>Responsible waste management should be promoted in ENP</i>						
Tourists	87,7	7,0	5,3	0	0	1,2
Staff	88,9	11,1	0	0	0	1,1
Subjective norm statements						
SN1: <i>My family thinks I should manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	70,2	14,0	15,8	0	0	1,5
Staff	72,2	22,2	0	5,6	0	1,4
SN2: <i>My friends think I should manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	57,9	22,8	17,5	0	1,8	1,7
Staff	72,2	16,7	11,1	0	0	1,4

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
SN3: <i>My colleagues think I should manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	49,1	17,5	29,8	1,8	1,8	1,9
Staff	77,8	22,2	0	0	0	1,2
SN4: <i>My supervisor/manager expects me to manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	40,4	17,5	35,1	5,3	1,8	2,1
Staff	94,4	5,6	0	0	0	1,1
SN5: <i>The community surrounding ENP expects me to manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	49,1	17,5	26,3	1,8	5,3	2,0
Staff	77,8	16,7	5,6	0	0	1,3
SN6: <i>ENP's staff expect me to manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	49,1	15,8	22,8	5,3	7,0	2,1
Staff	77,8	22,2	0	0	0	1,2
Perceived behavioural control statements						
PBC1: <i>The decision to manage my waste responsibly is completely up to me when visiting/at the staff village in ENP</i>						
Tourists	50,9	22,8	5,263	14,0	7,0	2,0
Staff	83,3	5,6	5,6	5,6	0	1,33
PBC2: <i>Responsible waste management is an easy task when visiting/at the staff village in ENP</i>						
Tourists	36,8	24,6	17,5	12,3	8,8	2,3

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
Staff	72,2	16,7	5,6	5,6	0	1,4
PBC3: <i>If I wanted to, I could manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	59,6	22,8	14,0	3,5	0	1,6
Staff	88,9	0	11,1	0	0	1,2
Situational factor statements						
SF1: <i>Responsible waste management is possible because there is sufficient space available in ENP</i>						
Tourists	40,4	26,3	26,3	0	7,0	2,1
Staff	83,3	16,7	0	0	0	1,17
SF2: <i>Responsible waste management is possible in ENP because I have enough time</i>						
Tourists	52,6	29,8	10,5	5,3	1,8	1,7
Staff	61,1	22,2	0	11,1	5,6	1,8
SF3: <i>Responsible waste management is possible in ENP because I have adequate knowledge</i>						
Tourists	49,1	28,1	14,0	7,0	1,8	1,8
Staff	55,6	16,7	5,6	11,1	11,1	2,1
SF4: <i>Responsible waste management is possible in ENP because waste management is enforced</i>						
Tourists	8,8	15,8	31,6	22,8	21,1	3,3
Staff	61,1	27,8	0	5,6	5,6	1,7
SF5: <i>Responsible waste management is possible in ENP because there is enough infrastructure (bins)</i>						
Tourists	26,3	31,6	19,3	12,3	10,5	2,5
Staff	55,6	11,1	0	16,7	16,7	2,3

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
SF6: <i>Responsible waste management is possible in ENP because there is adequate information</i>						
Tourists	14,0	22,8	19,3	22,8	21,1	3,1
Staff	61,1	22,2	5,6	0	11,1	1,8
SF7: <i>Responsible waste management is possible in ENP because there are adequate resources</i>						
Tourists	19,3	26,3	29,8	12,3	12,3	2,7
Staff	61,1	11,1	5,6	11,1	11,1	2,0
Intention statements						
I1: <i>I intend to manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	80,7	15,8	3,5	0	0	1,2
Staff	83,3	16,7	0	0	0	1,2
I2: <i>I intend to reduce the amount of waste I produce when visiting/at the staff village in ENP</i>						
Tourists	61,4	19,3	10,5	7,0	1,8	1,7
Staff	88,9	5,6	0	5,6	0	1,2
I3: <i>I intend to re-use waste that I have generated where possible when visiting/at the staff village in ENP</i>						
Tourists	47,4	24,6	15,8	12,3	0	1,9
Staff	83,3	11,1	0	0	5,6	1,3
I4: <i>I intend to separate my waste for recycling purposes when visiting/at the staff village in ENP</i>						
Tourists	63,2	17,5	14,0	3,5	1,8	1,6
Staff	77,8	16,7	0	0	5,6	1,4

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
I5: I intend to dispose of my waste in a responsible manner when visiting/at the staff village in ENP						
Tourists	71,9	19,3	7,0	1,8	0	1,4
Staff	88,9	11,1	0	0	0	1,1
I6: I intend to stop littering when visiting/at the staff village in ENP						
Tourists	87,7	7,0	5,3	0	0	1,2
Staff	94,4	0	0	0	5,6	1,2
I7: I intend to participate in ENP's waste management programmes (if any)						
Tourists	52,6	19,3	19,3	7,0	1,8	1,9
Staff	83,3	11,1	5,6	0	0	1,2
Perceived moral obligation statements						
PMO1: I have a moral obligation to manage my waste responsibly when visiting/at the staff village in ENP						
Tourists	87,7	12,3	0	0	0	1,1
Staff	94,4	5,6	0	0	0	1,1
PMO2: I have an obligation to future generations to manage my waste responsibly when visiting/at the staff village in ENP						
Tourists	89,5	10,5	0	0	0	1,1
Staff	94,4	5,6	0	0	0	1,1
PMO3: I think that it is my duty to manage my waste responsibly when visiting/at the staff village in ENP						
Tourists	84,2	14,0	1,8	0	0	1,2
Staff	94,4	5,6	0	0	0	1,1

Statements	Frequency of Likert scale responses (% of responses)					
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	Mean
PMO4: <i>I would feel guilty if I didn't manage my waste responsibly when visiting/at the staff village in ENP</i>						
Tourists	73,7	22,8	3,5	0	0	1,3
Staff	77,8	5,6	5,6	5,6	5,6	1,6
Perceived policy effectiveness statements						
PPE1: <i>The waste management facilities provided by ENP are sufficient</i>						
Tourists	14,0	21,1	42,1	10,5	12,3	2,9
Staff	50,0	16,7	5,6	16,7	11,1	2,22
PPE2: <i>ENP promotes responsible waste management and its benefits</i>						
Tourists	5,3	21,1	35,1	14,0	24,6	3,3
Staff	44,4	16,7	0	16,7	22,2	2,6
PPE3: <i>In terms of responsible waste management, I would recommend ENP to others</i>						
Tourists	24,6	24,6	35,1	7,0	8,8	2,5
Staff	66,7	16,7	5,6	11,1	0	1,6

16.2.1.1 Waste management behaviour (B)

Behaviour, in the context of this study, referred to the self-reported waste management behaviours/practices of participants while in ENP. These statements generally scored well for both tourists and staff, with 96.5% of tourists and 94.4% of staff agreeing or strongly agreeing that they regularly managed their waste responsibly while in the park (B1). The next five statements elaborated on specific waste management practices. Statements B4, B5, and B6 scored the highest in terms of agreement of participants. These related to whether participants disposed of their waste appropriately (B4; 89.5% of tourists, and 72.2% of staff agreed); whether they stored their waste in an environmentally friendly manner (B5; 84.2% of tourists and 100% of staff agreed); and whether they avoided littering (B6; 98.3% of tourists and 88.9% of staff agreed). Statements related to participants reducing their waste (B2) and separating their waste (B3) scored slightly lower, with 64.9% of tourists and 74.2% agreeing or strongly agreeing with B2; and 70.2% of tourists and 72.2% of staff agreeing or strongly agreeing with B3. Interestingly, only 50.9% of tourists agreed that they had a high involvement in responsible waste management activities in ENP, compared to staff with an 83.3% agreement rate (B7).

Both tourists and staff generally stated that they participated in waste management activities in ENP. From the observations, however, it was found that this may not be completely true. A lack of waste separation and some littering was observed in the tourist areas. The staff areas, in contrast, displayed much higher levels of litter and no waste separation (a detailed discussion of these observations is found in Section 5.3). Self-reported waste management/pro-environmental behaviours have been revealed to overestimate actual/observed behaviour. Barr (2007); Fuj *et al.* (1985); Kormos and Gifford (2014); and Tonglet *et al.* (2004) corroborate this statement.

The decision to participate in waste management behaviours is complex, with a number of factors that must be taken in consideration before choosing to act. According to the TPB, behaviour is influenced by intentions, which are influenced by attitudes, subjective norms, and perceived behavioural control. This research proposes that, in addition to these, awareness, situational factors, perceived moral obligation, and perceived policy effectiveness, also play a role. The function of these factors is discussed in the sections below. With additional challenges (as reported by participants) being discussed in Section 5.3.1.

16.2.1.2 The role of awareness (AW) in waste management

The participants understanding of various waste management practices are referred to as environmental knowledge or awareness. When examining specific behaviours, Kaiser *et al.* (1999) and Izagirre-Olaizola *et al.* (2015), determined that knowledge played a significant role in

changing behaviour. A few international tourist respondents indicated that managing their waste was a *natural* and *unconscious* experience when interviewed. Pakpour *et al.* (2014) and Fan *et al.* (2019) determined that developed countries were more knowledgeable about waste separation than developing countries.

Tourists agreed or strongly agreed that they were generally aware of how to manage their waste, particularly avoiding the generation of waste (AW1; 75.4%), reducing waste (AW2; 78.95%), and disposing of waste responsibly (AW5; 78.95%). Similar results were obtained from staff for AW1, AW2, and AW5. Approximately 89% of staff agreed or strongly agreed that they were aware of how to avoid their waste (AW1), 88.9% agreed that they knew how to reduce their waste (AW2), and 88.9% agreed that they knew how to dispose of their waste (AW5).

Statements related to tourists' awareness of the option to re-use their waste (AW3; 54.4%) and recycling their waste (AW4; 59.7%), however, scored lower. Waste reduction and recycling are some of the most crucial forms of waste management that tourists can engage in while travelling (Han *et al.*, 2018). Focussing on these practices (which tourists are not aware of) can greatly improve the conservation efforts in ENP. Staff respondents' level of agreement to AW3 and AW4 scored significantly higher than those of tourists. A higher percentage of the staff respondents agreed or strongly agreed that they were aware of the option to re-use their waste (88.9%) (AW3). This was also true for their awareness of recycling (AW4) with 88.9% agreeing or strongly agreeing with the statement. Environmental knowledge, according to Fenitra *et al.* (2021:508), is complex. Hu *et al.* (2018:275) further explained that environmental knowledge could be split up into theoretical and practical knowledge. In theory, an individual could possess the knowledge of different waste management techniques but might not know how to apply these practices in a real-world situation.

A point of concern is that the majority of tourists (52.6%) disagreed or strongly disagreed with statement AW6 which focused on awareness of waste management initiatives in the park. As part of the interview responses, one tourist stated that the only initiatives that they were aware of, were the banning of plastic bags in the park and prohibiting visitors from exiting their vehicles (to prevent waste from leaving the vehicles). Staff were, however, more aware of these initiatives, with an 83.3% agreement rate for statement A6. Notably, one staff member strongly disagreed with this statement.

It was revealed, through observations and literature, that waste management initiatives were attempted in the park but were not in operation at the time of the research. According to the MCC (2014), this may have been in reference to planned recycling initiatives which failed due to financial constraints and large transport distances. A few months after the data collection period,

a National Cleanup Day was held at Ombika on the 16th of September 2023. This was a collaboration between the Hai//om community (in Ombika and Okakuejo), Rent-A-Drum, NWR, and MEFT (NWR, 2023). In addition to the collection of recyclable waste, volunteers were trained to manage and prepare the recyclable waste for disposal at Ren-A-Drum's recycling facility. This training is valuable in improving the waste knowledge of staff at ENP. Future opportunities for collaborations could also be possible.

Waste-related behaviours which are based on knowledge, have been proven to be long-term and consistent (Kelly *et al.*, 2006; Raghu & Rodrigues, 2021). Education, knowledge, and awareness were one of the opportunities for improvement of waste management as identified by participants (further discussed in Section 5.3.2). Knowledge of waste management practices not only positively impacts intention but has also been determined to create positive attitudes (Hu *et al.*, 2018; Zhang *et al.*, 2015).

16.2.1.3 The role of attitudes (A) in waste management

This study defines attitude as the positive or negative evaluations participants may have of waste management in the park. Positive attitudes are often linked to sustainable waste management behaviours. If an individual views waste management practices favourably, they are more likely to adopt these behaviours. Ayob *et al.* (2017), Chan and Bishop (2013), and Pakpour *et al.* (2014) achieved similar results. Although positive attitudes directly influence pro-environmental behaviours, if these behaviours are inconvenient, individuals may choose not to participate (Kollmuss & Agyeman, 2002). Moreover, a positive attitude will increase environmental knowledge and vice versa (Paço & Lavrador, 2017). The relationship between these two constructs will enforce behavioural intention.

Statements regarding the importance of waste management to the environment scored very well for staff participants. All staff participants (n=18) either agreed or strongly agreed that waste management is a pleasant experience in ENP (A1), that their feelings towards waste management were favourable (A4), that it would create a clean environment (A5), that it would aid in environmental protection and the conservation of resources (A6), and that waste management should be promoted in the park (A7). Statements A2 and A3 also scored well with 88.9% of staff agreeing or strongly agreeing that waste management is a useful practice in the park (A2), and that it is beneficial to the environment (A3).

Similar results were achieved with tourists' attitudes for statements A2 to A7. These statements were specifically related to whether waste management is a useful practice (A2; 82.5%), whether it is beneficial to the environment (A3; 98.3%), whether it would create a clean environment (A5;

98.3%), and whether it would aid in environmental protection and conservation (A6; 98.3%). Tourists also agreed that they had a favourable attitude towards waste management in ENP (A4; 96.5%) and that it should be promoted in ENP (A7; 94.7%).

Statement A1, however, scored much lower amongst tourists than staff, with only 57.9% of tourists agreeing that waste management is a pleasant experience in ENP. This could be due to personal experiences within the park and could be explained by the challenges experienced by tourists. These challenges, as identified during interviews, included a lack of bins, waste information, infrequent waste removal, littering, and a lack of waste separation (further examined in Section 5.3.1).

