

**The factors influencing consumers' e-waste recycling intention:
A cross-generational study**

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Abstract

Electronic waste (e-waste) is a real-world problem and is being generated at an alarming pace; its generation is projected to outpace solid waste. Electronic devices are becoming more accessible, and new technologies are emerging rapidly, increasing consumer consumption. This increased consumption is leading to a surge in the generation of e-waste. Consumer disposal methods are primarily unsustainable, which poses a significant risk to human health and the environment, threatening resource conservation due to the hazardous nature of e-waste.

This research aimed to determine the factors influencing consumer e-waste recycling intentions across generational cohorts. Intentions drive behaviours and represent the motivation to engage in specific behaviours, making it crucial to understand the factors influencing consumers' e-waste recycling intentions and how intentions differ across generations. The Theory of Planned Behaviour theoretically anchored this study, and the research questions and hypotheses were formulated based on the expanded Theory of Planned Behaviour, which directed the study in terms of data gathering and data analysis.

To address the research problem/question, this study adopted a quantitative mono-method approach aligned with previous studies investigating similar quantitative relationships. A non-probability sampling technique was used, and the final data collected and analysed was based on 252 valid respondents.

The study's results revealed that environmental attitude, subjective norms and awareness of consequences were major influences on consumers' e-waste recycling intention. In contrast, marketing campaigns and consumer recycling confidence did not influence consumers' e-waste recycling intentions. Substantial differences were found among the generational cohorts regarding their e-waste recycling intention. Baby Boomers had a relatively higher inclination to recycle e-waste.

Keywords

Keywords: E-waste recycling, Intention, Generational cohorts, Consumer Behaviour

Declaration

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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Chapter 1: INTRODUCTION AND RESEARCH PROBLEM

The background and context are carefully considered in chapter one, and the waste spectrum is discussed. The issue of waste is emphasised, and the problem is contextualised and examined from consumer and organisational perspectives. Leveraging evidence from existing literature, the research questions are outlined and based on the prevailing societal problem. The scope and purpose are presented, concluding the study's relevance from theoretical and business perspectives.

1.1 Background and Context: The Global Dilemma of Waste Management

Waste remains one of the most urgent environmental challenges globally. Waste is defined as “objects or substances that are disposed of, intended to be disposed of, or require disposal under national law” (Letcher & Vallero, 2019, p.9). Discarded objects or substances are still considered waste, even if they can be reused or recycled. The waste spectrum is generally complex and large in scope. It is categorised in several ways, including material and product types, such as plastic, food, electrical, and electronic waste (e-waste) (United Nations Environmental Programme [UNEP], 2024). It can also be categorised by its source, such as municipal solid waste (MSW) generated within households, retailers, and small businesses (UNEP,2024). Waste management and generation are integral to the waste problem driven by economic activity, consumption, industrial production, construction and demolition (Kaza et al., 2018).

Waste continues to be generated globally at an alarming pace, with projections estimating it will reach 3.4 billion tonnes by 2025 (Omotayo, 2024). This escalation in waste generation highlights the urgency for effective waste management practices. Waste management involves collecting, treating, and disposing waste through composting, incineration, landfilling, dumping, and recycling (Letcher & Vallero, 2019). This study will focus on recycling as a form of waste management.

The waste management phenomenon is an old and enduring pursuit, and the literature links it to growing economies, increasing populations, excessive consumption,

industrialisation and urbanisation (Letcher & Vallerio, 2019; Kaza et al., 2018). As economies develop and grow from low to higher income levels, their consumption increases, exacerbating the difficulties associated with waste management (Kaza et al., 2018). The complexity of ensuring that economies are growing and environmental sustainability has led to sustainable development, which promotes balancing the two (Purvis et al., 2019). Despite the efforts to delink economic growth from the harmful environmental impact, the waste issue has become increasingly difficult to resolve, demonstrating the urgency for sustainable solutions.

1.2 The connection to the Sustainable Development Goals (SDGs)

Waste management presents a complex societal problem. As such, the severity of its impact has led global leaders from both developing and developed nations to adopt the Sustainable Development Goals (SDGs), recognising the urgency for sustainable solutions (United Nations [UN], 2015). The SDGs emphasise the urgency of sustainable waste management practices, highlighting strategies that promote sustainable development and consumption (UN, 2015). The SDGs focus on waste management through various goals. Responsible Consumption and Production (SDG 12) relates to waste management as it focuses on the fundamental elements of waste: consumption patterns and production (UN, 2015). Additionally, improper waste management harms Life Below Water (SDG 14) and accelerates climate change (SDG 13) (Ghafari, n.d.; Macklin et al., 2023). However, waste management can be linked to all the SDGs, such as SDG 2 (Zero Hunger), which states that effective waste management practices reduce food waste generation. In addition, waste management also intersects with SDG 6 (Clean Water and Sanitation), as poor waste management leads to water contamination (Omotaya, 2024; UNEP, 2024). This study will focus on SDG 12.5, which concentrates on sustainably reducing waste, and SDG 12.4.2, which addresses hazardous waste generation and disposal.

E-waste is inherently hazardous and refers to discarded equipment that requires electronic fields or electrical currents to function (Gilal et al., 2022). It includes discarded electronic and electrical devices, like consumer electronics, which contain harmful toxins that threaten resource conservation (World Health Organisation [WHO], 2023). Thus, effectively managing the emerging e-waste problem is essential for promoting sustainability and meeting the SDG objectives.

1.3 The Emerging Problem of E-Waste

Electronic devices have become integral to people's daily lives worldwide, driving economic, technological and social progress (Yadav et al., 2022). It has contributed immensely to economic development, e-commerce, education and health. However, as new technologies rapidly emerge, the availability and use of electronic devices are increasing, leading to a surge in e-waste (Yadav et al., 2022). Global spending on electronics is estimated to grow by 7% to 5 trillion U.S. dollars in 2024 (Federica, 2024). This demand is fuelled by the increasing demand for innovative technologies, technological advancements, and the need for more efficient devices, further exacerbating the problem (Federica, 2024).

Electronic devices that break or become obsolete are generally discarded or thrown away, producing tonnes of e-waste proliferating in households and businesses globally (Yadav et al., 2022). The alarming rate at which e-waste is generated emphasises the challenge; it has reached 62 million tonnes in 2022, with further growth projections (United Nations Institute for Training and Research [UNITAR], n.d.). It is projected to increase by 32% by 2030; this alarming projection highlights the importance and urgency of the problem (UNITAR, n.d). Despite efforts to improve e-waste management, approximately 23% or 14 million tonnes end up in landfills, emphasising the growing gap between effective generation and management practices (Forti et al., 2020). Improper e-waste disposal contaminates ecological components such as water, soil, and air due to substances such as lithium and lead typically found in e-waste (Patil & Ramakrishna, 2020).

E-waste can be processed through formal or informal recycling systems, where formal systems require sophisticated equipment to recover valuable materials efficiently (Tran et al., 2024). Recycling infrastructure in developing countries is either absent or underdeveloped, relying on informal recycling systems where e-waste is improperly handled through open incineration, which releases harmful greenhouse gases (Forti et al., 2020). This exposes workers to hazardous materials, leading to health risks, environmental degradation, and threats to resource conservation (Tran et al., 2024). Electronic devices have short lifecycles, few repair options and low recycling rates, which exacerbates the generation of e-waste fuelled by consumers' widespread use (Yadav et al., 2022). For this study, electronic devices include mobile phones, tablets, laptops, and smartwatches powered by wireless networks and characterised by their ability to enable

communication (Awati & Pratt, n.d.). The growth of e-waste calls for increased consumer participation and a greater understanding of consumer behaviours (Islam et al., 2021).

1.4 The Problem in The Consumer Context

While original equipment manufacturers (OEMs), large organisations, and corporations play vital roles in the e-waste dilemma, consumer actions and recycling behaviours are central to the problem. Consumer purchase decisions, consumption levels, and disposal methods directly impact environmental sustainability (Trudel, 2019).

The lifespan of electronic devices is predicted to increase from twenty-four to thirty-three months, allowing consumers to keep their devices longer (Cheng et al., 2022). However, this may have little effect on how long consumers keep their devices. Many consumers replace their devices prematurely, before the end of their lifecycle, due to device malfunction, technology advancements or theft (Phulwani et al., 2021). Consequently, devices are discarded in unsustainable ways, which include hoarding, storing in homes, trade-in or dumping, resulting in hazardous materials polluting the environment (WHO, 2023).

Managing e-waste is becoming a pressing global problem as e-waste outpaces solid waste (Newaz & Appolloni, 2024). Understanding what influences consumers' e-waste recycling behaviour across different generational cohorts is vital for addressing the problem.

1.5 Research Questions

Based on existing evidence from the literature that identifies e-waste as a pressing problem requiring urgent attention, the following research questions are presented:

What major influences drive consumers' e-waste disposal intention, and how do e-waste recycling intentions differ across generational cohorts?

The following sub-questions were formulated and constructed based on the Theory of Planned Behaviour (TPB) (Ajzen, 1991). The model was expanded based on existing literature (Vijayan et al., 2023; Aboelmaged, 2021; Koshta et al., 2022; Zhang et al.,

2019; Laeeyuddin et al. 2022; Sujata et al., 2019; Khan et al., 2019; Kumar, 2019), which will direct this study:

- 1.1 How do consumers' attitude towards recycling influence their intention to recycle e-waste sustainably?
- 1.2 How does environmental concern influence consumers' intention to recycle e-waste sustainably?
- 1.3 How do subjective norms influence consumers' intention to recycle e-waste sustainably?
- 1.4 How does perceived behavioural control influence consumers' intention to recycle e-waste sustainably?
- 1.5 How does access to recycling facilities influence consumers' intention to recycle e-waste sustainably?
- 1.6 How do marketing campaigns influence consumers' intention to recycle e-waste sustainably?
- 1.7 How does awareness of the consequences of e-waste disposal influence consumers' intention to sustainably recycle e-waste?
- 1.8 How do generational cohorts differ regarding attitude, environmental concern, subjective norms, perceived behavioural control, access to recycling facilities, marketing campaigns, awareness of consequences, and e-waste recycling intention?