From these results it can be said that both tourists and staff generally have a positive attitude towards waste management in ENP, with the exception of statement A1 which scored lower with tourists. However, *negative attitudes* and *not caring about how waste impacts on the environment* were mentioned as challenges towards waste management in ENP during interviews (Section 5.3).

16.2.1.4 The role of subjective norms (SN) in waste management

Subjective norms refer to the perceived societal pressure placed on the participants to manage their waste when in the park. De Groot *et al.* (2013:1830) and Ramayah *et al.* (2012:143) highlight that certain waste management behaviours are significantly influenced by the subjective norms perceived to be held by significant others such as colleagues, family and friends. These studies were, however, not in the PA context. Social norms are deemed to be important as they do not only influence intention and behaviour, but moral obligation as well (Han *et al.*, 2018).

The level of agreement to subjective norms (SN) statements related to waste management in ENP varied among tourists. The majority of tourists agreed or strongly agreed that their family and friends expected them to manage their waste responsibly when they visit ENP (SN1 and SN2; 84.2% and 80.7% agreement respectively). Neutral responses were reported for statements SN3, SN4, SN5, and SN6. These statements were concerned with their colleague expectations (SN3; 66.7%), their supervisor/manager expectations (SN4; 57.9%), the expectations of the Namibian community (SN5; 66.7%), and the expectations of ENP staff (SN6; 64.9%). This difference in levels of agreement could be attributed to a greater significance being placed on the opinions of family and friends. Kollmuss and Agyeman (2002:251) believed that an individual's values are most influenced by their immediate social circle (family, friends, neighbours, etc), referred to as the "microsystem". A study conducted in the USA and Norway among environmentalists found that childhood experiences (shaped by their close social circle) greatly

influenced their behaviours as environmentally conscious beings, and these individuals were also motivated towards pro-environmental behaviour by their close social circle (i.e. family and friends).

Staff responses, in contrast, placed more weight on the expectations of all others, without significant differences in the level of agreement to SN statements related to different social role-players. Staff agreed that their family (SN1; 94.4%), friends (SN2; 88.9%), colleagues (SN3; 100%), supervisor/ manager (SN4; 100%), the community surrounding ENP (SN5; 94.5%), and other staff members (SN6; 100%) expect them to manage their waste responsibly. The difference between staff who placed equal weight on the opinions of those that are not in their “inner circle”, as compared to tourists, could be attributed to the nature of their workplace. ENP relies on the protection of the environment and tourism. Keeping the park free from waste and other aesthetic pollution is a large part of a tourist’s satisfaction, which staff are mindful of. The opinions of colleagues and the Namibian community could, for this reason, score higher than those reported by tourists.

16.2.1.5 The role of perceived behavioural control (PBC) in waste management

Perceived behavioural control (PBC) refers to the amount of control that the participants believe they have over managing their waste in ENP. Factors or aspects influencing the perception of behaviour control over waste management may include knowledge regarding waste-related practices, waste management resources and facilities, moral obligations, and the effectiveness of waste-related policies (Wang *et al.*, 2020).

Tourists mostly agreed or strongly agreed that managing their waste in ENP is completely up to them (PBC1; 73.7%), and that they could manage their waste if they wanted to (PBC2; 82.5%). PBC3 scored slightly lower with 61.4% of tourists agreeing or strongly agreeing. This statement was in relation to the ease of waste management in the park. These statements scored higher for staff responses, with 88.9% of staff respondents agreeing or strongly agreeing to PBC1, PBC2, and PBC3.

Combined with strong intentions, the greater the perceived control over behaviour, the better chance of performing the behaviour (Hu *et al.*, 2024; Wang *et al.*, 2018). When an individual is confident about their ability to perform a behaviour, they will be more likely to act, compared to someone who believes they have limited control. In the tourism context, studies from Hu *et al.* (2018); and Wang *et al.* (2021b) found that PBC supports the intention to behave in a pro-environmental behaviour.

As discussed in Chapter 3, however, the results of TPB research are dependent on the context of the study area. Control over waste management is, therefore, not only an intrinsic factor, but is also dependant on external influences. Although participants believed they had control over managing their waste, additional factors could impede their intentions. Their decision to manage their waste, is therefore, not always under their control. The absence of waste resources and facilities, and a lack of information or knowledge, could all influence one's perception of control. These factors could be determined as part of situational factors (SF) influencing waste-related behaviour.

16.2.1.6 The role of situational factors (SF) in waste management

The external factors that hinder or promote the participants ability to manage their waste in this study are referred to as situational factors. Studies by Ghani *et al.* (2013), Raghu and Rodrigues (2021), and Ramayah *et al.* (2012) found that certain situational factors can affect recycling and source separation. These factors included opportunity, infrastructure, skills, and resources.

Most tourists agreed or strongly agreed that they have enough time (SF2; 82.5%) and knowledge (SF3; 77.2%) to effectively manage their waste in the park. Staff respondents reacted similarly, with 83.3% agreeing with SF2 and 72.3% agreeing with SF3. Although the level of agreement was lower than for the time (SF2) and knowledge (SF3) statements, tourists generally believed that they had enough space (SF1: 66.7%) and infrastructure (SF5; 57.9%) to manage their waste. All 18 of the staff respondents (100%) agreed or strongly agreed with SF1 regarding having sufficient space for waste management. However, only 66.7% of staff agreed or strongly agreed with SF5 regarding sufficient infrastructure.

Tourists, however, did not believe that waste management was adequately enforced in the park, with 43.9% of tourists disagreeing or strongly disagreeing with statement SF4. This was also the case with the provision of information related to waste management (SF6; disagreement of 43.9%). Lastly, only 45.6% of tourists agreed that ENP had enough waste management resources (SF7). Staff, however, viewed these factors more favourably. Approximately 89% of staff respondents agreed that waste management is possible because waste management is enforced (SF4). They also, generally, agreed that there is adequate information (SF6; 83.3%) and resources (SF7; 72.2%) for waste management.

Interestingly, a different narrative was documented as part of the interview responses (Section 5.3). One of the frequently mentioned challenges identified as part of interviews was the lack of waste management resources and infrastructure, with specific reference to a lack of bins and waste transport. These challenges are further discussed in Section 5.3 below. Kollmuss and

Agyeman (2002:248) state that pro-environmental behaviours are only able to be performed if the necessary infrastructure is provided for. A positive association between recycling behaviours and the existence of recycling facilities has also been found to affect the convenience of these behaviours (Barr *et al.*, 2001; González-Torre & Adenso-Díaz, 2005; Saphores *et al.*, 2012). Other studies (Ghani *et al.*, 2013; Tonglet *et al.*, 2004) have, however, not found any significant relationships between situational factors and recycling. Once again, the context of these studies should be taken into consideration when determining the importance of these factors. The quality of these resources is also important. The poorer these resources are, the less likely that individuals would want to use them. This could be seen in ENP, where bins were available in most tourist areas, but provision for all categories were not provided for. The situation in staff camps were even worse, with some areas only having one bin available for all waste types, without any provision for separation at source.

ENP could focus on improving these elements which participants perceived to be inadequate. By improving the situational factors, participants may feel that they have more control over managing their waste at ENP (Hu *et al.*, 2024). Additionally, improving the condition and convenience of waste management will increase the frequency of these practices (Chen & Tung, 2010). While improving situational factors is necessary, it is worth mentioning that protected areas are generally underfunded. Underfunding in PAs is a universal concern but is often more severe in developing countries (Rylance *et al.*, 2017). Namibian parks are mainly funded by the government, in addition to park entry fees, hunting concession fees, and donor funding. It is estimated that there is a financial gap of N\$ 8.8 million per annum for a minimum expenditure scenario, and N\$ 113 million per annum for an optimal spending scenario (MET, 2010a).

The financial sustainability of PAs is defined by Emerton *et al.* (2006:28) as *“the ability to secure sufficient, stable and long-term financial resources, to allocate them promptly and in an appropriate form, to cover the full costs of conservation and to ensure that they are managed effectively and efficiently”*. Financial stability, however, does not guarantee the sustainability of PAs. These funds should be used and allocated effectively (Rylance *et al.*, 2017). At present, these funds do not prioritise waste management in ENP. One of the challenges and priorities identified in the MEFT Annual Report 2021/22 (MEFT, 2022b) was the *“maintenance, upgrade and development of new protected area infrastructure, including fencing, roads, waste management facilities and water points.”* This report, however, indicated that their priority for the 2021/22 financial year was on park infrastructure, such as fence repairs, re-gravelling tourist roads, and upgrading waterholes. The only project related to waste management was the installation of the Rent-A-Drum recycling station. Additional projects included tagging vultures, placing collars on large carnivores, and translocating zebra. A fundraiser was run by WWF

Namibia and WWF United States specifically for the protection of black rhinos, which garnered 500 000 USD (WWF, 2023). This shows that funding is prioritised for wildlife conservation and improving park infrastructure mainly for tourism (which positively impacts the economy).

16.2.1.7 The role of intention (I) in waste management

In this research, intention refers to the willingness of tourists and staff to participate in waste management in ENP. Tourist responses indicated a high level of overall agreement on their subjective intentions. The vast majority of tourists agreed or strongly agreed that they intend to manage their waste responsibly while they visit ENP (I1; 96.5%). This was also true for their intentions to reduce (I2; 80.7%), re-use (I3; 71.9%); recycle (I4; 80.7%); and dispose (I5; 91.2%) of their waste responsibly. These respondents also agreed or strongly agreed that they intended to refrain from littering within the park (I6; 94.7%). Lastly, 71.9% of respondents agreed or strongly agreed that they would participate in waste management programmes while visiting the park (I7).

Staff responses scored higher for all statements with 100% of participants either agreeing or strongly agreeing that they intend to manage (I1) and dispose their waste responsibly in ENP (I5). Statements I2, I3, I4, and I6 also scored well for staff, with 94.5% agreeing or strongly agreeing that they intend to reduce (I2) and separate (I4) their waste, 94.4% agreeing or strongly agreeing that they intend to re-use their waste (I3) and stop littering (I6). Lastly, 94.4% agreed or strongly agreed that they intend to participate in waste management programmes in the park (I7).

Both tourists and staff reported strong intentions to participate in responsible waste management practices. Although intending to manage waste positively affects waste management behaviour (Chan & Bishop, 2013), numerous authors have discovered that there is a gap between intention and actual behaviour (Chen *et al.*, 2015; Chen & Tung, 2010; Zhang *et al.*, 2019). These studies are, however, specifically focussed on waste separation. Roos *et al.* (2021:43) discovered that commercial property owners in Sabi Sand Reserve, South Africa, intend to partake in responsible waste management, “*provided that it was convenient and did not interfere with tourist experiences*”. As can be seen, intentions alone are insufficient to adequately influence behaviour, with additional constructs playing a role.

16.2.1.8 The role of perceived moral obligation (PMO) in waste management

Perceived moral obligation (PMO) is the sense of responsibility or obligations that participants felt they had towards sustainably managing their waste in ENP. In sensitive environments like protected or conservation areas, the perceived moral obligation to engage in positive environmental behaviours tends to be elevated. These spaces often evoke a heightened

awareness of the environmental impact of human actions due to their ecological fragility, unique biodiversity, and intrinsic value (Lee & Jan, 2015). This heightened awareness can lead visitors and staff to feel a stronger moral responsibility to act in ways that protect and preserve the area.

Studies show that visitors to protected areas often feel a moral duty to adhere to environmental practices, which they may not feel as strongly in less sensitive settings. For example, Hughes *et al.*, (2011:308) have reported that - in conservation areas, the perceived moral obligation to prevent littering, conserve resources, and respect wildlife is amplified due to the recognised importance of the ecosystem's preservation. This sense of obligation can drive behaviours such as reducing waste, minimising resource use, and supporting conservation efforts, which are seen as necessary to sustain the area's ecological status (Lee & Jan, 2015). Furthermore, Ramkissoon and Mavondo (2014:673) suggest that the unique characteristics of protected environments, which are often associated with solitude, natural beauty, and escape from urban settings, contribute to a strong sense of place attachment. This attachment, in turn, reinforces an individual's moral commitment to minimise harm and positively impact the environment (Halpenny, 2010). Such environments provide immersive experiences that foster pro-environmental attitudes and a deeper appreciation for the natural world, leading individuals to feel more ethically compelled to protect them (Ramkissoon & Mavondo, 2014).

Perceived moral obligation statements scored very well. All tourists (n=57) agreed or strongly agreed that they have a moral obligation to themselves, as well as future generations, to manage their waste (PMO1 and PMO2). This was also true for staff responses. Furthermore, 98.3% of tourists agreed or strongly agreed that it is their duty to manage their waste when visiting ENP (PMO3), with 96.5% of tourists indicating that they would feel guilty if they did not do so (PMO4). All the staff respondents either agreed or strongly agreed with PMO3 in terms of moral duty towards responsible waste management. PMO4 scored slightly lower with staff with 83.4% of staff agreeing that they would feel guilty for not managing waste responsibly.

Waste behaviours contain a moral dimension (Tonglet *et al.*, 2004), especially as it relates to resource preservation and preventing adverse environmental impacts. Research conducted by Hu *et al.* (2024) concurred with this finding, establishing that an increase in moral obligation would increase behavioural intention. In particular, the moral obligation associated with recycling was discovered to increase behavioural intentions (Tonglet *et al.*, 2004). This was also true for waste separation (Chan & Bishop, 2013) and pro-environmental behaviours (Onwezen *et al.*, 2013). Previous research by Ouellette and Wood (1998) and Miller *et al.* (2014) found that tourists had a greater responsibility to manage their waste in their home countries, compared to tourist destinations. This was not necessarily the case in this research, where all tourists (local and international) had strong moral obligations towards responsible waste management.

Only 50.8% of tourists, however, reported that they had a high involvement with waste management when visiting the park (B7). This indicates that although tourists have a moral obligation to manage their waste, other factors could be impeding their ability to act. Waste management requires considerable time and effort, in most circumstances without tangible extrinsic rewards. An intrinsic reward is, therefore, required for the behaviour to occur. Chan and Bishop (2013:2), consider recycling to be a moral behaviour as the drive to engage in a behaviour should stem from an internal source or motivation.

16.2.1.9 The perceived effectiveness of ENP's waste management policies (PPE)

Lastly, perceived policy effectiveness (or PPE) refers to the effectiveness of ENP's waste management policies as perceived by participants. Policies (such as waste guidelines and waste promotion) serves as a motivational factor towards changing behaviour, where a stronger motivation will increase behaviour (Wan, 2014). Studies by Wan *et al.* (2014a; 2014b) determined that, in the household context, the perceived effectiveness of policies improved the intention to separate waste.

The perceived effectiveness of waste separation policies can enhance individuals' intentions to engage in this behaviour because it strengthens their belief that their actions will make a meaningful impact. When individuals perceive that waste separation policies are well-designed, properly enforced, and contribute significantly to environmental outcomes, they are more likely to feel that their participation in these policies is both valuable and impactful. This perceived effectiveness directly influences intention, as it supports the idea that waste management efforts will not be in vain but will contribute to positive environmental changes (Ajzen, 1991; Mullan *et al.*, 2015). Moreover, when policies are perceived as effective, they can increase the sense of social and moral responsibility among individuals. People may feel that adhering to effective policies aligns with their values, contributing to the collective goal of environmental protection. This alignment between personal values and effective policy outcomes can enhance their intention to manage waste responsibly (Bortoleto *et al.*, 2012). Studies also suggest that perceived policy effectiveness can boost perceived behavioural control (Section 5.2.1.5), a core component of the TPB. This perception of control is a key driver of intention, as it reinforces the belief that individuals have both the capability and support needed to manage waste effectively (Raimi *et al.*, 2016).

Statements related to the perceived effectiveness of ENP's waste management policies scored significantly lower than other TPB statements. The greater part of tourists disagreed or strongly disagreed that ENP's waste management facilities were sufficient (PPE1; 64.9%). A further 73.7% of tourists did not believe ENP adequately promoted waste management (PPE2). For the reasons

mentioned above, this is concerning. Tourists had positive attitudes and felt they had relative control over their waste behaviours. Without motivation, as a result of inadequate policies, their intention to manage their waste could be negatively affected. Notably, a greater number of tourists (49.1%) agreed or strongly agreed that they would recommend ENP to others in terms of waste management (PPE3).

The opinions of staff were, however, more favourable. Approximately 67% of staff agreed or strongly agreed that the waste management facilities provided were sufficient (PPE1). Furthermore, 61.1% respectively agreed or strongly agreed that ENP promotes waste management (PPE2), and that they would recommend ENP, in terms of waste management (PPE3). This difference in responses could possibly be attributed to the difference between the internal views of staff and the external views of tourists (regarding waste management standards).

Shen *et al.* (2022:3) proposes that PPE not only influences intentions but acts as a moderator for other TPB constructs as well. This could be seen with PPE diminishing the effect that attitude has on intention. A positive attitude will, therefore, not motivate an individual to manage their waste if the necessary policies are not in place. Adequate policies, in contrast, will increase PBC and ultimately behavioural intention.

16.2.2 Reliability test results

The Cronbach's Alpha test was used to test the reliability, or internal consistency, of the individual TPB constructs. Internal consistency, as described by Tavakol and Dennick (2011:56), refers to the degree to which a statement reliably measures a construct. In the case of this research, Cronbach's Alpha measures the extent to which the questions (posed under each TPB construct) reliably measure a TPB construct (determining the internal consistency of each TPB construct used in this study). This is measured on a scale from 0 to 1, where a value of 0.7 or higher is generally considered acceptable. According to George (2016:240), the values can be interpreted as follows:

- $\alpha > 0.9$ = excellent
- $\alpha > 0.8$ = good
- $\alpha > 0.7$ = acceptable
- $\alpha > 0.6$ = questionable
- $\alpha > 0.5$ = poor
- $\alpha < 0.5$ = unacceptable

The results from the reliability test are found in Table 5-4 below.

Table 16-4: Cronbach Alpha results for TPB constructs

Constructs	Cronbach's Alpha (α) for tourist responses	Cronbach's Alpha (α) for staff responses	Cronbach's Alpha (α) for combined responses
Behaviour	0.705	0.730	0.696
Awareness	0.875	0.807	0.868
Attitude	0.604	0.867	0.658
Subjective norms	0.743	0.793	0.774
Perceived behavioural control	0.332	0.514	0.434
Situational factors	0.652	0.738	0.700
Intention	0.782	0.753	0.784
Perceived moral obligation	0.820	0.312	0.673
Perceived policy effectiveness	0.641	0.239	0.599

With the exception of PBC for tourists and PBC, PMO, and PPE for staff, all constructs had a Cronbach's Alpha value above 0.6 (as seen in Table 5-4). Values below 0.6 are not considered sufficient for further statistical analysis. Several factors could attribute to low alpha values, including the number of statements per construct, sample size, and poor inter-relatedness between statements (George, 2016; Tavakol & Dennick, 2011). The low Alpha values for staff responses are possibly due to the small sample size, where there were only 18 staff responses. Six of the nine constructs did, however, have sufficient values. This could indicate that the small sample size is not the only reason for these low values.

PBC, in particular, had low Alpha values in several studies (Cheung & Chan, 2000; Kraft *et al.*, 2005; Yazdanpanah & Forouzani, 2015). Kraft *et al.* (2005:486) attributed this to the multidimensionality of PBC. These authors found that Alpha values increased when PBC is measured using multiple dimensions (perceived control, perceived confidence, and perceived difficulty). Kline (2013:33) posited that low values are expected when investigating psychological constructs, especially when these constructs are measured using two to three items. Multiple studies have supported this claim. Greaves *et al.* (2013); Halder *et al.* (2016); Kline (2013); Kumar (2019); and Sidique *et al.* (2010) have all investigated the psychology of recycling behaviours, with reports of low internal consistencies between some of their constructs. Provided there is an acceptable overall Cronbach's Alpha value, these studies have accepted values as low as 0.5. Furthermore, Nunnally (1978) maintained that values of 0.5 and above are considered justifiable in exploratory research. Ajzen (2011:1114) further acknowledge that TPB constructs rarely exhibit

reliabilities above 0.75, even when they are measured well. The average Alpha value for these constructs is generally 0.6.

PBC, PMO, and PPE were measured using three or four statements. To improve Cronbach's Alpha values, statements lowering that value are generally removed. There was a weak relationship between PBC 1 and PBC 2 (for both tourists and staff responses) and PPE1 and PPE2 (for staff responses) in this study. It was, however, not possible to remove a statement to increase reliability as there were only three statements used to measure the constructs (three or more statements are needed for reliability analysis). As the Alpha values were below 0.5, it cannot be considered acceptable, even for exploratory research. PMO also had a low Alpha value (0.312) for staff responses. It was determined that there was no variance between the responses of PMO1, PMO2, and PMO3. This could either be attributed to participants not responding truthfully, or that all participants had the same responses. From Table 5.3, it can be seen that PMO1, PMO2, and PMO3 had identical responses from staff participants (94.4% strongly agree, 5.6% agree), which resulted in the low correlation between statements.

To improve reliability, the responses of tourists and staff were combined. From these results, shown in Table 5-4 above, all constructs beside PBC had acceptable Alpha values. For this reason, PBC was not considered for further analysis.

16.2.3 Difference in the responses of staff and tourists towards the TPB constructs

An independent-samples t-test was conducted to determine if there were differences in the responses of tourists and staff, in terms of the TPB constructs. Table 5-5 shows the results of the t-test. The p-value is statistically significant if it is smaller than 0.05, whereas the d-value will be practically significant if it is larger than 0.2 (0.2=small effect; 0.5=medium effect; 0.8=large effect) (Ellis & Steyn, 2003).

Table 16-5: Results of the independent-samples t-test

TBP construct	Mean difference	95% confidence interval of the difference		Two-sided p-value	Cohen's d
		Lower	Upper		
Behaviour (B)	-0,01253	-0,36200	0,33694	0.943	-0.019
Awareness (AW)	0,68908	0,17842	1,19975	0.009	0.727
Attitude (A)	0,13283	-0,06776	0,33343	0.191	0.357
Subjective norm (SN)	0,59454	0,25580	0,93329	0.001	0.946
Situational factors (SF)	0,65622	0,27166	1,04079	0.001	0.919
Intention (I)	0,31830	0,02093	0,61566	0.036	0.577
Perceived moral obligation (PMO)	-0,00512	-0,18732	0,17708	0.956	-0.545
Perceived policy effectiveness (PPE)	0,76511	0,27362	1,25660	0.003	0.289

When looking at Table 5-5, one can see that the mean difference for all constructs fell between the range of the 95% confidence interval of the difference, when equal variances are assumed (which is the case for this data). The significance level (two-sided p-value) determines if these differences were due to chance. The p-values of AW, SN, SF, I, and PPE are below 0.05, indicating that the probability that the difference was the result of chance is low. There is, therefore, a significant difference in the responses of tourists and staff towards these values. As mentioned, this value does not indicate that the difference is practically significant. The effect

sizes (d-value) were calculated to determine if the difference were large enough to have a practical effect. AW, SN, and SF had large effect sizes, and I had a medium effect size. Although PPE was statistically significant, it had a small effect size. It can, therefore, be said that there was practical and significant difference between the responses of tourists and staff, related to the awareness, subjective norms, situational factors, and intention statements.

From the frequency table (Table 5-3), it was found that some AW statements scored lower for tourists than staff. This was in relation to the re-use and recycling of waste, as well as waste management initiatives in ENP. There was also a difference in their SN, where tourists placed greater importance on the opinions of their close social circle, whereas staff valued the opinions of the wider society as well. Next, certain situational factors scored much higher with staff than with tourists. Staff believed they had enough space, resources and information to manage their waste, whereas tourists did not. Tourists also did not think that waste management was adequately enforced, whereas staff did. Lastly, all statements related to intention scored very high with staff. Although tourist responses also performed well, they scored slightly lower.

By determining the difference in the self-reported measures between staff and tourists, the findings from these results can be used to guide real-world interventions towards improving waste management in ENP. As tourist and staff responses had to be combined for further analysis, it was important to highlight the areas for improvement from the differing perspectives of respondents. These results may also be used practically, to focus on the aspects which would most benefit interventions.

16.2.4 Predictors of waste management behavioural intentions

This study attempts to determine the influence that the six TPB constructs had on the participant's intention to manage waste, as well as behaviour (**Research objective 2**). First, the constructs were tested for multicollinearity.

It is important to ensure that two constructs are not correlated, i.e. they do not perform the same function. If two constructs are too closely correlated, one cannot reliably distinguish between the influence of these constructs (as discussed in Section 3.6.3). To this end, a test for multicollinearity was done, by examining the variance inflation factor (VIF) and tolerance value. When the tolerance value is above 0.20, and the VIF below 5, then it can be assumed that there is no risk of multicollinearity (Hair *et al.*, 2013). As can be seen in Table 5-6 below, there was no multicollinearity between the TPB constructs, and further testing could be done.

Table 16-6: Test for multicollinearity

	Collinearity statistics	
TPB constructs	Tolerance	VIF
Awareness	0.671	1.491
Attitude	0.612	1.635
Subjective norms	0.659	1.517
Situational factors	0.424	2.359
Perceived moral obligation	0.747	1.339
Perceived policy effectiveness	0.508	1.970

Next, the correlations between the constructs were determined by calculating the Pearson's Correlation Coefficient (r), as shown in Table 5-7 below. This was done to understand how the TPB constructs are influenced by each other (the strength and direction) and provided a basis for further analysis. The r value ranges between +1 and -1, with a value of 0 indicating no correlation (Schober, 2018). The closer the value is to 1, the stronger the correlation.

Table 16-7: Correlations between TPB constructs

Predictor variables	AW	A	SN	SF	PMO	PPE	I	B
Awareness (AW)	-							
Attitude (A)	0.393	-						
Subjective norms (SN)	0.435	0.412	-					
Situational factors (SF)	0.490	0.383	0.481	-				
Perceived moral obligation (PMO)	0.256	0.477	0.149	0.146	-			
Perceived policy effectiveness (PPE)	0.340	0.211	0.415	0.684	-0.004	-		
Intention (I)	0.539	0.460	0.267	0.389	0.531	0.262	-	
Behaviour (B)	0.531	0.245	0.348	0.350	0.195	0.205	0.363	-

The TPB framework asserts that there are associations between the constructs which influence behaviour (Ajzen, 1991; Ghani *et al.*, 2013; Razali, 2020). As expected, attitude ($r = 0.460$) and subjective norms ($r = 0.267$) positively influence intention (Ajzen, 1991), there was, however, a weak correlation between subjective norms and intention.

As can be seen, there were positive correlations between all TPB constructs, except for PMO and PPE ($r = -0.004$), indicating that these variables are directly proportional. Studies have found that PPE will negatively influence PMO (Davis *et al.*, 2006; Wan *et al.*, 2020), as is the case with this study. There is, however, a negligible correlation between these two factors, indicating that PMO will not be influenced by PPE, and vice versa.

Values below 0.29 are also considered weak or negligible, as is the case for the correlations between AW/PMO ($r = 0.256$), A/PPE ($r = 0.211$), A/B ($r = 0.245$), SN/PMO ($r = 0.149$), PMO/B ($r = 0.195$), PPE/I ($r = 0.262$), and PPE/B ($r = 0.205$). Many constructs had low correlations with PPE, which may suggest that PPE acts as a moderator, rather than it directly influencing the constructs. PPE was found to moderate the positive influence between subjective norms and recycling intentions, and awareness of consequences and recycling intentions, in a study by Wan *et al.* (2014). Investigating the moderating effect of PPE on the TPB constructs is, therefore, recommended for future studies in the protected area context. The relationship between SF and PPE, however, was found to be the strongest with a value of 0.684. This suggests that situational factors may influence the perceptions of individuals regarding the effectiveness of ENP's policies. If tourists and staff perceive situational factors favourably, then they may view ENP's policies in the same way.

The purpose of the structured survey questionnaire was to evaluate the ability of the adapted TPB framework to describe the waste management intentions of tourists and staff in ENP. Further, the influence of the additional constructs on the explanatory power of the TPB was examined. The statistical significance of these relationships was established by conducting a multiple regression analysis. Specifically, it was used to determine which of the six constructs (beside behaviour) have the greatest influence on waste management, with intention as the dependant variable. The values of p and the beta coefficients calculated in the multiple regression analysis are shown in Table 5-8.