1.6 Purpose of the research

The rate at which e-waste is growing warrants the urgent call for a deepened understanding, particularly in behavioural research, as the concept is an emerging one (Phulwani et al., 2021). Intentions are vital drivers of behaviours and represent the motivations to engage in behaviours; thus, understanding the factors influencing them is critical (Ajzen, 1991; Aboelmaged, 2021; Lou et al., 2022). While significant research on waste recycling has been conducted over the last decade, it has primarily focused on generating and managing municipal solid waste (Yadav et al., 2022).

The primary objective of this research is to answer the overarching research question: What major influences drive consumers' e-waste disposal intention, and how does it differ across generational cohorts?

Studies that use generational cohorts as variables are typically conducted in the context of organisational behaviours to understand different workplace attitudes, styles, and preferences (Rudolph et al., 2021). Generational cohort studies are also used in the broad and general context of responsible consumption, sustainable purchase behaviour, green behaviour, or pro-environmental behaviour (Casalegno et al., 2022). E-waste behavioural research has predominantly focused on households or two generational cohorts, Millennials and Generation Z, indicating gaps in the existing literature (Ivanova et al., 2019; Newaz & Appolloni, 2024; Vijayan et al., 2023). These identified gaps are addressed in this research for broader knowledge about e-waste recycling behaviours among various generational cohorts. Furthermore, through the expanded TPB leveraging existing literature, the research examines the predictability of attitudes, environmental concerns, subjective norms, perceived behavioural control, access to recycling facilities, marketing campaigns, and awareness of consequences on recycling intentions across different generational groups. The study offers insight into how these factors influence and shape e-waste recycling intentions.

1.7 Scope of The Study

Age is a frequent variable used in sustainable consumption research; however, generational cohorts capture age variations and variations in behaviours and values (Ham et al., 2022). Four generational cohorts, Baby Boomers (Boomers), Generation X (Gen X), Generation Y (Millennials) and Generation Z (Gen Z), are the focal points of this study. Meanwhile, generational cohorts vary in their demarcations in the literature, and the country-specific context plays an influential role (Ivanova et al., 2019). Defining generational cohorts by birth year provides insights into e-waste recycling behaviours across varying demographics. This study uses the widely adopted Pew Research Center classifications to determine the cohorts according to birth year: “Boomers (1946-1964), Gen X (1965-1980), Millennials (1981-1996) and Gen Z (1996-2012)” (Dimock, 2019, The generations defined section).

Conducted in South Africa, this study targets consumers across all provinces. It explores the recycling intentions of consumers who use or have owned one or more electronic devices and have previously replaced or disposed of them. It expands the TPB by incorporating additional factors, including access to recycling facilities, marketing campaigns, environmental concern, and awareness of e-waste consequences, providing

insights for policymakers, the business environment, and researchers on promoting and encouraging sustainable e-waste behaviours.

1.8 Significance of The Study

1.8.1 Business relevance

Manufacturing businesses are vital stakeholders contributing to the e-waste problem, relying on linear business models that do not consider the complete life cycle of electronic devices (Parajuly et al., 2019). Similarly, electronic devices are designed with little to no consideration for their environmental impact at the end of their lifecycle (Parajuly et al., 2019). The study's findings are relevant for manufacturers because the study aids in understanding what influences recycling intention across generational cohorts; thus, electronic devices can be designed to reduce the replacement frequency, enabling repairs instead of disposal. Insights from the study are vital in the initial product design and packaging phase, informing elements such as product manuals with repair instructions, packaging promoting e-waste recycling, and information on the availability of repair services and recycling centres (Islam et al., 2021). Manufacturers, retailers, and resellers can incorporate circular economy practices to address the e-waste problem as they encourage reuse, repair, and refurbishment (Islam et al., 2021). This may include implementing recycling and trade-in programmes, where customers are incentivised to return unused and unwanted devices. Businesses can benefit from reselling used devices as refurbished products, which increases alternative revenue streams and attracts new customer segments who cannot afford new devices. Retailers can also contribute to sustainable waste management practices through implementing buy-back or leasing models, encouraging customers to return unwanted devices.

E-waste recycling companies/recyclers are also vital stakeholders as they collect unwanted electronic devices (Esenduran et al., 2019). With insights from this study's findings, these companies stand to enhance drop-off or collection methods for unwanted electronics. Insights into the factors that affect the different generational cohorts can also be leveraged to customise services to increase the responsiveness among the respective cohorts.

Marketers traditionally influence consumer behaviour by encouraging increased usage, acquisition and upgrades to the latest electronic devices (White et al., 2019). Since marketing influence on sustainable behaviours is interlinked, marketing initiatives can be directed to influence consumption behaviours to be more sustainable (White et al., 2019). The insights and discoveries from this study are relevant for marketing and advertising specialists. Gaining insights into factors such as awareness of consequences, attitudes, or subjective norms across generational cohorts in South Africa can be used to tailor marketing strategies and awareness campaigns that appeal to the different generational cohorts. Moreover, target audiences can be segmented to ensure relevant communication strategies through segment-relevant marketing mediums such as social media and digital marketing to target younger cohorts or traditional marketing mediums that may appeal more to the older cohorts.

Furthermore, marketing professionals can also leverage technology platforms such as mobile applications to drive e-waste behavioural change by educating consumers about which electronic devices to recycle and providing information about e-waste recycling facilities (Islam et al., 2021).

Regulations and legislation are crucial avenues in defining what constitutes e-waste, how it should be regulated, the stakeholders' responsibilities in the lifecycle of devices, and clarity regarding the consequences of violations (Aboelmaged, 2021). Policy and decision-makers, specifically at a local or national government level, can gain vital insights from the study to inform effective e-waste management policies and regulations. Since the study considers consumers across South Africa, by identifying factors that hinder e-waste recycling, policy and decision-makers can design interventions at a provincial level to drive sustainable recycling behaviours across the country. Government officials at both national and local levels can utilise the insights and findings from this study to create frameworks and policies that address the varied needs of consumers.

1.8.2 Theoretical relevance of the study

Research on e-waste recycling behaviour is limited, particularly in studying multiple generational cohorts in South Africa. This study seeks to contribute to waste management and consumer behaviour literature. Research on e-waste disposal has mainly taken place in Western and Eastern regions, such as China, India, the United States, and several European nations (Yadav et al., 2022). This study focuses on a South African consumer context, offering a more nuanced perspective than international studies regarding consumer e-waste recycling intention.

The literature asserts that integrating several theories in a study enhances knowledge of the studied area (Aboelmaged, 2021). The TPB is a foundational theory to this study and is expanded for a deeper exploration of e-waste recycling intention across multiple generations (Casalegno et al., 2022). The study's findings support future sustainability, environmental and consumer behaviour research.

1.9 Conclusion

The e-waste problem persists, with detrimental environmental consequences. Consumer behaviour is central to the problem; thus, the study responds to the call for a longer-term solution by understanding factors influencing consumers' recycling intention. Understanding the factors influencing e-waste recycling intention benefits all businesses, governments, societies, and academic stakeholders. The subsequent chapters will build on this foundation by reviewing related literature, hypothesising based on the extended TBP model, and outlining the research methodology.

Chapter 2: LITERATURE REVIEW

2.1 Introduction

An exploration of the constructs that informed the research questions and hypotheses is discussed in this chapter. The chapter comprehensively reviews the literature covering additional determinants: environmental concern, access to facilities, marketing campaigns and awareness of consequences. It concludes with a detailed discussion of the different generational cohorts and their distinct backgrounds and a review of their behaviours regarding sustainable behaviours through a South African lens.

2.2 Theoretical Anchor: Theory of Planned Behaviour

Explaining human behaviour is challenging due to its complex and multifaceted nature (Ajzen, 1991). With deep roots in psychology and sociology, human behaviour studies are vital for comprehending consumer interactions with the environment as these behaviours inform and influence actions (Ajzen, 1991; Lou et al., 2022). Consumer behaviour was fundamental to this study, as e-waste results directly from human activities and actions (Macklin et al., 2023).

Behavioural studies on waste management utilise various theoretical models to explain the phenomena of waste behaviours, which extend to the specific behaviours of e-waste disposal (Yadav et al., 2022). Many theories have been applied, argued, and deliberated. For instance, Dhir et al.; 2021 employed the Behavioural Reasoning Theory (BRT) to understand the influence on consumers' reasons for and against intentions. Through a single decision-making model, the authors concluded that the BRT helps evaluate the factors influencing sustainable behaviour (Dhir et al., 2021). Laeequddin et al. (2022) leveraged The Theory of Reasoned Action (TRA) to investigate safe e-waste, which factors influence the safe disposal of electronics (Laequddin et al., 2022). Other theories and models leveraged in e-waste disposal research include the TPB, Goal-framing theory, Norm-activation theory, System simulation model and Technology acceptance model (Gilal et al., 2022). While this does not represent an exhaustive list of

theories used in e-waste recycling literature, the TPB is frequently used in studies on e-waste intention and behaviour, followed by the TRA (Gilal et al., 2022).

Icek Ajzen developed the TPB model to contextually explain behaviour, which assumes motivational factors capture consumer intentions and strong intentions elevate the probability of participating in the behaviour (Ajzen, 1991). See the graphic depiction below (Ajzen, 1991).