Table 16-8: Results of multiple regression analysis

TPB construct/independent variables	Original TPB framework		Adapted TPB framework	
	Beta coefficients (β)	Sig. (p)	Beta coefficients (β)	Sig. (p)
With intention as the dependant variable:				
Awareness			0.353	0.001
Attitude	0.422	0.000	0.115	0.303
Subjective norms	0.092	0.422	-0.071	0.512
Situational factors			0.091	0.499
Perceived moral obligation			0.384	0.000
Perceived policy effectiveness			0.086	0.484
With behaviour as the independent variable:				
Awareness			0.435	0.001
Attitude			-0.049	0.702
Subjective norms			0.139	0.267
Situational factors			0.136	0.381
Perceived moral obligation			0.067	0.570
Perceived policy effectiveness			-0.083	0.558
Behaviour			0.363	0.001

First, multiple regression calculated what proportion of the variance in the dependant variable (intention) is explained by the independent variables, indicated by the adjusted R^2 value. To assess the statistical significance of this the p -value is considered, where the influence of the constructs was significant at the level of 0.05. A value below 0.05 is considered statistically significant. Moreover, the relative contribution of the independent variables to explaining the proportion of variance is determined by the beta coefficient. The greater this value, the greater its contribution.

The adjusted R^2 value of the original TPB constructs, attitude and subjective norms, were calculated first. Together these two variables explained 19.7% of the variance in waste management intentions, with attitude being the only statistically significant predictor of intention. This was found to be the case with a study by Tonglet *et al.* (2004), which used an extended TPB to investigate the determinants of recycling behaviour in households in an urban area. Additional studies who concurred with these findings include Cao *et al.* (2023), Chen (2020), Heidari *et al.* (2018), López-Mosquera *et al.* (2014), and Savari and Khaleghi (2023). These studies were conducted in various settings and examined different behaviours, where the inclusion of additional variables increased the explanatory power of the TPB.

After the additional variables were added, this percentage increased to 44.1%. As mentioned by Ajzen (1991), the TPB framework can be adapted, provided that the additional constructs improve upon the predictive power of the model. As can be seen, there is a significant improvement in the proportion of variance accounted for by the additional constructs. This coincides with previous studies who determined that additional constructs were needed when applying the framework to waste-related behaviours (Boldero, 1995; Davies *et al.*, 2002). A proportion of variance in independent variables exceeding 50% is said to moderately contribute to the explanation of intention (Hair *et al.*, 2011). The adapted TPB framework used in this study was, therefore, determined not to be the best predictor of waste-related intentions in ENP. It did, however, greatly improve upon the predictive ability of the original framework.

When adding the additional constructs, AW ($\beta = 0.353$; $p = 0.001$) and PMO ($\beta = 0.384$; $p = 0.000$) were the only statistically significant constructs. It must be reiterated that TPB constructs generally do not exhibit large correlation values (Ajzen, 2011). This suggests that awareness and perceived moral obligation were the constructs most strongly correlated with the respondent's intention to manage their waste. This is shown in Table 5-7, where AW and PMO had the highest r -values, indicating that they had the highest contribution to behavioural intentions. This emphasises the role of AW and PMO towards waste-related intentions, suggesting that behavioural intention is increased by greater awareness and moral obligations. Although AW and PMO did not have strong positive correlations in this study ($r = 0.256$), Hansla *et al.* (2008) and Si *et al.* (2020) have noted that knowledge increases an individual's sense of responsibility. Waste conscious individuals generally have stronger moral obligations.

PMO, in particular, was found to be the strongest predictor of household waste behaviours in some studies (Miafodzyeva *et al.*, 2013; Pakpour *et al.*, 2014; Razali, 2020). Other studies, however, have determined that pro-environmental behaviour is generally related to self-interest motives in these settings (Esfandiar *et al.*, 2020; Li & Wu, 2019). The emphasis on environmental conservation in vulnerable areas, such as ENP, could heighten morality. This is consistent with a

study by Esfandiar *et al.* (2020) and Esfandiar *et al.* (2021), where moral considerations played a greater role than self-interest in national parks. This was confirmed when looking at the frequency of responses related to PMO (Table 5-3), where tourists and staff agreed that it was their duty to themselves and to future generations to manage their waste in the park. Cao and Morrison (2023) also found moral norms to increase the responsibility of tourists to sort their waste in heritage sites.

As shown in Table 5-8, attitude ($\beta = 0.422$; $p = 0.000$) had a positive and moderate correlation with intention (in the original TPB framework). Although the significance of attitude decreased when additional constructs were added to the point that it was no longer a significant predictor of intention ($\beta = 0.115$; $p = 0.303$). When examining visitor's binning behaviour in national parks, Esfandiar *et al.* (2021) discovered that attitude was also not a significant predictor of behaviour. This was also true when examining tourist plastic waste reduction intentions on beaches (Badawi *et al.*, 2024).

Perceived moral obligation, which was the greatest predictor of intention, is said to be influenced attitudes. All respondents generally had positive attitudes towards waste management in ENP, as discussed in section 5.2.1.3. For this reason, the relevance of positive attitudes towards the intention to manage waste may be obsolete in the presence of strong moral obligations. Studies by Shaw *et al.* (2000) and Sparks *et al.* (1995), found that PMO reduced the contribution of attitude on ethical consumption and obligation. Chan and Bishop (2013) also determined that attitude could be replaced by moral norms when investigating recycling intention.

It was interesting to note that subjective norms had a negative relationship with intention ($\beta = -0.071$). Although not statistically significant, this suggests that respondents were less concerned with the opinions of others. This could be due to the weight of tourist responses who were generally not concerned with the opinions of those outside their immediate social circle. This was discussed in section 5.2.1.4, where greater weight was placed on the opinions of family and friends. The insignificance of attitudes and subjective norms in this study were not expected, as they form part of the original framework and are expected to significantly influence human behaviour. This highlights the importance of taking into account the context of the study area when considering the constructs that may explain behaviour.

It was surprising that situational factors were not found to be statistically significant to the respondent's intentions. Although some studies have found SF to be a weak predictor of waste-related behaviours (Ghani *et al.*, 2013; Ioannou *et al.*, 2013; Tonglet *et al.*, 2004), a lack of certain situational factors were found to be a major challenge towards responsible waste management in ENP (specifically infrastructure and resources which are discussed in section 5.3.1.2). This

was, however, generally related to the quality of these factors, and not the lack thereof. SF may, for this reason, be insignificant. Furthermore, Chen and Tung (2010:831) noted that rather than directly influencing intentions, SF may have a moderating effect on other independent variables. SF would then strengthen or weaken the relationships between A, SN, and PMO towards intention.

Next, the significance of the relationships between TPB constructs and behaviour was determined. According to the Theory of Planned Behaviour, no constructs were expected to have a direct influence on behaviour, besides perceived behaviour control and intention (Ajzen, 1991). Awareness ($\beta = 0.453$; $p = 0.001$) was not anticipated to have a direct influence on behaviour and contributed more to behaviour than intention ($\beta = 0.363$; $p = 0.001$). This reveals that knowledge of waste-related practices is a strong indicator of behaviour (specifically in the context of this study), where the outcome is increased by an increase in knowledge.

Figure 5-1 below illustrates the model drawn from these results and indicates the weight of each statistically significant variable.

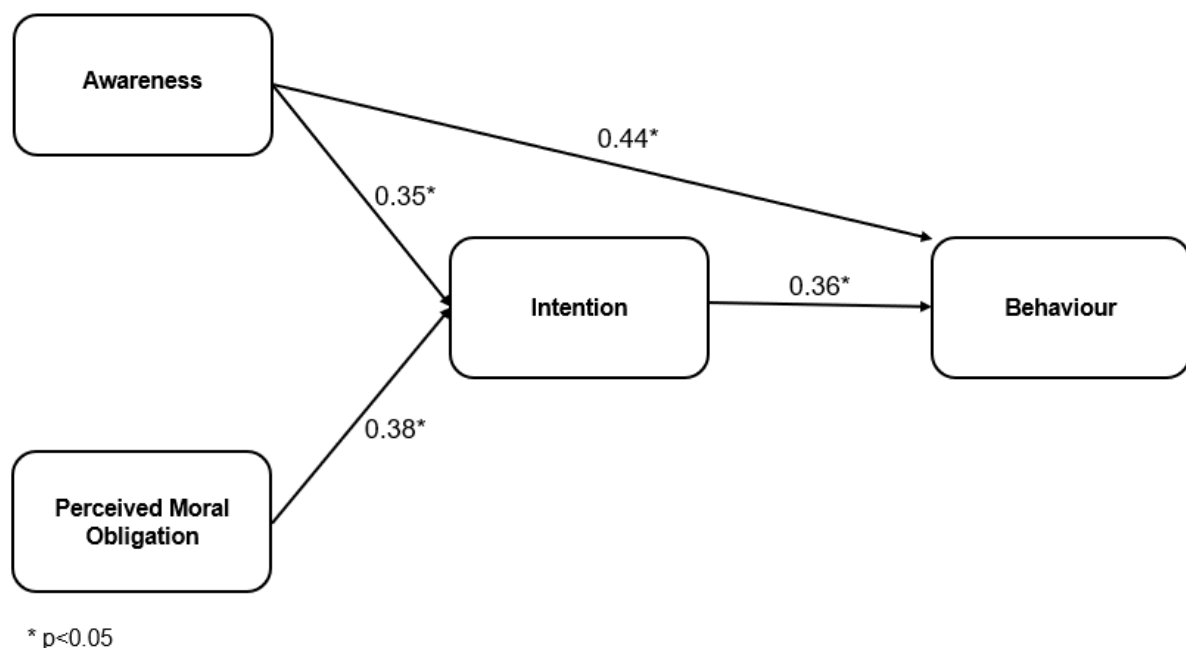


Figure 16-1: Predictors of waste management behaviour

The results of this test showed that intention was not the best predictor of behaviour, but rather awareness. The original TPB constructs, as well as two of the additional constructs (SF and PPE), did not predict behavioural intentions. Awareness and perceived moral obligation were found to

be the only significant predictors of tourist and staff intentions to participate in waste management behaviour. AW, PMO, and I were, therefore, the only constructs included in the model as they were the only significant predictors of intention and behaviour (as seen from the beta coefficients and probability values).

The effectiveness of the adapted framework in explaining waste-related intentions and behaviour were a cause of concern when adding additional constructs. Although the adapted framework showed an increase in the percentage of variance in intention as explained by the TPB variables, the figure was still low. The combination of constructs chosen for this study may, therefore, not be the best predictors of intention in this specific context. It was proved, however, that all constructs had a positive influence on intention, with two additional constructs being statistically significant (AW and PMO). While these two constructs were the greatest predictors of behavioural intention, other constructs may be better suited in terms of waste management in ENP. This is a point of consideration for future applications of this framework to waste-related behaviour in protected areas. The results of these findings indicate that adapting the TPB to account for the intricacies of human behaviour is an ongoing process. It should be noted that a sample size may also have an effect on the variability of the beta coefficients, leading to biases in the estimations of these values (as well as the p-values) (Maneejuk & Yamaka, 2021). Due to this, the significance of some constructs may have been reduced.

For this specific data set, the results demonstrate that awareness (AW) and perceived moral obligation (PMO) are the most significant predictors of waste management intentions, suggesting that interventions should focus on enhancing individuals' knowledge and fostering a sense of moral responsibility. Awareness not only influenced intentions but also had a direct impact on behaviour ($\beta = 0.435$, $p = 0.001$), underscoring the importance of targeted educational campaigns to increase knowledge about waste management practices. Additionally, moral obligations were found to heighten waste-related intentions, which aligns with research showing that pro-environmental behaviours in national parks often stem from intrinsic ethical considerations (Esfandiar *et al.*, 2020; Nicolaides, 2020).

The weak or negligible correlations of constructs such as subjective norms (SN), situational factors (SF), and perceived policy effectiveness (PPE) with intention indicate that these factors may play a moderating rather than a direct role. For instance, SF's strong correlation with PPE ($r = 0.684$) suggests that improving infrastructure and resources could positively influence perceptions of policy effectiveness, indirectly enhancing behaviour (Wan *et al.*, 2017). This highlights the need for supportive situational conditions, such as accessible waste management infrastructure, to complement moral and educational interventions.

Furthermore, the study underscores the contextual nature of waste management behaviours. While traditional TPB constructs like attitude (A) were found to have diminishing relevance in the presence of strong moral obligations, the findings emphasise the importance of customising behavioural models to reflect the unique environmental, cultural, and logistical contexts of protected areas. Future interventions could incorporate additional constructs or adapt existing frameworks to capture the complexity of behaviours in such settings, as suggested by previous studies on TPB extensions (Boldero, 1995; Davies *et al.*, 2002).

16.3 The opportunities and challenges towards waste management in ENP (RO3)

The opportunities and challenges towards waste management in ENP were derived from semi-structured interviews with staff and tourist respondents. Certain themes and trends were identified and are discussed below and compared to observations made by the researcher.

16.3.1 Barriers/challenges to waste management in ENP

The barriers or challenges towards waste management, as identified by respondents, are discussed in the following sub-sections. Forty tourists (70.2% of total) and thirteen staff members (68.4% of total) mentioned challenges to responsible waste management in ENP as part of their interview responses (Table 5-9). The overall challenges identified by respondents were a lack of waste management awareness, information, resources, services, behaviour, and practices. These challenges were grouped into themes based on an existing framework of challenges towards waste management in protected areas proposed by Roos *et al.* (2022). It should be noted that the framework of challenges by Roos *et al.* (2022) was based on a private protected area in South Africa, compared to this research being conducted on a public national park in Namibia.

Table 16-9: Challenges towards waste management in ENP as identified by respondents

Category	Sub-category	Phrases	Frequency			
			Tourists (n = 40)	%	Staff (n = 13)	%
Institutional challenges	(C1) Lack of awareness and education	"lack of awareness", "no training"	3	7.5%	3	23.1%
	(C2) Lack of waste	"visibility", "availability", "no	11	27.5%	1	7.7%

Category	Sub-category	Phrases	Frequency			
			Tourists (n = 40)	%	Staff (n = 13)	%
	management information	<i>information”, “uncertainty”</i>				
Technical and operational challenges	(C3) Insufficient waste management resources and infrastructure	<i>“paper bins”, “not enough”</i>	7	17.5%	5	38.5%
	(C4) Insufficient waste management services	<i>“infrequent waste collection”, “no regular transport”</i>	10	25%	6	46.2%
Social and cultural challenges	(C5) Changing behaviour	<i>“do not care”, “attitude”</i>	4	10%	0	0%
	(C6) Inappropriate waste management practices	<i>“litter”, “no waste separation”</i>	4	10%	5	38.5%

16.3.1.1 Institutional challenges

A lack of information (C2) was identified as a significant waste management challenge in ENP, with eleven tourists (27.5%) specifically mentioning this during interviews. Notably, tourists shared the sentiment that there was insufficient information available on waste management and that they were uncertain about how waste should be managed. An international tourist specifically highlighted that *“there is no information provided about waste management. You have to find it out yourself. Hopefully we are doing it the right way”*. Kianpour *et al.* (2017) and Zorpas *et al.* (2017) have found that a lack of information will decrease an individual’s intention to participate in responsible waste management practices. This was confirmed by the researcher during her stay in ENP during data collection. Although some signage was available at certain points in the

park (see Figures 5-2 and 5-3), no further detailed information on waste management could be found.

Before entering ENP from the Galton Gate entrance, there is a sign banning individuals from entering ENP with plastic bags (Figure 5-2). However, no such signage was seen at the Ombika entrance (the entrance closest to Okakuejo Camp). Whether this is enforced in the park could only be confirmed at the Galton Gate entrance. The researchers observed that visitors were asked by staff if they had any plastic bags in their vehicles when checking in. Notwithstanding, it could not be determined if visitors were telling the truth or not, since no vehicles were checked for the presence of plastic bags at the time of the research.



Figure 16-2: “No plastic bags allowed in the Park” sign at the Galton Gate entrance

Between Okakuejo camp and the western side of ENP, numerous signs were seen requesting tourists not to litter (Figure 5-3). These signs were, however, not present throughout the eastern side of the park.



Figure 16-3: “Do not litter” sign found along the western parts of the park

Mateer *et al.* (2020) conducted a study of visitor's waste disposal in three national parks in the United States. From this study, the authors determined that 68.8% of the observed visitors had no meaningful interaction with waste signage. Those who did interact, and did not appear confused by the signage, were 2.68 times more likely to properly dispose of their waste. Sussman *et al.* (2013) and Verdonk *et al.* (2017) also determined that effective signage may influence waste disposal. For signage to be effective, however, it should be accompanied by additional information. Signage could be placed directly on bins, accompanied by clear and short instructions on proper waste disposal/separation procedures (Werner *et al.*, 1998). As ENP receives many international tourists, who speak various languages, it is important to provide signage and information that can be easily understood. Combining written information and images (behavioural cues) has proven to successfully improve waste-related behaviour (Verdonk *et al.* 2017; Sussman & Gifford, 2013).

Linked to waste management information, is the lack of awareness and education (C1). Three staff members (7.5%) and three tourists mentioned this as a challenge (23.1%). Differences were identified between the level of awareness and education between local and international participants. Many international tourists mentioned that recycling is a common behaviour in their home countries, with one tourist stating: *"Responsible waste management is part of our normal, everyday life. We recycle everything. It is not something we have to think about."*

A study by Lee *et al.* (2022) reviewed waste education in schools and colleges in five European cities. From this research it was found that environmental awareness and education campaigns are instrumental in improving recycling rates. Further, waste education was determined to create knowledgeable and waste conscious individuals (Lee *et al.*, 2022). Similar studies by Maddox *et al.* (2011); Schultz *et al.* (1995); and Starr and Nicolson (2015) provided the same results. In addition to education producing waste-aware individuals in schools, it was found that this also had an intergenerational influence as well. These programmes are implemented in many European cities with pleasing results.

Approximately 34% of tourists visiting Namibia are from Europe (MEFT, 2022a) who are often adamant on responsible tourism. Koščak and Rourke (2023:46) attribute this to the increase in concern for the environment. Responsible tourism is defined by TSG (2012:2), as *"awareness, decisions and actions of all those involved in the planning, delivery and consumption of tourism, so that it is sustainable over time"*. The European tourism industry is intensely focused on sustainability. Environmental initiatives carried out by the European Commission (EC) include reducing the detrimental environmental impacts at tourist destinations. Further, the EU Integrated Tourism Policy (2021) places emphasis on raising tourists' environmental awareness and improving responsible behaviour (Nekmahmud *et al.*, 2022). This *"awareness"* and *"these values"*,

as mentioned by a tourist, *“might not be instilled with staff”*. It was recommended by this tourist that awareness programmes should focus on staff as the waste in staff areas was regarded as *“unacceptable”*. This individual also stated that: *“Waste management depends on a person’s values and awareness, and we need to change that. Focus needs to be placed on awareness and education of waste management”*. A staff member echoed this statement by expressing that without education they would not know about the advantages and disadvantages of not managing waste responsibly. It was highlighted by this respondent, as well as two others, that no training was made available to staff and that they were not made aware of proper waste management techniques.

Environmental education is one of the policies set out in the Etosha Management Plan (MET, 2007), which states the following: *“To facilitate environmental education via formal partnerships targeted mainly at tourists, schools, students, decision makers and community leaders.”* According to this policy, education should be focussed on the value of wildlife and its conservation, as well as the value of the park and its culture and history. This plan also calls attention to the association between environmental education and the tourism product. Education related to waste management, is however, not provided for in this plan. From engagements with staff during interviews, it also seemed that waste education and awareness were not provided for in practice in ENP.

Another staff member added that there used to be recycling initiatives (with some awareness around recycling) in the past, but not anymore. The MCC (2014:13) attributes the discontinuation of recycling initiatives in Namibia to the lack of an appropriate transport system and budget to carry out recycling. As mentioned in Section 5.2.1.2 above, some improvements have been made since this data was collected, with a National Cleanup Day being held in September 2023. The focus of this day was on the collection of recyclable materials, as well as education on how to manage these waste types.

The success of initiatives such as these, without continued efforts towards waste education and awareness, show limited success. Jackson (2005:66) determined that forming pro-environmental habits and changing irresponsible behaviours are very difficult. Sporadic initiatives, such as clean-up days, provide short-term rewards but do not guarantee long-term effects.

16.3.1.2 Technical and operational challenges

A lack of appropriate waste management resources (C3) was highlighted by tourists and staff as a particular challenge in ENP. Specifically, the number and categories of waste separation bins was brought to the researcher’s attention during interviews. Three tourists stated that they

believed that ENP “*did not provide enough bins throughout the park*”, with one tourist mentioning that some areas in the park only have one bin for waste disposal. Only one staff member, however, noted this challenge. The state of waste management infrastructure in the park was observed to be significantly different between the tourist and staff camps. The tourist camps had several bins throughout public areas. Generally, four separate bins were placed beside each other for glass, metal, plastic, and other waste (Figure 5-4 below).



Figure 16-4: Example of waste bins at Okakuejo Camp

As can be seen from Figure 5-4 above, bins for the separation of paper were available at any of the tourist camps observed (Okakuejo Camp, Dolomite Camp, and Olifantsrus Camp). This observation was confirmed by four tourist respondents, who noticed that there was no provision made for the separation of paper and cardboard and expressed their confusion about the matter. Furthermore, the researcher noted that two of the picnic areas/rest stops located between Okakuejo Camp and the Western side of the park had no bins available for waste disposal.

The absence of bins in picnic spots may, however, help keep the surrounding areas clean. The “no bin” initiative is implemented by SANPARKs at some of the smaller, less commercial picnic sites in some of its South African national parks, like Addo Elephant National Park and Mokala National Park. A study by Van Doesum *et al.* (2021) found that removing bins from inside urban parks, and only providing bins at exits, decreased littering. This was only successful, provided that additional information was supplied. Without this information, littering increased. Additional information could include clear signage explaining why there are no bins and encouraging visitors to take their waste with them. It is hoped, through removing bins, that visitors would be motivated to keep their waste until they find a bin. If there are bins present, these individuals will be encouraged to dispose of their waste in these sensitive areas. This could result in an increase in wind-blown waste and animal access to bins, if not adequately designed.

The absence of waste disposal infrastructure (if feasible) aligns with the “Leave No Trace” initiative, which attempts to encourage individuals to minimise their impact on the environment (Vagias *et al.*, 2014). Disposing of waste properly is one of the seven principles of “Leave No Trace”. This principle promotes individuals to “pack it in, pack it out”, and remove all waste from the area.

One other advantage of removing bins from picnic spots, is that no waste needs to be collected from these areas, improving the efficiency of waste management (Van Doesum *et al.*, 2021). Transportation and infrequent collection of waste was found to be a challenge in ENP and will be discussed later in this section.

Staff camps, however, present a different narrative. Bins were available to staff, but not to the extent of public areas. Most staff houses had at least one waste bin, although these bins were not dedicated to separate waste categories (despite the bins being labelled). This challenge was not brought up by any staff members. This seems to be a challenge in many PAs in Namibia as mentioned in the MCC (2014:8). A shortage of bins in ENP as well as other parks in the Northeast of Namibia were found to be the cause of litter, especially in staff areas.

Littering behaviour is not only affected by the number of bins available, but also the placement of bins. Schultz *et al.* (2013) found that the placement of waste disposal facilities plays an important role in reducing litter. In this study, the authors determined that bins should be placed in an accessible location, in the path that pedestrians are most likely to dispose of their waste. Interestingly, the study concluded that one well-placed bin was more effective in reducing litter than several bins that were not well-placed. The negative effect of inconveniently placed bins on binning behaviour have also been cited by Liu and Shibley (2004), Neupane (2015), Perry *et al.* (2010), Robinson (2023), and Shukor *et al.* (2012). Some of these authors not only cite well-placed bins as a precursor to binning behaviour, but an appropriate distance between bins as well.

Lastly, four staff members mentioned insufficient fleet (vehicles) as a significant barrier towards waste management. It was stated that there are not enough vehicles to collect waste throughout the park. A staff member working at the Dolomite Camp stated that “*collection trucks have been standing still for months and not collecting waste... We are forced to use small cars to take waste to the collection truck.*”

This statement was confirmed through observations, where a buggy car was seen taking black trash bags from the Dolomite camp to a stationary waste vehicle at the bottom of the hill. From the literature it was determined that this is a common challenge for Namibian PAs, where despite

the existence of vehicles, they are often non-operational (MCC, 2014). These vehicles are not only used for the transportation of solid waste, but other MEFT activities as well. Waste management is, therefore, often a low priority. According to the NWR integrated annual report (NWR, 2023:34), four trucks were donated by the MEFT to assist with waste management within ENP. Maintaining these waste vehicles, however, might not be prioritised due to the lack of funds available to PAs, as mentioned in Section 5.2.1.6.

Croset (2014:8) found that waste collection throughout Africa suffers from a lack of resources. A particular challenge identified in Tsumeb, Namibia by this study towards waste collection was the breakdown of collection vehicles. This was echoed by three staff members who mentioned that transport was often not available to collect waste. As mentioned, this was due to a shortage of – and breakdowns of collection vehicles.

The lack of operational vehicles, and vehicles dedicated to waste management, has proven to be a challenge for many Namibian PAs and conservation areas (MCC, 2014). These include Waterberg National Park, Von Bach National Park, Namib Naukluft Park, Khaudum National Park, Mangetti National Park, Mahango National Park, Bwabwata National Park, Mudumu National Park, Nkasa Rupara National Park, Skeleton Coast National Park, Ai-Ais Hot Springs, Hardap Game Park, and the Cape Cross Seal Reserve. Insufficient fleet is not only a challenge when collecting waste within a park, but also when that waste needs to be transported to landfills or recycling facilities. It was suggested in this report that existing vehicle journeys (for the purchase of supplies) could be used to transport some types of solid waste of these areas. Further waste transport systems could be shared between park or between private lodges in a similar location.

The provision of efficient services (C4) is an integral part of waste management in PAs. These services can include the collection, transportation, handling, and disposal of waste. Eleven tourists (27.5%) stated that they found the collection of waste to be lacking in some areas of the park. Four tourists specifically mentioned that waste in the picnic areas (not those mentioned in the observations from the researcher) were a cause of concern, with one tourist stating that “*Trash at the picnic spots do not get removed frequently, causing the trash to overflow*”. Overflowing waste bins is not only a mere aesthetic problem which deters tourists, but also causes pollution and the possibility of animal access (Abubakar *et al.*, 2022). This demonstrates that removing bins, as discussed previously, could decrease the amount of waste found in picnic areas.

The infrequent collection of waste was not only mentioned in picnic areas, but throughout the park. Five staff members stated that the “*collection of waste is often delayed*”. A lack of collection vehicles, as discussed above, is most likely the reason for this. This challenge is not unique to ENP but is present throughout Namibia.

Overall waste collection figures could not be located for Namibia. Research by Amwele (2022) reviewed waste management systems in three urban areas of Namibia. It was revealed that waste was not collected on a regular basis in Oniipa, with Ondangwa and Ongwediva having higher collection rates. It was determined that only 20.5% of waste was collected in Kavango, whereas 88.9% was collected in Kharas. Additionally, Windhoek had the highest waste collection rate and is cited as one of the cleanest cities in Africa (Ruppel & Ruppel-Schlichting, 2022). As can be seen, waste collection rates vary greatly between regions in Namibia.

16.3.1.3 Social and cultural challenges

Waste management behaviour (C5) as a challenge was only mentioned by four tourists (7.5%) during interviews. There are many factors affecting the behaviour of individuals, some of which are highlighted in previous sections. These include awareness and knowledge, effective communication and information, personal norms, demographics, service delivery and infrastructure, and attitude, to name a few (Brown *et al.*, 2010; Harper *et al.*, 2022; Wang *et al.*, 2020). Attitude, in particular, was of concern, with these respondents suggesting that some individuals simply “*do not care*” about sustainable waste management practices. This was in reference to both staff and tourists. Indifference towards waste management can also be connected to moral obligations, where an individual recognises a responsibility to act, but fails to overcome their lack of motivation or concern. Perceived moral obligation was the greatest predictor of behavioural intention in this study (see section 5.2.4; Table 5.8), highlighting the need to identify the source of their indifference. A focus on improving knowledge and reducing the barriers towards waste management could increase these individuals’ attitudes.