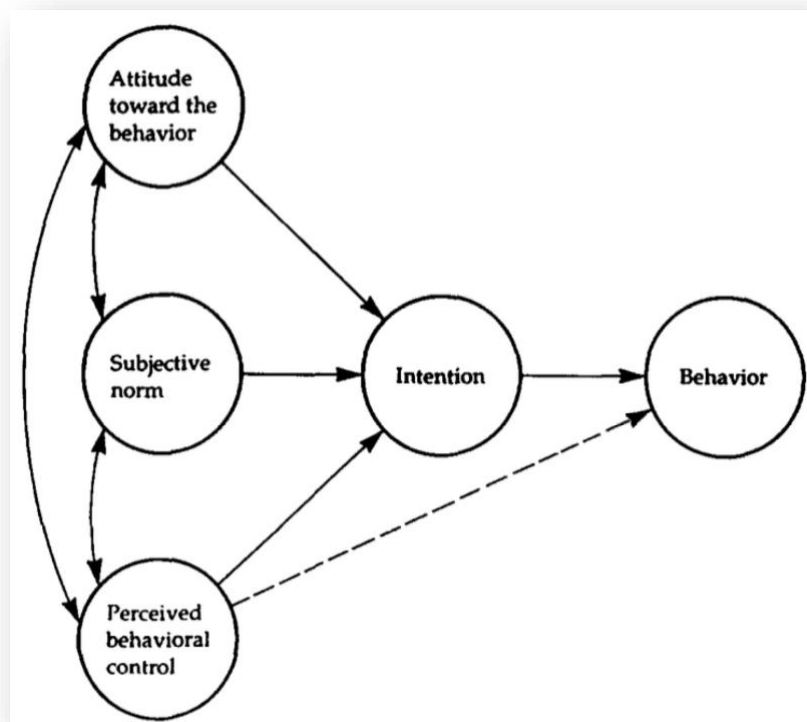


Figure 1: The Theory of planned behaviour (Ajzen, 1991)

Attitude is the consumer's overall evaluation of engaging in a behaviour (Vijayan et al., 2023). These evaluations can be either positive or negative (Vijayan et al., 2023). It consists of three dimensions: cognitive (knowledge about the issue), affective (emotional connection to it), and conative (likelihood of acting) (Michael et al., 2024).

Subjective norms are the perceived social pressures experienced by individuals to engage in specific behaviours; these pressures can be from social reference groups such as family or friends (Aboelimged, 2021).

Perceived behavioural control captures how capable consumers perceive they are to engage in the behaviour, and the perception could be that it is challenging or effortless to engage in the behaviour (Aboelmaged, 2021). When consumers have a positive attitude, face favourable social pressures, and hold a strong sense of control, this strengthens the link between intention and behaviour (Bosnjak et al., 2020).

Despite being widely utilised, the literature notes multiple limitations regarding the TPB. Extrapolating results in TPB studies is often challenging because questionnaires are specified and tailored to a specific population (Yuriev et al., 2020). The most noted criticism of the model in the literature is its ability to explain only between 30% and 40% of intention variances (Newaz & Appolloni, 2024; Aboelmaged, 2021). To address this limitation, this study expanded the TPB with the cognitive factors of environmental concern, awareness of the consequences, access to facilities and marketing campaigns. This approach is supported in the literature and aligns with prior studies (Aboelmaged, 2021; Kumar, 2019; Laeequddin et al., 2022; Vijayan et al., 2023; Zhang et al., 2020). Even with limitations, TPB remains relevant due to its predictive power and explanatory strengths regarding consumers' intentions to engage in sustainable recycling behaviours (Gilal et al., 2022).

2.3 Consumers' Recycling Intention and Eventual Disposal Behaviour

Intention is at the TPB's core, representing the consumer's motivation to engage in sustainable behaviours (Ajzen, 1991). The prevailing view in the literature holds that consumers with a firm intention to recycle their e-waste are likelier to behave according to their intentions (Aboelmaged, 2021; Laeequddin et al., 2022; Lou et al., 2022). The likelihood of engaging in sustainable recycling behaviour is more substantial when the consumers' intention is firm (Ajzen, 1991). The opposite is also true when the intention to engage in sustainable behaviours is weak; the eventual behaviour will not be firm (Lou et al., 2022).

The factors discussed in the graphic depiction of the TPB model are independent, and their ability to predict intention varies (Ajzen, 1991). This was evident in a study by Strydom (2018), who found that while attitude contributes to recycling intention, the link is relatively weak. Perceived behaviour was shown to have an insignificant effect on intention, while subjective norms substantially influenced recycling intention (Strydom,

2018). Several other studies reported varying results demonstrating that the determinants that predict intention vary (Lou et al., 2022; Aboelmaged, 2021).

The literature debates that intention does not guarantee participation in sustainable behaviours (Arlı et al., 2020a; Phulwani et al., 2021). However, intentions drive behaviours thus its relevance (Ajzen, 1991).

2.4 Sustainable E-Waste Recycling Behaviour

Consumer behaviour is traditionally concerned with individuals' or groups' purchase decisions, usage patterns and product disposal behaviour (Trudel, 2019). However, sustainable consumer behaviour differs in that decisions are driven by their environmental impact (Trudel, 2019). In the literature, these behaviours are commonly known as pro-environmental or green consumption behaviours (Yuriev et al., 2020). In sustainability, consumption involves purchasing decisions, quantities purchased, usage, and disposal methods impacting future generations and the environment (Han, 2021; Phulwani et al., 2021; Trudel, 2019). Furthermore, behaviour is considered sustainable if it lessens waste generation, especially when items are still usable (Phulwani et al., 2021). These behaviours include recycling, repairing, reselling and reusing (Phulwani et al., 2021). Recycling behaviours are said to be associated with three key factors, namely: value for the environment, that is, the consumer's attitude towards the environment, knowledge and past recycling and experience and lastly, psychological factors, such as intrinsic and extrinsic motivation, social influence and the perceived risk on the environment (Arlı et al., 2020).

Electronic devices are disposed of when consumers stop using them, and disposal decisions are influenced by marketing and promotional campaigns and product-related factors, including outdated technology and obsolete, malfunctioning, or damaged devices (Phulwani et al., 2021). These factors encourage consumers to replace devices frequently and often prematurely, resulting in adopting sustainable or unsustainable behaviours (Phulwani et al., 2021). These behaviours are discussed below.

Sustainable e-waste behaviours include returning devices to OEMs, retailers, or network providers or donations to family or friends, which were also deemed sustainable as they allow reuse and diversion from landfills (Phulwani et al., 2021). Sustainable

behaviours involve resources, knowledge, and expertise typically outside of the consumers' control (Mohamad et al., 2022). Thus, access to the required resources and intention positively influence behaviour (Ajzen, 1991). This also aligned with Laeequddin et al. (2022), who found that the availability of resources is positively related to consumer engagement in sustainable behaviours.

Unsustainable e-waste behaviours include the disposal of devices with general household waste, as people are mostly unaware of the environmental impact (Gilal et al., 2022). Consumers tend not to repair devices that are out of warranty; instead, new devices are purchased as it is often a cheaper alternative compared to expensive repairs (Gilal et al., 2022). Consumers remain reluctant to dispose of unused devices; 75% of consumers were found to store their devices in households, which is considered unsustainable behaviour (Gilal et al., 2022). The reluctance is driven by the consumer's fear of information leaks where old devices store personal information (Phulwani et al., 2021). In addition, frequent upgrades to newer devices instead of refurbished or second devices are preferred as consumers find them undesirable (Gilal et al., 2022).

E-waste consumption behaviours are mostly unsustainable because a mere 17% of the generated is recycled (Forti et al., 2020). Approximately 360,000 tonnes are generated in South Africa annually, which is reflective of the increasing problem of e-waste (Stickland, 2024). Thus, the need to address the unsustainable e-waste disposal behaviours is critical in combating the surging problem of e-waste. The study tests the following hypothesis:

2.5 Factors That May Influence Consumers' Recycling Behaviour

2.5.1 Attitudes

Positive attitudes enhance intention, while negative attitudes have the inverse effect (Kumar, 2019). Attitudes are developed based on associations between the actual behaviour and its outcomes, meaning that the assumed behaviour outcome influences the consumer's attitude (Ajzen, 1991). Thus, if the consumer considers the result of their behaviour positive, the likelihood increases that behavioural intention will correspond (Phulwani et al., 2021).

Prior research on e-waste recycling reported varying views on the influence of attitude. For instance, Zhang et al. (2019) found attitudes and green purchase intentions correlated positively, highlighting its predictability on intention. Furthermore, attitudes significantly predicted the intentions of Indian households to participate in sustainable activities (Vijayan et al., 2023). Similarly, in a cross-cultural study to determine the e-waste recycling behaviours of young adults (Kumar,2019). However, Mohamad et al. (2022) found a contradictory result in a study to determine e-waste recycling behaviour. This finding led the authors to call attention to the role of awareness and consumer information on attitude (Mohamad et al., 2022). The TPB posits that individuals make decisions based on available information; thus, considering its role in light of awareness is valid (Seoke, 2022). Laeequddin et al. (2022) agreed and emphasised that awareness is vital to reinforce positive attitudes, which, in turn, positively influence behaviours.

The “attitude-behaviour gap” is a concept commonly debated in the literature. It holds that while customers may have favourable attitudes towards sustainable behaviours, these are not always followed up with corresponding actions (White et al., 2019). However, TPB holds that attitude towards a behaviour stimulates intention and predicts sustainable behaviours (Aboelmaged, 2021). The following is proposed:

H1: A positive attitude towards e-waste recycling significantly enhances consumers' e-waste recycling intention.