Negative attitudes often lead to inappropriate waste management behaviours, and ultimately, unsustainable waste management practices (Chen *et al.*, 2020a; Roos *et al.*, 2022). Self-reported attitude (as discussed in Section 5.2.1.3 of the survey questionnaire responses) presented a contrasting result. It is interesting to note that staff and tourists generally stated that they had had positive attitudes concerning waste management in ENP.

Certain waste management practices (C6) were also found to hinder waste management in ENP. “*Littering*” and “*a lack of/insufficient waste separation*” were the greatest concerns. Despite the presence of bins, two tourists and two staff members, noted that there is still litter. Some scattered litter was found during observations at the Okakuejo lookout point, and throughout staff areas. Widespread littering is a challenge in Namibia (MCC, 2014).

A lack of resources, such as bins, is often cited as one of the main reasons for the presence of litter (Schenck *et al.*, 2022). As mentioned above, some individuals still choose to litter even

though there are bins available. Brown *et al.* (2010:880) state that there are certain individuals who behave in ways that do not align with the conservation efforts of protected areas. These authors do not attribute this to ill-natured intentions, but rather to naivety or misunderstanding. Further authors cite laziness, habit, ignorance, disregard for the environment, and insufficient knowledge, as antecedents of littering behaviour (Hansmann & Steiner, 2017; Schenck *et al.*, 2022). With the environmental consequences of litter being most prevalent in vulnerable areas, it is important to determine the reasons behind this behaviour. Numerous authors have used psychological frameworks (such as the Theory of Planned Behaviour and Norm Activation Model) to understand littering behaviour in vulnerable areas (Esfandiar *et al.*, 2021; Fenitra *et al.*, 2023; Hu *et al.*, 2019; Ojedokun *et al.*, 2022). These studies specify attitude, perceived behavioural control, awareness of consequences, subjective norms, and personal norms as some of the greatest predictors of littering behaviour. The influence and weight of these constructs on behaviour vary between studies and are dependent on the context of the area. Staff houses in Namibian PAs in particular suffer from litter, partly due to a lack of bins and low levels of awareness (MCC, 2014). Windblown waste as a result of litter was observed by a staff member, stating: *“I find plastic deep in the bush when going on tours. It is not possible to climb out of vehicles to collect it because of safety reasons”*.

Concerning waste separation, it was found that not only is waste incorrectly separated, but it is mixed during collection as well. Five tourists stated that they observed a lack of waste separation from other tourists during their visit. One tourist mentioned that *“when I open the bins, I see that a lot of people do not separate their waste like it is shown on the bins”*. This was confirmed through observations, where waste was found in the incorrect bins (shown in Figure 5-5 below).



Figure 16-5: An example of inappropriate waste separation at Okakuejo Camp

Separation at source improves the collection transportation and disposal of waste, effectively reducing the impact on the environment. Waste sorting in tourism destinations, and especially protected areas, rely heavily on the behaviour of tourists (Cao *et al.*, 2022). It has been suggested by Cao and Morrison (2023:2), that the behaviour of tourists may change when they are travelling and less inclined to act pro-environmentally. This could be due to their anonymous nature and the length of their stay in tourist destinations. From the TPB perspective, attitude, subjective norms, perceived behavioural control, interpersonal trust, knowledge, moral obligations, waste-sorting policies, and self-identity, have significantly predicted waste-sorting intentions in protected areas in past studies (Cao *et al.*, 2022; Cao & Morrison, 2023; Esfandiar *et al.*, 2023).

The perceptions of tourists and staff may be influenced by the identified challenges. Addressing the challenges identified in this study will positively impact the TPB constructs, and ultimately, intention and behaviour.

16.3.2 Opportunities for waste management in ENP

The suggested opportunities towards improved sustainable waste management, as identified by respondents, are found in Table 5-10 below. A total of 40 tourists (70.18%) and 15 staff members (83.33%) suggested opportunities during interviews. Opportunities for improving waste management challenges included introducing waste management information and educational programmes and improving waste management resources and services. One other opportunity identified was the creation of jobs. As with the waste management challenges, responses for opportunities were clustered using a framework by Roos *et al.* (2022). There is a clear link between the challenges mentioned in Section 5.3.1 and opportunities identified in this section.

Table 16-10: Opportunities towards waste management in ENP as identified by respondents

Category	Sub-category	Phrases	Frequency			
			Tourists	%	Staff	%
Institutional opportunities	(O1) Introduction of waste management information	"visibility", "availability"	23	57.5%	3	20%
	(O2) Improvement	"more waste categories", "more	11	27.5%	8	53.33%

Category	Sub-category	Phrases	Frequency			
			Tourists	%	Staff	%
Technical and operational opportunities	of waste management resources and infrastructure	<i>bins</i> , <i>“increased transport”</i> , <i>“alternatives to disposal”</i> , <i>“composting”</i> , <i>“anaerobic digestion”</i>				
	(O3) Improvement of waste management services	<i>“increased collection”</i> <i>“reliable service delivery”</i>	4	10%	3	20%
Social and cultural opportunities	(O4) Introduction of educational programmes	<i>“education”</i> , <i>“training”</i>	3	7.5%	4	26.67%
	(O5) The creation of jobs	<i>“waste management division”</i>	1	2.5%	4	26.67%

16.3.2.1 Institutional opportunities

Dhingra and Kumar (2023) and Wang *et al.* (2021a) suggest that information should be provided to tourists to provide awareness about different waste topics. This includes information on proper waste disposal, recycling, and reduction techniques.

“Distributing information on waste management expectations/requirements” (O1) was heavily suggested by tourists, with 24 mentions of this theme as an opportunity for more effective waste management. Seven respondents specifically mentioned that in addition to the tourism-related documentation received when checking in, an information pamphlet on waste management could be provided. One tourist stated, *“When we arrive, the park should provide us with brochures explaining the proper procedures for recycling and minimising our waste”*. One of the tourists suggested that online resources could be provided to decrease paper waste. Dunjić *et al.* (2017) and Hu *et al.* (2024) have noted that, with regards to waste reduction and recycling, a manual could be made available in tourist destinations to improve knowledge. This manual could include

information about how to recycle, and how to reduce the amount of waste that tourists bring into the park.

Six tourists also proposed increasing the amount of signage throughout the park and potentially providing placards in the rooms. This was mentioned as a challenge in Section 5.3.1.1 above, where limited signage was observed throughout the park (specifically on the eastern side). Mateer *et al.* (2020); Sussman *et al.* (2013); and Verdonk *et al.* (2017) determined that efficient signage positively impacts waste disposal and separation. Placing signage close to waste bins in ENP, containing relevant information about waste disposal and separation, could effectively improve these practices (Werner *et al.*, 1998). It is, however, important to keep this information as short and concise as possible to accommodate all nationalities. Tourists who are unclear about waste management information are less likely to manage their waste responsibly (Meis & Kashima, 2017). This uncertainty could negatively impact the control that these individuals feel they have over waste management. Perceived behavioural control (PBC), according to the TPB, is influenced by awareness/knowledge. Providing information about responsible waste practices that are clear and concise could improve the awareness/knowledge of tourists and staff. To further improve PBC, information could be provided pertaining to the success of responsible waste management. For example, the amount of recyclable waste diverted from landfills could be shared, ultimately leading to an increase in the perceived effectiveness of these measures. Improving these aspects could lead to an improvement in intentions and behaviour.

Improvement of information as an opportunity towards more responsible waste management was only mentioned by three staff respondents. More in-depth educational programmes were, however, suggested. Improving knowledge and awareness of these topics through information sharing are essential for the promotion of sustainable waste practices (See O4 in Section 5.3.2.3 below).

16.3.2.2 Technical and operational opportunities

Improvements to the current waste management infrastructure and waste management alternatives (O2) was brought up by twelve tourists and ten staff members. The focus of suggested opportunities was towards improving waste separation infrastructure and providing for alternatives to landfill disposal.

All twelve tourist responses alluded to the provision of waste separation bins in the paper and cardboard category. As stated previously, this was identified as a challenge as this category of waste was generally disposed of in the “other” waste category, despite its recycling potential. As paper and cardboard waste forms a substantial of Etosha’s waste stream, between 10 and 25%

(MCC, 2014), bins specifically for this category should be provided for. If not, this waste ends up in other waste streams. Opportunities for improved waste separation through the provision of sufficient infrastructure with more separation categories, could, therefore, be made available. One staff member agreed with this by stating: *“Four bins are available, but we need more for plastic, glass, metal, non-recycled, and compost or food waste”*. Similar statements were provided by four other staff participants. More bins are, however, only advantageous if individuals are aware of how to separate their waste. Knowledge regarding separation at source, as previously discussed, is one of the antecedents of binning behaviour (Cao & Morrison, 2023). Improving the awareness of both tourists and staff (through improved information or education) concerning these practices will ensure that waste is separated correctly if additional waste category bins are provided.

Alternatives to landfill disposal were suggested by four of the international tourists, mentioning *“diversion from landfill”, “recycling”, and “composting”*. Roos *et al.* (2022:6) suggest that composting could be a valid option of diverting food waste from landfills if it is practical, stating that attracting animals might be a concern. Composting was brought up by two staff members as an option of waste management in staff areas, however, others noted that this attracts animals to these areas. A staff member noted that composting was attempted previously, although animal access proved damaging to not only property and gardens but was dangerous to families residing in the staff villages. Animal access is often a challenge to composting in parks (Matthews *et al.*, 2006; Przydatek, 2019; Roos *et al.*, 2022). Offensive odours from anaerobic activities and the release of greenhouse gasses are two other challenges associated with composting. Ayilara *et al.* (2020) state that improved aeration, increased air porosity, and trapping released toxic gasses can mitigate these problems. Lastly, the sites for composting facilities should be selected based on certain considerations. These include sites that cannot be accessed by animals and are an appropriate distance from tourist areas. If these challenges cannot be mitigated, alternative solutions, such as transporting food waste to local farms (MCC, 2014), would then have to be considered.

After mentioning opportunities towards the improvement of waste management infrastructure as a suggestion, a local tourist added *that “although waste management infrastructure could be improved, it would prove meaningless without efficient service delivery”*. Improving waste management services (O3), specifically regular waste collection, was mentioned by seven respondents. Waste collection in ENP is not the responsibility of the municipality, but the NWR as is often the case in Namibian PAs (MCC, 2014). Waste from Okakuejo Camp was observed to be collected frequently (generally once per day); however, this was not the case for other camps, picnic areas and especially staff camps. The MCC (2014:10) report that waste in tourist areas is collected often, although waste in staff areas suffer from infrequent waste collection. The

opportunity to increase collection rates does, however, come with some challenges. Transport distances and a lack of working transport vehicles (see C3 above) hinder collection services, which would be costly to repair. The improvement of these situational factors (SF) could improve the control that staff and tourists have over managing their waste in ENP. This will ultimately increase their intention to participate in waste management behaviours.

16.3.2.3 Social and cultural opportunities

Responses related to social and cultural opportunities scored lower than other themes. Their significance, however, should not be underestimated. The introduction of educational programmes (O4) was mentioned by three tourists and four staff respondents, while job creation (O5) was mentioned as an opportunity by one tourist and four staff respondents during interviews.

To combat ineffective waste management practices, the introduction of educational programmes (O4) was proposed by four staff respondents. This was specifically in relation to the education of staff members. The importance of education was reflected in a statement from a NWR staff member who communicated that *“If not for education, I would not know the advantages and dangers of not managing waste”*. One of the staff respondents further stated that *“some staff are rotational, so they need more and constant education on waste management. MEFT has a clear understanding, but NWR (rotational) staff need education”*. As mentioned, MEFT staff are responsible for the overall conservation of biodiversity in ENP, whereas NWR staff are responsible for tourist accommodation and facilities. How these staff view waste management, and the importance thereof, are influenced by these responsibilities.

This statement was echoed by one other staff member who went on to suggest that ENP management create a course for rotational staff with official guidelines on waste management in the park. For permanent staff, it was recommended that staff should have regular training (perhaps quarterly). Cunningham-Scott *et al.* (2005) and Rispo *et al.* (2015) highlight that frequent communication over time was found to be a requirement for the waste management practices.

Biderman and Bosak (1997:93) cite that cultivating an environmental consciousness among locals and tourists is an important part of PA management. This can be accomplished through environmental education programmes. Education in this context is defined by Orlović-Lovren (2011:52) as *“the process of acquiring and improving the skills, knowledge and experience needed for sustainable governance of the protected area”*. These programmes should be centred around creating awareness of the negative effects of human activities on the environment, and how this can be mitigated. The relevance of nature conservation and resource management to the everyday lives of individuals should be at the forefront of these programmes (Biderman &

Bosak, 1997). Increasing the knowledge/awareness of tourists and staff regarding waste-related practices would positively impact their attitudes, moral obligations and perceived control. Increasing these factors are important in influencing their intentions to manage their waste responsibly.

Job creation (O5) was mentioned the least of all the opportunities suggested. A total of four respondents (one tourist and three staff members) noted there was a need for a waste management division, with staff who only deal with waste management within ENP. Further comments were made by one staff member and one tourist during interviews, expressing the need for an environmental officer. Roos *et al.* (2022) investigated opportunities for waste management in South African PAs, where 'job creation and contributing to livelihoods' was identified as the most significant opportunity. There is an opportunity for surrounding communities to be involved in waste management who could benefit from increased employment.

Klundert and Anshutz (2001) believe that partnerships with local communities or businesses are beneficial in that they possess knowledge that could prove useful to sustainable waste management. When defining sustainable waste management, these authors stress the importance of designing systems that are appropriate to local conditions. Encouraging active participation from local communities will give a sense of ownership and responsibility for maintaining the sustainability of a PA. Community Based Organisations (CBOs), as stated by Mwangi and Thuo (2014:235), play an important role in the education and organisation of waste management problems and opportunities.

It was interesting that job opportunities outside of ENP was not mentioned as an opportunity during this research. As the distance between camps within ENP- and between ENP and the outside communities- are significant, it might not be viable to extend job opportunities to the communities outside of the park (without them relocating to staff camps). Further, although there are opportunities for recycling, separated waste may not be able to be transported to recycling facilities (due to a lack of vehicles). It is for these reasons that outsourcing employment to the surrounding communities may not have been mentioned. It may be more viable to create a waste management team or division consisting of existing staff members, who could receive additional training. Challenges related to infrastructure (C3), services (C4), and location should, however, be attended to before employment opportunities can be considered (Roos *et al.*, 2022).

Improving these factors identified by participants, will not only improve the conditions in ENP, but influence the constructs of the Theory of Planned Behaviour. By improving the perceptions of tourists and staff towards these constructs, intention to participate in waste-related behaviours could also improve.

16.4 Chapter summary

Despite the growing concern for waste and the importance of responsible waste management in vulnerable areas, little attention has been given to identifying and understanding the factors that affect waste-related behaviours. Towards **Research objective 2**, this study determined which factors have the greatest influence on the behaviour of tourists and staff in Etosha National Park. Through the TPB framework proposed in this study, it was determined that awareness (AW) and perceived moral obligation (PMO) were the dominant determinants of waste management intentions.

In addition to determining which factors influence intention and behaviour, the challenges and opportunities for waste management as perceived by participants were investigated (**Research objective 3**). Tourists identified insufficient services and a lack of information as the greatest challenges towards waste management. Staff also identified a lack of waste services, in addition to a lack of resources and infrastructure as particular challenges. This was confirmed through observations, where a lack of signage, bins, and waste removal vehicles were identified. Opportunities towards improved waste management, from both tourists and staff, included the introduction of information and increase in resources. Specifically, the introduction of waste management brochures/pamphlets, and the inclusion of other waste bin categories, were alluded to.

The findings from this research have important implications for the development and implementation of projects, strategies, or policies aimed at improving waste management in ENP. All respondents had strong intentions to participate in responsible waste management in ENP, although certain challenges were identified that impede these behaviours. Through the use of the TPB, the main constructs that influence intention and behaviour were identified. Designing interventions aimed at improving awareness and moral obligations, will influence their success. Additionally, focussing on the opportunities for improvement that were identified by respondents will ensure that these interventions are based on actual problems within ENP.

Exploring the factors that influence waste-related behaviour from the subjective view of tourists and staff—in addition to the perceived challenges and opportunities—attempts to provide a comprehensive view of the factors affecting waste behaviour in the park. By understanding the psychology behind a complex behaviour such as waste management, areas for improvement and intervention could be identified. Improving waste management in protected areas not only aids the conservation goals of the park but improves the experiences of tourists visiting the park. As the tourism industry accounts for a large portion of Namibia's GDP, it is important to maintain the

flow of tourists in the country. The importance of ENP, as a tourism destination, cannot be understated.

CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS

17.1 Introduction

Understanding the underlying factors related to waste management behaviour of tourists and staff is of great significance to the responsible management of waste in protected areas, such as Etosha National Park, Namibia. The overall aim of the research was to explore solid waste management behaviour in Etosha National Park. Towards this aim, this study used an adapted Theory of Planned Behaviour to determine the factors (constructs) that have the most influence on the behaviour of tourists and staff, with the objective of identifying the challenges and opportunities for improvement.

To achieve the aim, three research objectives were formulated:

- **Research objective 1:** Developing an adapted version of the Theory of Planned Behaviour (TPB) which is suitable towards understanding waste management behaviour within Etosha National Park;
- **Research objective 2:** Applying the adapted TPB framework to determine the underlying factors (constructs) influencing waste behaviour in Etosha National Park; and
- **Research objective 3:** Exploring opportunities and challenges towards waste management in Etosha National Park.

Data was collected from four camps in ENP, namely Okakuejo Camp, Dolomite Camp, Olifantsrus Camp, and Galton Gate during 2023, through questionnaires (with a survey and interview component) and observations. A total of 57 tourists and 18 staff respondents participated in the research.

17.2 Conclusions related to Research objective 1

Complex behaviours, such as waste management practices in protected areas, are influenced by a multitude of factors. To explore these underlying factors, various models and frameworks can be applied. For this research, the Theory of Planned Behaviour (TPB) served as the primary framework. However, it was recognised that the original TPB does not fully address the complexities of responsible waste management in the unique context of protected areas, which are heavily reliant on ecotourism.

Theoretical gaps identified in the literature highlighted that the original TPB does not adequately account for the contextual, cultural, and emotional nuances influencing the intentions and behaviours of individuals (Zhang, 2018). Waste management behaviour, in particular, is strongly shaped by situational and environmental factors. Furthermore, research has suggested that

constructs other than intention might better predict behaviour in certain contexts (Araújo-Soares *et al.*, 2013; Conner *et al.*, 2013). Ajzen (1991) also underscored the need to incorporate additional constructs to enhance the explanatory power of the model. Given these limitations, an adapted TPB framework was developed for this study (**Research objective 1**).

This study adapted the TPB to incorporate constructs identified in both waste-related research and other disciplines. Awareness, situational factors, perceived moral obligation, and perceived policy effectiveness were proposed as additions to the TPB framework to better capture the drivers of waste management behaviour in protected areas.

By extending the TPB, this research aimed to improve its predictive accuracy, accommodating the multifaceted nature of waste-related behaviour. The inclusion of contextual and situational factors, knowledge, morality, and policy influence broadens the applicability of the framework. It was anticipated that this comprehensive approach would enhance the design and implementation of interventions, programs, and policies, ensuring they are more aligned with the specific needs and conditions of protected areas. While the inclusion of additional constructs enhanced the predictive power of the TPB framework, there is a need to caution against overcomplicating models, especially when sample sizes are small. Overcomplicating the model by incorporating too many constructs can dilute its practical utility, increase multi-collinearity issues, and reduce the reliability of results. A balance must be struck between capturing sufficient behavioural complexity and maintaining model parsimony to ensure robust and interpretable outcomes.

17.3 Conclusions related to Research objective 2

Research objective 2 applied the adapted TPB framework to assess the influence of its constructs on waste management behaviour, using data from structured survey questionnaires. A total of 75 responses were collected, comprising 57 tourist respondents and 18 staff respondents. Among the tourists, the majority were female (52.63%) and aged 26–35 (26.32%). International participants formed the majority (54.39%), with 28 participants holding postgraduate degrees (49.12%) and representing a diverse range of occupations. Staff respondents were predominantly male (77.78%), with 38.89% also aged 26–35. Nearly all staff were Namibian (88.89%) and had tertiary education (38.89%). Staff roles within ENP included management, operations, administration, tourism, security, and research.

The analysis of survey responses indicated that both staff and tourists expressed positive alignment (agreeing or strongly agreeing) with self-reported behaviour statements. However, self-reported measures are known to overestimate actual behaviour, as highlighted by Kormos and Gifford (2014) and Tonglet *et al.* (2004). Direct observations in ENP confirmed that waste was not

always responsibly and sustainably managed, illustrating the influence of various factors on behaviour. The adapted TPB framework accounted for these complexities, revealing that both tourists and staff demonstrated strong intentions to manage waste. While intention is a key predictor of behaviour, it is insufficient on its own, as noted by Ajzen (1991) and Sheeran (2002), necessitating the inclusion of additional constructs.

Tourists and staff exhibited positive attitudes toward waste management and acknowledged the importance of managing waste within ENP. However, 52.6% of tourists were unaware of existing waste management initiatives in the park, reflecting findings from Zulfa and Nugraheni (2020) on the importance of awareness in shaping environmental behaviour. Differences emerged in the significance of subjective norms: tourists valued the opinions of their immediate social circle, consistent with the findings of White *et al.* (2019), whereas staff placed greater emphasis on societal expectations. Both groups perceived their control over waste management positively, although situational factors such as time, knowledge, space, and infrastructure also played a role (Tonglet *et al.*, 2004). Notably, tourists held negative perceptions of enforcement and the availability of waste-related information and resources, while staff reported more favourable perspectives. Interviews identified insufficient information and resources as barriers to waste management, similar to barriers reported by Oluleye *et al.* (2022).

From a moral standpoint, respondents agreed on their responsibility to manage waste, not just for themselves but for future generations. This aligns with studies by Schwartz (1977) on moral responsibility and its role in pro-environmental behaviour. However, perceived effectiveness of ENP's waste management policies received the lowest scores across all constructs. Tourists believed that the park did not provide adequate facilities or promote waste management effectively, while staff opinions were more favourable but still moderate. The absence of motivation from effective policies undermines the influence of intention and perceived control (Ajzen, 1991). Statistical analyses revealed significant and practical differences between tourist and staff responses regarding awareness (AW), subjective norms (SN), situational factors (SF), and intention (I).

The analysis of correlations between constructs combined tourist and staff responses due to the small sample size of staff participants. Reliability testing using Cronbach's Alpha revealed low internal consistency for perceived behavioural control (PBC) ($\alpha = 0.434$), leading to its exclusion from further analysis. Pearson's correlation coefficients showed that most TPB constructs were positively associated, except for perceived moral obligation (PMO) and perceived policy effectiveness (PPE), which had a negligible negative correlation ($r = -0.004$). The strongest relationship was between situational factors and perceived policy effectiveness ($r = 0.684$), underscoring the role of policy clarity and infrastructure, as highlighted by Steg and Vlek (2009).

The research demonstrated that the adapted TPB framework provided strong explanatory power for waste management behaviour in ENP. Multiple regression analysis revealed that the framework effectively explained waste management intentions, particularly in relation to awareness and perceived moral obligation. While constructs such as attitude, subjective norms, situational factors, and perceived policy effectiveness did not significantly influence intention, they positively contributed to it. Interestingly, awareness directly influenced behaviour and was a stronger predictor than intention, consistent with findings by Kollmuss and Agyeman (2002).

These findings suggest that future studies investigating waste-related behaviour in protected areas should prioritise awareness and moral obligation. These constructs emerged as significant influences on behaviour, highlighting their importance for targeted interventions. Practical recommendations of how these aspects can be integrated into behavioural interventions towards improving waste management at Etosha National Park is provided in Section 6.5.

Lastly, this research had a small sample size which was not initially anticipated at the inception of this research when the adapted TPB framework was developed. Due to this, an original TPB construct (PBC) had to be removed when determining which variables predict behavioural intentions. As mentioned previously, the incorporation of many additional constructs can overcomplicate the model's predictive ability, especially with a small sample size. Focusing on constructs like awareness, moral obligation, and situational factors ensures interventions remain practical and scalable. Simplified models are easier to implement and evaluate, which is critical in resource-constrained settings (Kollmuss & Agyeman, 2002; Ajzen, 1991).

17.4 Conclusions related to Research objective 3

The perceived challenges and opportunities towards waste management in ENP were addressed in **Research objective 3**. These were derived from the semi-structured interviews and the two open-ended questions at the end of the structured survey questionnaire (Annexure A, Section 4). Themes and patterns were identified and compared to the observations made by the researcher. Challenges were provided by forty tourists and thirteen staff members. Challenges and opportunities were grouped into institutional; technical and operational; and social and cultural challenges. The challenges and opportunities are discussed in a combined manner (according to theme) to demonstrate the interconnected nature of the challenges and opportunities.

Institutional barriers such as insufficient information and inadequate awareness or education were critical constraints to effective waste management. Tourists indicated dissatisfaction with the limited information available about waste-related practices, as reflected in survey responses concerning situational factors. Observations revealed sparse signage, primarily prohibiting

littering and the use of plastic bags, but lacking guidance on sustainable waste practices. This aligns with findings from Kianpour *et al.* (2017), which highlight that providing accessible and context-specific information enhances knowledge and positively influences environmental intentions. Similarly, Schwartz (1977) notes that knowledge plays a pivotal role in cultivating long-term environmentally conscious behaviour. Staff awareness emerged as another gap, with tourists suggesting that sustainable practices like recycling are culturally ingrained in certain regions but are less familiar to ENP staff due to limited training. Respondents suggested that addressing this gap through structured educational initiatives could create a more informed and proactive workforce, contributing to long-term behavioural change (White *et al.*, 2019).

Resource and infrastructure inadequacies were consistently highlighted as *technical and operational* barriers. Tourists and staff alike noted insufficient waste separation bins, with tourists specifically identifying the absence of dedicated paper and cardboard bins - categories that comprise a significant portion of Namibia's waste stream and possess recycling potential (MCC, 2014). Waste collection inefficiencies, attributed to an insufficient fleet of operational vehicles, further compounded the issue. Irregular waste collection, especially in picnic areas and staff villages, led to widespread litter accumulation, reflecting similar challenges observed in protected areas globally (Oluleye *et al.*, 2022). Opportunities for improvement mentioned by respondents included increasing bin availability and frequency of waste collection, as well as providing bins tailored to specific recyclable categories. While composting was suggested as a potential strategy, it must be implemented cautiously to mitigate wildlife-related risks, as highlighted in studies on human-wildlife conflict in conservation settings (Steg & Vlek, 2009). Respondents indicated that addressing these issues requires significant investment in transport and disposal logistics to enhance operational efficiency and sustainability.

Socio-cultural challenges and opportunities were mostly related to attitude and changing behaviour. Although most respondents reported positive attitudes toward waste management, some noted a persistent indifference among certain individuals. This dichotomy is consistent with findings by Kollmuss and Agyeman (2002), which suggest that attitudes alone may not translate into consistent behaviour without supportive external factors. Observations in ENP revealed littering and insufficient waste separation in tourist and staff areas, partially due to limited bin availability and unclear guidelines. Staff villages, in particular, exhibited widespread litter, pointing to structural and cultural challenges. To address this, it was suggested that educational programmes targeting staff could play a transformative role. Training initiatives tailored to permanent MEFT and rotational NWR staff were suggested as being crucial for ensuring consistent and sustainable practices, as emphasised by Tonglet *et al.* (2004). Additionally,

creating specialised waste management roles, such as an environmental officer, could improve accountability and foster a culture of sustainability.