(Vijayan et al., 2023; Aboelmaged, 2021)

2.5.2 Environmental concern

Expanding on the TPB, this study incorporated environmental concerns to establish factors influencing e-waste recycling across the different generational cohorts. Environmental concern signifies consumers' attitudes toward protecting the environment; it is the degree to which consumers consider their actions and ecological impact (Zhang et al., 2019). Engagement in sustainable behaviours results from the consumers' environmental disposition and concern about the harm caused to the environment and its adverse effects (Koshta et al., 2022). Prior research that expanded the TPB, incorporating environmental concerns, agreed that positive environmental concern results in an elevated intention to engage in sustainable behaviours (Zhang et al., 2019; Koshta et al., 2022).

Similarly, examining sustainable behaviours among millennials, Gen X and Z, Casalegno et al. (2022) note that a high ecological concern results in increased participation in sustainable practices, irrespective of age. Environmental concern starts with awareness about e-waste's ecological consequences. Concerned individuals exert effort to learn and educate themselves about environmental-related issues when they believe that unsustainable behaviour is detrimental to the environment (Casalegno et al., 2022). It is hypothesised that:

H2: Environmental concern positively influences consumers' intention to recycle e-waste responsibly.

(Koshta et al., 2022; Zhang et al., 2019)

2.5.3 Subjective norms

The perceptions individuals have of pressures exerted by friends, family and colleagues to participate in particular behaviours encompass subjective norms. (Ajzen, 1991). This sense of pressure affects intentions, whether it is the opinion, approval, or disapproval of significant others (Aboelmaged, 2021). Subjective norms stem from normative beliefs, which are the prospect that significant others, such as peers or the community, approve or disapprove of behaviours (Phulwani et al., 2021). Subjective norms can influence individuals to abandon a specific behaviour if it is deemed unacceptable by significant others (Laequddin et al., 2022). The perceived pressure from social expectations to engage in sustainable behaviours, such as using recyclable shopping bags to purchasing electric cars, can also influence consumers purchasing behaviours (Laequddin et al., 2022). If the response from significant others is anticipated to be positive, the intentions regarding e-waste recycling behaviour are higher (Seoke, 2022). The inverse can also be true. This social factor can be instrumental in predicting recycling intentions, as Laequddin et al. (2022) found. However, the literature contained differing results regarding subjective norms and intention. Aboelmaged (2021) argued that subjective norms are context-specific and are not standard across countries. The author postulated that the role of subjective norms is influential in cultures where behaviour is legitimised and confirmed (Aboelmaged, 2021).

Thus, it is essential to investigate this relationship further. The following hypothesis is suggested:

H3: Prevailing subjective norms significantly influence consumers' e-waste recycling intention.

(Laeeyuddin et al. 2022; Aboelmaged, 2021).

2.5.4 Perceived Behavioural Control

A consumer's self-efficacy beliefs influence their efforts to perform a behaviour, the preparation undertaken, and the choice of activities (Ajzen, 1991). On the other hand, control beliefs relate to how much consumers perceive control over their behaviour (Phulwani et al., 2021). Combined, these components can shape consumers' likelihood of engaging in sustainable behaviours (Phulwani et al., 2021). However, consumers typically anticipate difficulty displaying a specific behaviour due to available resources, perceived convenience, habits or experience (Phulwani et al., 2021). Thus, available information, recycling ease, and awareness of e-waste may influence consumers' perceptions of behavioural control.

Prior studies found positive behavioural control increases sustainable disposal behaviours (Zhang et al., 2019). However, consumers may desire to recycle e-waste responsibly, but if their perception of control over the action is low, their intention will also be low (Phulwani et al., 2021). Consequently, the proposed hypothesis is:

H4: Consumers' perceived behavioural control significantly influences their e-waste recycling intention.

(Zhang et al., 2019).

2.5.5 Access to Facilities

Consumer engagement in sustainable behaviours is not only influenced by the consumer's general disposition; various situational factors enable or inhibit behaviour. (Ajzen, 1991). The availability of e-waste management infrastructure and facilities is underdeveloped or absent, particularly in developing countries, which results in unsustainable behaviours, such as improper electronics disposal (Forti et al., 2020). Prior studies expand on the TPB and incorporate constructs related to infrastructure

conveniently accessible for e-waste recycling (Kumar, 2019; Delcea, 2020; Vijayan et al., 2023).

Having convenient access to recycling facilities increases the likelihood of participating in e-waste recycling initiatives, as consumers feel at ease when little time and effort are required to participate (Vijayan et al., 2023). Along with awareness and enforcing policies and regulations, access to facilities is a critical barrier impacting e-waste recycling behaviours (Kumar & Dixit, 2018). The availability and access to facilities are vital in supporting consumers' environmental concerns and enhancing perceived behavioural control (Kumar & Dixit, 2018; Kumar, 2019). Consumers may intend to dispose of devices responsibly; however, this desire is disabled due to the lack of facilities (Arli et al., 2020). According to the TPB, situational factors such as the availability and access to infrastructure influence behavioural control (Arli et al., 2020). While this situational factor is outside the consumer's control, the availability and access to facilities to conveniently recycle unwanted or unused devices increase sustainable e-waste behaviours (Vijayan et al., 2023). Consequently, the proposed hypothesis is:

H5: Access to the relevant facilities significantly influences consumers' e-waste recycling intention.

(Vijayan et al., 2023).

2.5.6 Marketing campaigns

Education and awareness through marketing campaigns can be practical management tools to reduce unsustainable e-waste behaviours (Jayaraman et al., 2019). Marketing campaigns are strategic efforts employed by organisations to drive their goals and objectives (Tarver, 2024). These campaigns are traditionally designed to promote business offerings and to influence consumer behaviour towards a particular action, such as purchasing, awareness, or engagement with the offering (Tarver, 2024). Various forms of media can be used, including radio, television, print media, direct marketing, out-of-home advertising, events or online and digital platforms, including social media (Tarver, 2024). In this study, marketing campaigns involve advertising and refer to efforts to promote e-waste recycling behaviour through awareness, education, media messaging, and informational campaigns. Leveraging the various advertising platforms,

organisations, governments, NGOs, retailers, and manufacturers can employ these efforts to influence consumer e-waste recycling intention.

The literature reported various studies that examined and explained the influence and relationship between different marketing and advertising mediums on behaviour (Muthukumari et al., 2024; Sujata et al., 2019; Tran et al., 2024). Background variables were acknowledged as variables informing the independent components of the TBP (Arlı et al., 2020). Background variables, such as exposure to media and marketing informational campaigns, may impact behaviour and intention, affecting perceived behavioural control (Arlı et al., 2020). Thus, marketing campaigns and initiatives are critical communication tools for disseminating the information pertinent to influencing consumer e-waste recycling behaviours (Sujata et al., 2019). Effective marketing campaigns can enhance perceived behavioural control by providing relevant information about recycling programmes and the availability of facilities, reducing barriers, and making participation seem accessible (Sujata et al., 2019). However, Muthukumari et al. (2024) suggest publicity about e-waste and its environmental effects may not directly influence e-waste recycling behaviours. The influence is indirect as marketing campaigns, including publicity, information or social media campaigns, are insufficient to predict recycling behaviours (Muthukumari et al., 2024). Instead, marketing influences perceived behavioural control and attitude, influencing consumers' recycling intentions (Muthukumari et al., 2024). Furthermore, marketing campaigns' success relies on the messaging strategy; poor messaging can render campaigns ineffective (Trivedi et al., 2018).

The role of digital and online marketing through social media cannot be ignored as a powerful tool that facilitates communication. It is particularly relevant in the digital age for disseminating information and is influential in recycling behaviours (Sujata et al., 2019). Marketing campaigns leveraging social media may strongly predict recycling intention as social media facilitates information and knowledge sharing that can be disseminated widely, driving awareness, attention, and interest (Sujata et al., 2019). Increasing e-waste awareness through marketing campaigns is vital. The following hypothesis is proposed:

H6: Marketing campaigns enhance consumers' intent to recycle e-waste responsibly.

(Sujata et al., 2019).

2.5.7 Awareness of the consequences

The awareness that consumers have of behavioural outcomes encapsulates this factor; it involves the “cognitive or instrumental aspects of an individual” (Koshta et al., 2022, p. 4). Khan et al. (2019) explained this in light of the altruistic behaviour model and noted that understanding the outcomes or consequences of an action is crucial in predicting altruistic behaviour. In essence, when consumers recognise how their actions impact the environment or society, they respond appropriately (Khan et al., 2019). Furthermore, if the consequences are deemed to be positive, this will result in a positive attitude being developed and the behaviour being repeated. If consumers are aware and understand the consequences of recycling e-waste, for instance, reduced air pollution caused by incineration, and they perceive it to be positive, their attitudes towards e-waste recycling will change to positive, resulting in behaviour (Khan et al., 2019). Consumers are motivated not only by emotional aspects or what they feel but also by their knowledge of the consequences of their behaviours (Koshta et al., 2022). Similarly, Phulwani et al., 2021 noted consumers’ actions are affected when they understand the consequences of their behaviours or actions, influencing their behavioural intentions.

Awareness of consequences is often used to extend the TPB and predict intention. In a study on consumers’ plastic recycling intention, understanding the outcomes significantly predicted intention (Khan et al., 2019). However, there are contradictory findings; Kumar (2019) found that awareness of consequences was statistically insignificant in influencing intention. These contradictions necessitated further investigation. The following is proposed:

H7: Consumers’ awareness of the consequences of their behaviour has a significant positive influence on their intention to recycle e-waste.

(Khan et al., 2019; Kumar, 2019).

2.6 The Role of Generational Cohorts

Generational cohort theory suggested that similar beliefs are held by individuals born in the same period; the theory further suggests that social characteristics and historical experiences influence their behaviours (Casalegno et al., 2022). These shared

experiences shape their attitudes and values, distinguishing the cohorts from each other (Casalegno et al., 2022). As a sociological framework, the generation cohort theory aids in explaining the differences across generations, including their interaction with and attitude towards technology, their concern for the environment, and e-waste recycling behaviours. Generations and age are frequent variables used in sustainable consumption research; however, while generational cohorts capture age variations, they also capture variations in values, beliefs, attitudes and behaviours (Ham et al., 2022). In addition, using a generational view is adequate for understanding societal and consumer change (Atkinson, 2023). This study deemed this a reliable approach as it endeavoured to understand the factors influencing e-waste recycling intentions across Baby Boomers, Generation X, Millennials, and Generation Z (Atkinson, 2023).

Various arguments exist about the effectiveness of age and generational cohorts in predicting sustainable behavioural intent, specifically in South Africa, as its history is unique with rich diversity (Ipsos, 2023). Furthermore, findings from prior studies on generational cohorts are often contradictory and ambiguous; this may be due to the country's context, the sample size, the research method, or inaccurate age ranges used to segment generational cohorts accurately (Ham et al., 2022; Ivanova et al., 2019). While the controversial debate in the literature continues about the use of generational references, this study considers the various standpoints and findings locally and internationally. This study also holds and aligns with various studies that agree that understanding generational cohort differences is vital for addressing and decelerating global environmental challenges (Casalegno et al., 2022; Ham et al., 2022; Ivanova et al., 2019).

- ***Baby Boomers***

Boomers, also known as Boomers, were born between 1946 and 1964; current age ranges between 60 and 78 (Dimock, 2019). While this study aligns with widely adopted classifications to define generational cohorts, it is critical to note the importance of the country's context. Boomers in the South African context differ from their Western counterparts. While western Boomers grew up experiencing prosperity and freedom in South Africa, Boomers experienced the introduction of Apartheid and inequality, and it is these experiences that shape their behaviours (Ipsos, 2023).

Amongst the generational cohorts, Boomers were found to seek to engage in more sustainable behaviours proactively; the cohort's environmental concern is reported to be the highest (Ham et al., 2022; Parzonko et al., 2021; Skeiryte et al., 2022; Wang et al., 2021). A South African study confirmed these findings, revealing that Boomers tend to engage more in sustainable recycling practices (StatsSA, 2018). Despite their age differences and stereotypes compared to younger generations, Boomers' use of electronic devices is growing and following similar trends to that of younger generations (Global Web Index [GWI], 2019). Thus, understanding their recycling behaviours is essential as findings will provide insights into whether their environmental concern translates into sustainable behaviours.

- ***Generation X***

Gen Xers this cohort was born between 1965 and 1980, and their current age range is between 44 to 59 (Dimock, 2019). Known for their ability to adapt, this generation grew up in South Africa's transformative years; they experienced the end of Apartheid and witnessed economic transactions, sociopolitical shifts, and the advancement of technology, which shaped their attitudes, perceptions, and behaviour (Mosupyoe, 2014).

This generation was born in the era of analogue and the introduction of personal computers, and they are known as the digital immigrants who adopted technology later (Hayes, 2022). Despite not being deemed digital natives, 56% of Gen Xers' online time is captured using mobile electronic devices (GWI, 2018). Traditional values shape their behaviour, and they have been found to hold a moderate attitude to engaging in sustainable behaviours. This cohort is also the least likely to change unsustainable behaviours (Casalegno et al., 2022). However, this is due to not understanding the impact of their contribution and the difference they can make (Skeiryte et al., 2022). The lack of environmental concern can be addressed by providing convincing information that increases their awareness of consequences and perceived behavioural control (Ivanova et al., 2019).

- ***Millennials***

Generation Y (Gen Yers), popularly referred to as Millennials, this cohort was born between 1981 and 1996, and their current ages range between 28 and 43 (Dimock, 2019). Like Gen X, millennials were born during political and social change in South

Africa. Born a decade before the end of Apartheid, this generation witnessed the political transformation and the dawn of the country's democracy (Mosupyoe, 2014). This cohort comprises 29.6% of South Africa's population and has achieved higher educational levels than its predecessor cohort (StatsSA, 2020). While faced with the challenge of unemployment, despite having tertiary qualifications, 49.5% are employed and are entering their peak earning and spending years (StatsSA, 2020; Nielson, 2023). This generational cohort consists of diverse sub-cohorts with unique characteristics based on their life stage (Casalegno et al., 2022). Life stages may include young millennials who are students, single homeowners and parent millennials (GWI, 2019).

Millennials were raised during the digital revolution and are categorised as the first digital generation or digital natives. They are mobile-centric, multi-device users, indicating high consumption, which results in e-waste generation (GWI, 2019). Social pressures influence millennials' decisions as they are more concerned with approval from significant others (Ivanova et al., 2019). Regarding device disposal behaviour, prior research on Indian millennials' concluded that attitudes, behaviour control and subjective norms are associated positively with intention (Sharma et al., 2024).

- **Generation Z**

Gen Z were born between 1997 and 2012 and their current ages range between 27 and 12 (Dimock, 2019). However, this study only considered respondents 18 years and older. They are known as the 'born frees' because they were born after the South African political transition (Nkrumah, 2021). This cohort comprises more than a third of the population and is categorised as young adults, youth and children (StatsSA, 2019). This generation grew up at the pinnacle of technological advancements and is more educated and informed about the importance of environmental sustainability than older generations (Ham et al., 2022). They are aware of climate change and take and are willing to act to ensure sustainable development (Casalegno et al., 2022). Termed the 'Green Generation,' Gen Z is more inclined to engage in sustainable activities (Nkrumah, 2021). This is evident in the active participation seen globally for climate action and change towards sustainability from government, organisations and households (Nkrumah, 2021). Regarding their device use, while electronic devices have become a part of the daily lives of all the generational cohorts, for Gen Z, this has become progressively entrenched in their lives as they seek to acquire the latest technologies (A. Kumar, 2019).

However, the literature differs on the environmental behaviour of younger cohorts. Financial limitations are vital to why Gen Z's ecological consciousness does not result in corresponding behaviour (Cheung & To, 2019; Ham et al., 2022). Alternative views hold that younger generations are self-concerned and pleasure-seeking, which prevents environmental action (Ham et al., 2022). This cohort strives not to conform to the status quo; thus, initiatives to influence intention should be carefully considered (Ivanova et al., 2019). Kumar (2019) studied Gen Z in China and India and discovered that attitudes, subjective norms, and behavioural control positively impacted intentions.

In contrast, awareness of the outcomes and facility access had no significant effect (Kumar, 2019). Gen Z represents the country's future leaders and decision-makers; thus, understanding the factors affecting their intention to recycle e-waste is critical for guiding and shaping future environmental behaviours.

2.7 Conclusion

Related literature was extensively reviewed through the lens of the TPB. Expanding the traditional TPB, the review incorporated additional factors to provide a broader understanding of e-waste recycling determinants. The review highlighted that factors influencing intention are not uniform across generational cohorts. Thus, the relevance of considering the distinct characteristics, values, and beliefs amongst the generational cohorts was brought to the fore to understand the e-waste dilemma better. The insights acquired informed the leading research question sub-questions, and hypotheses were formulated that directed the study.

Chapter 3: RESEARCH QUESTIONS | HYPOTHESES

3.1 Research Questions

The study took direction from its theoretical anchor and existing literature to formulate the research questions and hypotheses.

Main research question:

What major influences drive consumers' e-waste disposal intention, and how do e-waste recycling intentions differ across generational cohorts?

The following sub-questions were formulated and constructed on the expanded Theory of Planned Behaviour (TPB) (Ajzen, 1991; Vijayan et al., 2023; Aboelmaged, 2021; Koshta et al., 2022; Zhang et al., 2019; Laeeyuddin et al. 2022; Sujata et al., 2019; Khan et al., 2019; Kumar, 2019), which will direct this study:

- 1.1 How do consumers' attitude towards recycling influence their intention to recycle e-waste sustainably?
- 1.2 How does environmental concern influence consumers' intention to recycle e-waste sustainably?
- 1.3 How do subjective norms influence consumers' intention to recycle e-waste sustainably?
- 1.4 How does perceived behavioural control influence consumers' intention to recycle e-waste sustainably?
- 1.5 How does access to recycling facilities influence consumers' intention to recycle e-waste sustainably?
- 1.6 How do marketing campaigns influence consumers' intention to recycle e-waste sustainably?
- 1.7 How does awareness of the consequences of e-waste disposal influence consumers' intention to sustainably recycle e-waste?
- 1.8 How do generational cohorts differ regarding attitude, environmental concern, subjective norms, perceived behavioural control, access to recycling facilities, marketing campaigns, awareness of consequences and e-waste recycling intention?

3.2 Hypotheses based on the expanded TPB

The following hypotheses directed the study in terms of data gathering and data analysis:

H1: A positive attitude towards e-waste recycling significantly enhances consumers' e-waste recycling intention (Vijayan et al., 2023; Aboelmaged, 2021).

H2: Environmental concern positively influences consumers' intention to recycle e-waste responsibly (Koshta et al., 2022; Zhang et al., 2019).

H3: Prevailing subjective norms significantly influence consumers' e-waste recycling intention (Aboelmaged, 2021; Laeequddin et al., 2022).

H4: Consumers perceived behavioural control significantly influences their e-waste recycling intention (Zhang et al., 2019).

H5: Access to relevant facilities significantly influences consumers' e-waste recycling intention (Vijayan et al., 2023).

H6: Marketing campaigns significantly enhance consumers' intent to recycle e-waste responsibly (Sujata et al., 2019).

H7: Consumers' awareness of the consequences of their behaviour has a significant positive influence on their intention to recycle e-waste (Khan et al., 2019; Kumar, 2019).

3.3 Conceptual Model

The conceptual model expands the TPB by incorporating additional constructs relevant to this study. Generational cohorts were assessed to determine whether they have differences regarding recycling intention. This conceptual model presented in Figure 2 served as a framework that guides the study.

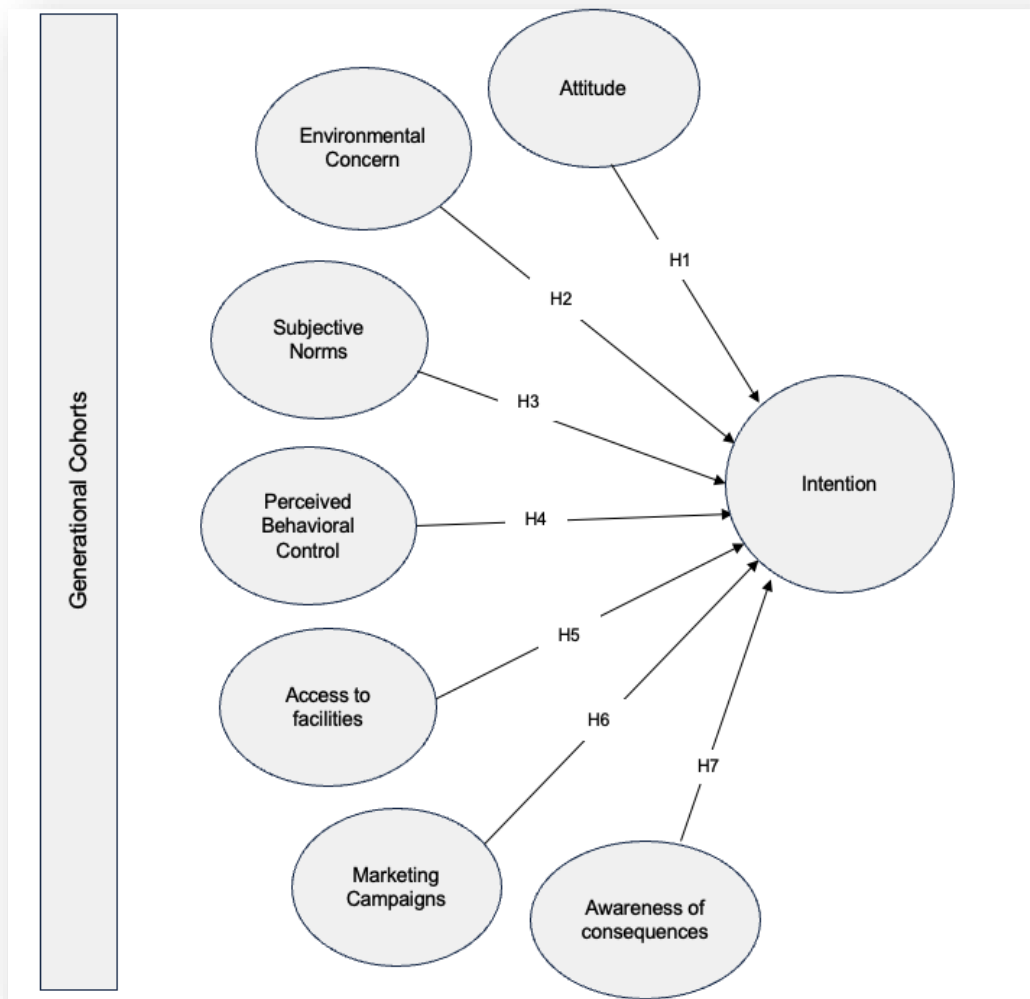


Figure 2: Proposed conceptual model

(Author's design)

3.4 Conclusion

The proposed conceptual model represented the theoretical factors, as outlined in this chapter. The literature-guided research questions and hypotheses were also outlined. The succeeding chapter comprises the research methodology, which presents a comprehensive overview of the selected methods and design.

Chapter 4: RESEARCH METHODOLOGY AND DESIGN

4.1 Introduction

This chapter introduces the chosen methodology that addresses the research question/problem. The research methodology and design align with previous studies, where similar quantitative relationships were investigated, utilising a survey and a deductive approach (Casalegno et al., 2022). The validity and theoretical reliabilities with associated Cronbach Alphas were presented. The chapter also covers the approach to statistical analysis, sampling methods and measurement instruments.

4.2 Research Methodology

4.2.1 Research Philosophy

The e-waste phenomenon is a well-observed reality within societies globally, making the positivist philosophy well-suited, as the study involves observable and measurable facts within society (Alharahsheh & Pius, 2020). A positivist philosophy is endorsed when studies leverage existing theory for hypothesis development (Saunders & Lewis, 2018). Hypotheses were tested based on the TPB, including factors such as behavioural control, attitudes and subjective norms across generational cohorts

A positivist approach was appropriate as the study used evidence-based scientific methods to quantitatively assess the factors influencing e-waste recycling intentions across generations (Saunders & Lewis, 2018). The study adopts an extreme positivist position as it focused on the observable problem of e-waste disposal, which was measured to produce concrete findings and workable insights (Saunders & Lewis, 2018). Furthermore, leveraging the principles of positivism in its purest form, the study's respondents were independent of the researcher; this level of dualism reduces bias (Park et al., 2020).

4.2.2 Research approach

Employing a deductive method, the established research question leveraged an existing theoretical framework which complemented a positivist approach (Saunders & Lewis, 2018). Deduction requires the identification of the study's anchoring theory and legitimising its use (Varpio et al., 2020). The literature review contextualises the theoretical framework and supports its use in consumer behavioural intention research, supporting the use of TPB in this study's context (Varpio et al., 2020).

The TPB and associated concepts were operationalised, and e-waste intention was tested according to the hypotheses and the background variables (Varpio et al., 2020). Once collected, the data was analysed and tested per the hypotheses to indicate whether the theory was supported (Saunders & Lewis, 2018). A deductive approach's 'top-down' nature explains the relationships in theory concerning e-waste recycling intention (Saunders & Lewis, 2018). The study leverages and expands on one fundamental theory and progresses linearly to the findings, results discussion and recommendations, further supporting a deductive approach (Varpio et al., 2020).

4.2.3 Methodological choices

Waste recycling is a measurable and quantifiable social behaviour, which rendered a quantitative methodological choice appropriate for this study (Rahman, 2020). This approach was also aligned with a positivist philosophy where variables are measured, and insights are obtained through empirical testing (Rahman, 2020). Since the study was rooted in existing academic theory and literature reviewed before data was collected, quantitative methods were suitable for this study (Saunders & Lewis, 2018).

A mono-method approach for this academic study was considered sufficient despite the frequently recommended mixed methods (Saunders & Lewis, 2018). Similar studies that leverage the TPB and its extensively researched constructs to measure intention supported this approach (Seoke et al., 2022).

4.2.4 Purpose of research design

E-waste is a mounting challenge, and numerous studies have been done to explain its occurrence. Similarly, this study's findings demonstrate the various factors influencing sustainable behaviours. Additionally, the study describes the specific tendencies concerning e-waste recycling based on empirical evidence gathered. A quantitative mono-method is commonly used in studies that use an explanatory design (Saunders & Lewis, 2018). The explanatory design sought to specify more clearly the relationship between attitudes or environmental concerns and their influence on e-waste recycling behaviour (Saunders & Lewis, 2018).

4.2.5 Research Strategy

A survey was utilised to address the research questions. Surveys remain one of the most widely used research strategies and are said to be foundational to the social sciences (Story & Tait, 2019). Among studies done on e-waste recycling, 67.44% of published research articles utilise surveys (Gilal et al., 2022). This strategy is popular when researchers seek to know 'who', 'where', 'what', 'how much' and 'how many' (Saunders & Lewis, 2018). The 'who' in this study refers to the generational cohorts, and the "what" refers to e-waste recycling intention.

However, this research strategy has pitfalls compared to other methods; participating in electronic surveys requires access to the Internet, which may not be accessible for respondents, and respondents may not participate due to confidentiality concerns, which may reduce response rates (Story & Tait, 2019). Additionally, when surveys are not objective, poorly framed and implemented, the risk of research bias increases (Story & Tait, 2019). Despite the drawbacks, surveys are popular strategies, and their popularity stems from researchers reaching many respondents within a set period (Saunders & Lewis, 2018).

4.2.6 Time horizon

Consumers' e-waste recycling intentions were considered at a point in time, not considering behavioural changes over time (Saunders & Lewis, 2018). The research findings offered a 'snapshot' of how the different factors influence recycling behaviours

across generational groups throughout South Africa (Saunders & Lewis, 2018). Cross-sectional studies are often criticised for lacking causality (Spector, 2019); this was the only viable option due to the academic nature of this study, which posed precise completion dates.

4.3 Research Design

4.3.1 Population

The 2022 South African census reported that the population grew by 20%, from 51.7 million in 2021 to 62 million in 2022 (StatsSA, 2022). Electronics use is also increasing, and 92% of South Africans own mobile phones (StatsSA, 2022). This study examined e-waste recycling behaviours across South Africa; however, the entire population is too extensive and inaccessible for data collection (Majid, 2018). This study thus recruited a population sample, and the target consisted of all individuals across the four generational cohorts, which included Boomers aged (60-78), Gen X (44-59), Millennials (28- 43), and Gen Y in the age range of (18-27) (Dimock, 2019). The study focused on generational cohorts of South Africans over 18.

At the start of this study, a sample size of at least 240 respondents with approximately 60 responses per generational cohort was envisaged to ensure a large enough sample subset for statistical analysis and possible generalisation of the findings (Majid, 2018).

4.3.2 Unit of analysis

This research examined recycling behaviours across different generational cohorts, each consisting of individuals; the study investigated individual recycling behaviours and how these behaviours differed across the cohorts. Thus, the unit analysed was at an individual level within particular age cohorts. Units being analysed typically answer the 'who' and the 'what' of the research (Kumar, 2018). The 'who' studied were individuals within one of the four distinct generational cohorts. The 'what' studied is their e-waste recycling intentions. The individuals were categorised per their generational cohort, and one cohort constituted a unit that can be compared with other units (Kumar, 2018). The

data was analysed at a group level (four categories), and intentions were compared across the cohorts.

Most studies examining e-waste recycling intention were done at an individual level, considering consumers, students, or one or more generational cohorts (Aboelmaged, 2021; Islam et al., 2021; Laeequddin et al., 2022). Similarly, research conducted across two generational cohorts (Gen X and Gen Y) was performed individually yet analysed at a group level (Delcea et al., 2020). The fitting unit for the study was South African consumers who owned at least one electronic device (mobile phone, tablet, laptop or smartwatch) and had replaced at least one.

4.3.3 Sampling method and size

A population subset was recruited to manage this constraint and ensure an accurate inference (Story et al., 2019).

The population sample could not be selected randomly, as not all individuals in the generational cohorts have a random or equal chance of being selected (Saunders & Lewis, 2018). Purposive non-probability sampling was utilised based on age and ownership of electronic devices, which is supported and frequently used in e-waste research (Gilal et al., 2022). Since the selected sample consisted of four generational cohorts, the purposive sample was heterogeneous, as each cohort has diverse and unique characteristics (Saunders & Lewis, 2018). This approach is supported in a similar behavioural study on generational cohorts and their sustainable behaviours (Casalegno et al., 2022). Data gathering was done through a self-administered online survey. A screening question was included to recruit respondents only from relevant age categories: 311 respondents were recruited, and after data cleaning, 252 useful completed questionnaires remained for analysis.

4.3.4 Inclusion Criteria

The target population included individuals across South Africa over eighteen, irrespective of location, as accessibility to disposal centres differs depending on location. Hence, all the alternatives were included. Only individuals relevant to the research were selected to ensure logical generalisations could be made (Saunders & Lewis, 2018). The

criteria considered individuals using one or multiple electronic devices (mobile phones, tablets, laptops, and smartwatches) on the precondition that they must have replaced at least one in the past.

4.3.5 Measurement instrument and discussion guide

As in this study, quantitative studies commonly use structured techniques to collect data, such as **structured questionnaires, including quantifiable measurement scales** (Ahmad et al., 2019). Respondents were requested to answer the same series of questions integrated into a questionnaire distributed electronically (Brace, 2018). Prior studies on e-waste used similar methods, such as those of Laeequddin et al. (2022). The authors additionally leveraged social media groups as part of their distribution, while this study was posted broadly on social media. However, Islam et al. (2022) distributed their e-waste questionnaire using a paper-based survey.

The **online questionnaire** was designed and guided by scales captured in existing studies on e-waste. The questionnaire used closed-ended questions. Respondents were required to provide general information to profile the sample, which was needed to secure the distribution of age categories and ensure a balanced sample. They also had to provide information about their ownership of electronic devices and confirmation that they had replaced and disposed of any of them in the past. These **prerequisites were stated as screening questions** in the cover letter and invitation.

The questionnaire comprised a screening question, demographics, and factors influencing recycling intention. The three sections presented thirty items, each adapted from previous research on e-waste recycling. The final questionnaire is presented in (Appendix 1).

Screening Question (SQ)

The screening question ensured that only respondents who met the criteria had access, while those who did not were omitted. People younger than eighteen were automatically excluded from participating.

Section A: Demographic factors

The demographic section captured demographic information such as geographic location and gender (only to profile the sample) to ensure adequate numbers and a balanced sample. Questions in this section also related to the respondent's **device ownership, usage, and confirmation that devices were disposed of in the past** (Aboelmaged, 2021).

Section B: Factors influencing intention

The third section of the questionnaire comprised the expanded TPB constructs to measure the factors influencing recycling intention across generational cohorts adapted from prior e-waste studies (Aboelmaged, 2021; Khan et al., 2019; Koshta et al., 2022; Laeequddin et al., 2022; Sujata et al., 2019; Vijayan et al., 2023; Zhang et al., 2019; Kumar, 2019).

Five-point Likert-type scales were adapted from prior e-waste disposal studies to record responses ranging from 1- strongly disagree to 5 - strongly agree (Kumar, 2019; Casalegno et al., 2022; Sujata et al., 2019).

Section B1: Attitudes (ATT)

This section included three questions on e-waste recycling attitudes (ATT1 – ATT3), which were adapted from the studies by Aboelmaged (2021) and Vijayan et al. (2023) on e-waste recycling and disposal behaviours.

Section B2: Environmental Concern (EC)

The five questions in this section were related to **environmental concerns** (EC1- EC5) and were amended by Koshta et al. (2022) and Zhang et al. (2019).

Section B3: Subjective Norms (SN)

Four questions relating to **subjective norms** were adapted from Aboelmaged (2021) and Laeeyuddin et al. (2022) and associated with the subjective norms (SN1-SN4) influencing e-waste recycling.

Section B4: Perceived Behavioural Control (PBC)

This section contained three questions about **perceived behavioural control** (PBC1-PBC3) adapted from prior e-waste studies by Zhang et al., 2019.

Section B5: Accessibility of e-waste recycling facilities (ATF)

This section included **access to recycling facilities** and consisted of three questions (ATF1-ATF3) adapted from Vijayan et al. (2023).

Section B6: Marketing Campaigns (MC)

B6 included three questions about **e-waste recycling marketing campaigns** (MC1-MC3) adapted from Sujata et al. (2019).

Section B7: Awareness of Consequences (AOC)

This section comprised **consumers' awareness of the consequences** of their behaviour; it included five questions (AOC1-AOC5) adapted from Khan et al., 2019 and Kumar, 2019.

Section B8: Intention (INT)

The section consisted of four questions related to **intention** (INT1-INT4) adapted from Aboelmegeed (2021) and Lou et al. (2022). While not hypothesised, the purpose was to examine the differences in intention across generational cohorts.

4.3.6 Measurement Scales

Researchers typically utilise similar scales to measure recycling intention (Gilal et al., 2022). A five-point Likert-type scale was adapted from prior research to measure the study's constructs (Kumar, 2019; Casalegno et al., 2022; Sujata et al., 2019). However, it is important to note that for environmental concerns, to examine how ecological awareness correlates with the intent to recycle e-waste among different generations, the Casalegno et al. (2022) scale was adapted from a seven-point Likert-type scale to align with the other scales utilised.

Nominal data described the respondents' profiles in an effort to understand which generational cohort they would be categorised into, their location and ownership of an electronic device, and whether they had disposed of a device before.

4.3.7 Pilot Study

Pilot tests allow issues to be addressed before a large-scale distribution, and they also ensure respondents' comprehension of the scales and instructions and the time required for completion (Saunders & Lewis, 2018).

The feedback from the pilot test in this study highlighted **two areas for improvement**: Firstly, the **instructions** needed to follow a question in one section of the survey immediately. Secondly, the survey was intended to **close immediately for respondents under the age of eighteen**. These shortcomings were a function of the Google form setting and were resolved accordingly. The final questionnaire was distributed timeously to collect data.

4.3.8 Data gathering process

An electronic web-based platform was utilised for data gathering, and the study's questionnaire was created using Google Forms. This method of data gathering is commonly used in e-waste research (Gilal et al., 2022). The internet was used as a distribution vehicle since the objective was to collect the maximum number of complete questionnaires. (Saunders & Lewis, 2018). The questionnaires were distributed in two ways: through direct email to individuals, who distributed them to colleagues and friends; the study link was also shared on Facebook, LinkedIn, and WhatsApp. Colleagues, friends, and family members reposted the study to ensure a wide distribution and increased collection. The questionnaire included an invitation to participate, which included an introduction of the researcher, a brief yet comprehensive explanation of the research objectives, a definition of e-waste, the researcher's affiliation, and contact numbers to verify its legitimacy. The questionnaire was completed in 10- 15 minutes, supported by the pilot study.

4.4 Data analysis

A qualified statistician oversaw the data analysis, and the researcher held the responsibility for the interpretation of the results. The questionnaire was initially coded on a Microsoft Word document (Appendix 1). After closing the questionnaire, the data was exported from Google Forms and then coded. IBM's Statistical Package for Social

Sciences (SPSS) was used by the statistician to analyse the data thoroughly. The subsequent chapters will provide more detailed explanations and findings.

4.4.1 Data cleaning and screening

The initial step was to filter and clean the data to ensure reliability before analyses. This also ensured the statistical results were accurately reported (DeSimone & Harms, 2018). The study's questionnaire consisted of mandatory response fields, and respondents could not proceed without selecting a response; thus, no missing values were identified in the screening. The criteria for participation required that respondents be over eighteen, have owned an electronic device or have replaced or discarded an electronic device. Respondents who did not fulfil these criteria were omitted from the data set.

4.4.2 Descriptive statistics

Once the data set was confirmed to contain no errors, the descriptive phase of the analysis commenced. Descriptive statistics describes the data set's features and characteristics and assists in assessing for assumption violations and any trends that may exist (Mishra et al., 2019; Pallant, 2016). Frequent measures and percentages were used for nominal variables to determine the number of valid responses by gender, age, device ownership, disposal and location (Mishra et al., 2019). Central tendency was used to determine the most representative value, which includes three key measures: the mean (average), median and mode and (Mishra et al., 2019). The standard deviation determined variability (Mishra et al., 2019).

4.4.3 Inferential statistics

Inferential statistics are often employed in research to make inferences or conclusions regarding population differences. They also help identify relationships between constructs (Guetterman, 2019). Techniques such as ANOVA and regression were utilised to test the study's hypothesis (Pallant, 2016). This study used one-way ANOVA for mean comparisons (Pallant, 2016).

4.4.4 Factor Analysis

As a statistical multivariate technique, factor analysis examines relationships between large sets of variables (Hair et al., 2010). With a dependent variable and seven independent variables, data reduction methods were used to condense the items into

smaller components (Pallant, 2016). This study adapted validated and existing scales from previous research to formulate a new survey questionnaire to determine the factors influencing e-waste recycling intention. A pre-tested instrument was not used; therefore, Exploratory Factor Analysis (EFA) was suitable. (Hair et al., 2010; Pallant, 2016).

4.4.4.1 Assessing Suitability

Suitability was determined considering two issues: how intercorrelated the items were and the sample size (Pallant, 2016). While there is no consensus in the literature on what constitutes a valid sample size, 252 is deemed adequate (Pallant, 2016). How intercorrelated the items were to justify the analysis; this was done by examining the correlation matrix for dependent and independent variables to determine what groups together empirically. In addition, it ensures there are no challenges in the regression analysis. An inspection of the correlation matrix was then done to investigate for coefficients greater than 0.3. For EFA to be deemed appropriate, a considerable number of correlations must exceed 0.3 (Watkins, 2018; Hair et al., 2010).

To test for correlations, Bartlett's Test of Sphericity was performed; p-values under 0.05 suggested the presence of correlations, confirming the appropriateness of conducting a factor analysis (Pallant, 2016). To measure the sample's suitability, Kaiser-Meyer-Olkin Measure of Sampling adequacy was tested, and a value greater than 0.6 is generally considered suitable (Pallant, 2016). However, Watkins (2018) suggests that a value greater or equal to 0.7 is advantageous, while KMO values below 0.5 are unacceptable (Watkins, 2018; Hair et al., 2010).

4.4.4.2 Factor Extraction Method

Principal Axis Factoring (PAF) was utilised for extraction as it considers the shared variances of items utilised in Likert-type scale data, making no assumptions about distribution (Mabel & Olayemi, 2020). Although criticised for 'factor indeterminacy', PFA is appropriate for this study as it is concerned with the shared variance between variables to assist in identifying the latent variables that drive sustainable behaviour (Hair et al., 2010). Furthermore, since this study focuses on recycling intentions across various variables, PAF is a preferred extraction method as it pursues the least amount of shared variance (Mabel & Olayemi, 2020). Eigenvalues were used to determine extraction (Pallant, 2016). An eigenvalue greater than one is recommended and deemed significant (Shrestha, 2021). This method is also considered reliable as it creates a cutoff

specifically when items are between twenty and fifty; in this study's context, this is valid as the questionnaire contained thirty items (Hair et al., 2011). In addition, all the eigenvalues were plotted using SPSS and then inspected to identify where the extraction was halted (Pallant, 2016).

4.4.4.3 Communalities

In factor analysis, the unaccounted variables should be determined once item loadings are identified (Hair et al., 2010). This is commonly done by assessing the variable communalities to determine whether the variables meet a level at which an explanation is acceptable (Hair et al., 2010). The applied threshold was above 0.3 for the communalities at extraction, indicating at least 30% common variance shared among the items. Items below this threshold were omitted as weak items.

4.4.4.4 Factor rotation method and interpretation

After extraction and the retained factors were identified, they were rotated, clearly showcasing the loading patterns for a more straightforward interpretation (Pallant, 2016). Factor rotation methods can be orthogonal or oblique, which distribute variances and determine the variables that group the highest (Hair et al., 2010). The selected rotation method was the Varimax rotation due to its superiority in achieving simple factor structures (Hair et al., 2010). Simpler factor structures also make interpreting the study's findings more effective (Hair et al., 2010). The factor analysis resulted in two factors being grouped into one, which is environmental concerns, with attitudes grouped into one factor, and perceived behavioural control with access to facilities. This will be discussed further in the chapter on findings and results.

4.5 Quality controls

4.5.1 Validity

The study's validity refers to its truthful and valid conclusions (Saunders & Lewis, 2018). It concerns whether the measuring instruments used to assess behaviour perform as intended and function correctly (Surucu & Maslakci, 2020). This enabled the researcher to answer whether the research was credible (Surucu & Maslakci, 2020).

The study leveraged current literature to define the theoretical constructs and tested scales for testing. The TPB is the theoretical framework employed by the study; additionally, it expanded on the framework, leveraging existing literature. To achieve **construct validity**, the measurement tools measured the theoretical constructs they were intended to measure based on existing literature to ensure construct validity (Hajjar, 2018)

Face Validity, also called content validity, was achieved by testing the study's content suitability and sensibility, ensuring appropriateness and alignment with the research objectives (Connell et al., 2018). The scales selected per construct were also ensured to expand to theoretical considerations beyond the empirical considerations that are all relevant (Hair et al., 2010).

Eliminating the factors that can invalidate research findings is critical as they threaten the study. These factors can be internal or external. Internal factors include bias in selecting research participants (which was addressed by specifying the criteria for inclusion on the cover page), historical events that may impact the study's findings, and poorly planned and executed data collection processes that may negatively influence respondents as well as any confusion and ambiguity that may affect the study's validity (Saunders & Lewis, 2018). To ensure that all views were considered, this study recruited respondents who have experience with electronic equipment and have previously disposed of it: those living across the country, those in urban areas where responsible recycling is more feasible due to waste disposal facilities (external factors), as well as others who do not have the same facilities nearby. In addition, regarding the questions and instructions for completion, the researcher ensured that they were straightforward and that the questionnaire was manageable for respondents. The questionnaire cover letter reiterated that participation was anonymous and that responses were confidential.

4.5.2 Reliability

For the research to be deemed reliable, there must be consistency in the data collection methods, the analytical approach, and the study's findings (Saunders & Lewis, 2018). A study's reliability is threatened when respondents give **unreliable and invalid information**, which refers to subject bias (Saunders & Lewis, 2018). A pilot study was vital to enhance reliability and to ensure that results were not compromised by observer

error, that is, unclear questions and scales that were challenging to interpret (Saunders & Lewis, 2018).

4.5.2.1 Theoretical Reliabilities

The Cronbach alpha, presented in Table 1, assessed internal consistency and relied on a consistency level with a minimum score of 0.7 was deemed acceptable (Hair et al., 2010). Reliabilities obtained from the theoretical are above the 0.7 consistency level, making it acceptable. Notably, the independent theoretical reliabilities were based on seven constructs, and the dependent variables consisted of one construct with a reliable Cronbach Alpha of 0,901.

Table 1: Cronbach Alpha theoretical reliability test for independent and dependent variables

Independent Variables	Cronbach Alpha Value
Attitude	0.854
Environmental Concern	0,860
Subjective Norms	0,746
Perceived Behavioural Control	0,720
Access to recycling facilities	0,876
Marketing Campaigns	0,873
Awareness of consequences	0,783
Dependant Variable	Cronbach Alpha
Intention to recycle	0,901

4.6 Normality and Comparisons

Statistical analysis techniques, including ANOVA, regression and correlations, assume normality; thus, the normality tests had to be conducted to ensure tests were reliable (Mishra et al., 2019). Normality was considered when the p-values equalled or exceeded 0.05 (Cleff, 2019).

Due to the varying sample sizes of the generational cohorts, two tests were used to assess normality. **Shapiro-Wilk** was suitable for evaluating the Boomers and Gen Z

cohorts, as the samples were below fifty (Cleff, 2019). For the millennials and Gen X cohorts, these cohorts exceeded fifty, making the **Kolmogorov-Smirnov** test appropriate (Cleff, 2019). Both methods tested for degrees of freedom (how many individuals per cohort), test statistics and significance (Sig.), or p-value.

Although some variables were not normally distributed, the study utilised a parametric test due to its robustness against deviations from normality, mainly if the group sizes were large enough, as was the case for this study (Pallant, 2016). The **one-way ANOVA** is also appropriate as the study considers more than three groups and tests variances between and within cohorts (Pallant, 2016). The mean scores were analysed to assess if they differed statistically and significantly.

A test for **homogeneity of variances** was also conducted to test whether the variability in the scores for each group was similar; this is vital as variances that are not similar can negatively impact the reliability of the study's findings (Pallant, 2016). Levene's test was used in this regard (Pallant, 2016). For the variances to be deemed equal, the p-value must equal or exceed 0.05 (Pallant, 2016).

For **multiple comparisons**, **ANOVA** was applied to assess variances between and within the four cohorts, as no violations were identified (Pallant, 2016). Significant differences between the mean scores were determined with a p-value of 0.05 or less (Pallant, 2016). Additionally, a comparison was made with the generational cohorts to ensure that the cohorts were accurately compared and to obtain similar group sizes, which involved selecting the first fifty valid responses randomly from the millennial cohort, consisting of one hundred and sixty respondents. This was to provide a more comparable for the tests.

Following this, the groups were compared by performing a **post-hoc test**. A **Bonferroni adjustment** (correction) was applied to ensure that the differences found are, in fact, valid. This adjustment is appropriate since the study considers multiple comparisons and mitigates Type I errors or results with false positives (VanderWeele & Mathur, 2019). To apply the adjustment, the significance levels are typically divided by the number of groups (VanderWeele & Mathur, 2019). This study took a moderate approach to ensure the