By addressing these institutional, technical, and socio-cultural challenges, ENP can leverage opportunities to develop a robust waste management strategy. Interventions must be context-specific, resource-supported, and integrated into broader environmental management goals to achieve long-term behaviour change and sustainability. Practically, this means that waste management interventions at ENP should be designed with a clear understanding of the unique challenges identified in the park. For example, providing more targeted waste-related information through signage and educational materials will help raise awareness, especially among tourists and staff with limited knowledge. Investments in infrastructure, such as additional waste bins and an improved fleet for regular collection, will support operational efficiency. Furthermore, addressing the socio-cultural aspects of waste behaviour, like training staff and engaging tourists in proactive waste management practices, can help ensure long-term, sustainable behaviour changes. These interventions should be aligned with ENP's broader environmental goals, ensuring that waste management becomes an integral part of its conservation and sustainability efforts. Recommendations for behavioural interventions towards improving waste management in ENP are provided in Section 6.5.

17.5 Recommendations regarding behavioural interventions towards improving waste management in Etosha National Park

The findings of the research provide practical insights into developing waste-related interventions or programmes aimed at changing behaviour in protected areas like ENP. A key outcome was the significant role of awareness in directly influencing waste-related behaviour. This highlights the critical importance of prioritising educational efforts that increase awareness about waste management initiatives. Awareness campaigns should utilise clear messaging, signage, and educational materials to inform park users about proper waste disposal practices and the ecological implications of improper waste management. Research has shown that increasing environmental awareness can have a profound effect on pro-environmental behaviour (Kollmuss & Agyeman, 2002).

The strong influence of perceived moral obligation suggests that interventions should emphasise the ethical and moral dimensions of waste management. Messaging that highlights individual responsibility and frames waste management as an act of stewardship for future generations can resonate emotionally and inspire action. Schwartz (1977) noted that moral responsibility is a strong driver of pro-environmental behaviours, while White *et al.* (2019) emphasised the importance of appealing to personal values and social norms in behaviour change strategies.

Incorporating these elements into programs can foster a sense of accountability among both tourists and staff.

While situational factors, such as time, knowledge, space, and infrastructure, were generally perceived favourably, qualitative insights revealed gaps in enforcement, information dissemination, and resource provision. Addressing these barriers requires practical interventions, such as enhancing waste disposal infrastructure, providing clear and accessible waste management resources, and improving enforcement mechanisms. Effective infrastructure and situational support have been identified as crucial for waste management success in similar studies (Tonglet *et al.*, 2004; Oluleye *et al.*, 2022). Additionally, enforcement policies must be paired with adequate communication to ensure that stakeholders understand the rationale behind the rules and feel supported in complying with them.

The low scores for perceived policy effectiveness indicate a need to strengthen waste management policies and their implementation. Interventions should focus on making policies more visible and impactful through consistent enforcement, community involvement, and regular feedback loops. Steg and Vlek (2009) highlighted that policies perceived as effective and fair increase compliance and improve behavioural outcomes. Moreover, the alignment of policies with infrastructural and educational support can address concerns related to inadequate facilities and insufficient promotion of waste management.

The study also revealed differences between tourists and staff regarding subjective norms, which suggests the importance of tailoring interventions to specific audiences. For tourists, interventions might leverage the influence of their immediate social groups, such as family or friends, through collective challenges or group-oriented waste management activities. Staff interventions could align more with broader societal expectations, fostering a culture of collective accountability and environmental responsibility within their roles in the park. Such segmentation aligns with findings from White *et al.* (2019) on the varying influences of social norms in shaping behaviour.

In conclusion, these findings underscore the importance of designing waste-related interventions that are contextually relevant, targeted, and practical. By focusing on awareness, moral obligation, and situational support while ensuring policy clarity and infrastructure improvements, interventions can effectively drive behavioural change and promote sustainable waste management practices in ENP and other protected areas.

17.6 Recommendations for future research

This research contributes to the literature on waste-related behaviour by examining the waste management practices of tourists and staff in ENP, an area with limited behavioural research,

especially within Southern Africa. The study applied an adapted version of the TPB tailored to the unique context of a protected area with intensive ecotourism activities. Despite its contributions, the study faced limitations that provide opportunities for future research.

Data collection was restricted to four camps (Okakuejo, Dolomite, Olifantsrus, and Galton Gate). Future studies should aim to include all camps, including Namutoni, Halali, and Onkoshi, to provide a more comprehensive review of waste management in ENP. Due to time and safety constraints, including these additional camps was not feasible for this study. Data was gathered by only two researchers, limiting the number of participants approached. Increasing the research team would allow for a larger sample size, enabling more robust statistical analyses and enhancing the validity of findings. In addition, involving a local researcher could improve staff participation rates, as access to staff was a significant limitation in this study, which also influenced the choice of analysis techniques.

This research serves as a valuable baseline for future studies on waste-related behaviour in other protected and vulnerable areas. Given the complexity and context-specific nature of waste-related behaviour, future adaptations of the TPB may be needed. A deeper exploration of the influence of awareness and perceived moral obligation on behavioural intentions in conservation contexts is necessary. Policies and interventions could then be designed to target the key factors influencing behaviour while considering the perceived challenges and opportunities for improvement within these settings.

Based on the limitations and findings of this study, several avenues for future research could be explored:

- **Comparative studies across different protected areas:** Research could compare waste management behaviour across various protected areas in Namibia or Southern Africa to identify common trends and contextual differences.
- **Inclusion of additional TPB constructs:** Future studies could explore other potential constructs, such as environmental awareness or personal norms or habits, and assess how these impact waste management behaviour. Caution must, however, be taken not to overcomplicate the model, especially for small sample sizes.
- **Longitudinal studies:** Exploring and tracking changes in behaviour over time, especially before and after the implementation of specific interventions, would provide valuable insights into the long-term effectiveness of waste management programmes and initiatives.

- **Focus on staff behaviour:** Further research could specifically target staff behaviour, especially regarding training and awareness programmes, to assess how these influence their waste management practices.
- **Barriers to effective waste management:** Exploring the institutional and infrastructural barriers more deeply could inform strategies to overcome challenges related to waste collection and disposal, particularly in remote areas.
- **Waste management policies:** Research could focus on evaluating the effectiveness of existing waste management policies within protected areas and suggest improvements based on behavioural insights.

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ANNEXURE A –QUESTIONNAIRE

SECTION 1 – BACKGROUND TO THE STUDY

Background to the project:	
You are invited to participate in a research study conducted by Carrigan Harper, under the supervision of Prof. Claudine Roos (North-West University – South Africa), Dr. Reece Alberts (North-West University – South Africa), and Prof. Morgan Hauptfleisch (Namibian University of Science and Technology). This study is entitled “Exploring Solid Waste Management Behaviour in Etosha National Park, Namibia” and aims to explore the underlying factors influencing waste management behaviour in ENP. You were purposively selected as a possible participant in this study because of your proximity to ENP. The research will form part of a doctoral thesis which will be submitted for the degree PhD in Science with Geography and Environmental Management at the North-West University, South Africa.	
This project has been approved by the Faculty of Natural and Agricultural Sciences (FNAS) Ethics Committee (Ethics Number: NWU-01470-22-A9). The survey will take you approximately 10 minutes to complete. Your participation is completely voluntary and anonymous. You may choose to withdraw your consent at any time. The records from this study will be kept as confidential as possible. No individual identities will be used in any reports or publications resulting from the study. All transcripts will be given codes (e.g. Participant 1) and stored separately from any names or other direct identification of participants. The information obtained through the survey will be used exclusively for this study and for no other purpose.	
Thank you for your participation in this study. For any queries, please feel free to contact carriganharper162@gmail.com or claudine.roos@nwu.ac.za.	
By completing this questionnaire, you declare that you are fully informed of the purpose of this study and give permission for the data to be used for research purposes without identifying you as an individual.	
☐	I consent

SECTION 2 - SOCIO-DEMOGRAPHIC INFORMATION

Please indicate your age	
18-25	
26-35	
36-45	
46-55	
56-65	
Older than 65	
Please indicate your gender	
Male	
Female	
Non-binary	
Other	
Prefer not to say	
Please indicate your nationality	
Namibian	
SADC (Southern African)	
African	
International	
Please indicate your highest level of education	
No formal education	
Primary education	
Secondary education	
Tertiary education	
Postgraduate education	
Please state your occupation:	

SECTION 3 – THEORY OF PLANNED BEHAVIOUR CONTRACTS

Code	Statements	Reference
Behaviour/practice statements		
B1	I regularly manage my waste in a responsible manner when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B2	I always attempt to reduce the amount of waste I produce when visiting/at the staff village in ENP	Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
B3	I often separate my waste when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B4	I often dispose waste in the appropriate recycling bins when visiting/at the staff village in ENP	Ghani <i>et al.</i> 2013; Nomura <i>et al.</i> , 2017; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B5	I always attempt to store my waste in an environmentally friendly manner when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B6	I always attempt to avoid littering when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Mak, 2018; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
B7	I have a high involvement in responsible waste management activities when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Wang <i>et al.</i> 2020
Awareness statements		
AW1	I am aware of how to avoid the generation of waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW2	I am aware of how to reduce my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW3	I am aware of the option to re-use my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW4	I am aware of how to recycle my waste when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW5	I am aware of how to dispose of my waste responsibly when visiting/at the staff village in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020
AW6	I am aware of waste management initiatives in ENP	Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Wang <i>et al.</i> 2020

Code	Statements	Reference
Attitude statements		
A1	Responsible waste management is a pleasant experience when visiting/at the staff village in ENP	Ioannou <i>et al.</i> 2013; Si <i>et al.</i> 2020; Wang <i>et al.</i> 2020
A2	Responsible waste management is a useful practice when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Ioannou <i>et al.</i> 2013; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017
A3	Responsible waste management is beneficial to the environment	Ioannou <i>et al.</i> 2013; Razali <i>et al.</i> 2020
A4	My feelings towards waste management are favourable	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Ioannou <i>et al.</i> 2013
A5	Responsible waste management would create a clean environment	Issock, 2020; Razali <i>et al.</i> 2020; Yadav & Pathak, 2017; Xu <i>et al.</i> 2017
A6	Responsible waste management aids in environmental protection and conservation of resources in ENP	Issock, 2020; Razali <i>et al.</i> 2020
A7	Responsible waste management should be promoted in ENP	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Nomura, 2017
Subjective norm statements		
SN1	My family thinks I should manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN2	My friends think I should manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN3	My colleagues think I should manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN4	My supervisor/manager expects me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SN5	The community surrounding ENP expects me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013

Code	Statements	Reference
SN6	ENP's staff expect me to manage my waste responsibly when visiting/at the staff village in ENP	Alhassan <i>et al.</i> , 2018; Issock, 2020; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Strydom, 2018; Ghani <i>et al.</i> 2013
Perceived behavioural control statements		
PBC1	The decision to manage my waste responsibly is completely up to me when visiting/at the staff village in ENP	Mak, 2018; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Si <i>et al.</i> 2020
PBC2	Responsible waste management is an easy task when visiting/at the staff village in ENP	Nomura <i>et al.</i> , 2017; Razali <i>et al.</i> 2020; Stoeva & Alriksson, 2017; Tonglet <i>et al.</i> 2004; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
PBC3	If I wanted to, I could manage my waste responsibly when visiting/at the staff village in ENP	Mak, 2018; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018
Situational factor statements		
SF1	Responsible waste management is possible because there is sufficient space available in ENP	Ioannou <i>et al.</i> 2013; Nomura <i>et al.</i> , 2017; Mak, 2018; Stoeva & Alriksson, 2017; Ghani <i>et al.</i> 2013
SF2	Responsible waste management is possible in ENP because I have enough time	Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Ioannou <i>et al.</i> 2013
SF3	Responsible waste management is possible in ENP because I have adequate knowledge	Ghani <i>et al.</i> 2013
SF4	Responsible waste management is possible in ENP because waste management is enforced	Ghani <i>et al.</i> 2013
SF5	Responsible waste management is possible in ENP because there is enough infrastructure (bins)	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Issock, 2020; Stoeva & Alriksson, 2017
SF6	Responsible waste management is possible in ENP because there is adequate information	Alhassan <i>et al.</i> , 2018; Heidari <i>et al.</i> 2018; Issock, 2020; Stoeva & Alriksson, 2017
SF7	Responsible waste management is possible in ENP because there are adequate resources	Alhassan <i>et al.</i> , 2018; Issock, 2020; Stoeva & Alriksson, 2017
Intention statements		
I1	I intend to manage my waste responsibly when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a

Code	Statements	Reference
I2	I intend to reduce the amount of waste I produce when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I3	I intend to re-use waste that I have generated where possible when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I4	I intend to separate my waste for recycling purposes when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I5	I intend to dispose of my waste in a responsible manner when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I6	I intend to stop littering when visiting/at the staff village in ENP	Chen & Tung, 2010; Ghani <i>et al.</i> 2013; Heidari <i>et al.</i> 2018; Wan <i>et al.</i> 2014a
I7	I intend to participate in ENP's waste management programmes (if any)	Wan <i>et al.</i> 2014a
Perceived moral obligation statements		
PMO1	I have a moral obligation to manage my waste responsibly when visiting/at the staff village in ENP	Chen & Tung, 2010; Heidari <i>et al.</i> 2018; Xu <i>et al.</i> 2017
PMO2	I have an obligation to future generations to manage my waste responsibly when visiting/at the staff village in ENP	Ioannou <i>et al.</i> 2013
PMO3	I think that it is my duty to manage my waste responsibly when visiting/at the staff village in ENP	Heidari <i>et al.</i> 2018; Si <i>et al.</i> 2020; Xu <i>et al.</i> 2017
PMO4	I would feel guilty if I didn't manage my waste responsibly when visiting/at the staff village in ENP	Heidari <i>et al.</i> , 2018; Razali <i>et al.</i> 2020; Si <i>et al.</i> 2020;
Perceived policy effectiveness statements		
PPE1	The waste management facilities provided by ENP are sufficient	Wan <i>et al.</i> 2014a; Xu <i>et al.</i> 2017
PPE2	ENP promotes responsible waste management and its benefits	Wan <i>et al.</i> 2014a; Xu <i>et al.</i> 2017
PPE3	In terms of responsible waste management, I would recommend ENP to others	Chuang <i>et al.</i> 2018

SECTION 4 - SEMI-STRUCTURED INTERVIEW QUESTIONS

Please state any barriers or challenges to waste management seen or experienced in Etosha National Park:

Please state any opportunities for waste management that can be implemented at Etosha National Park: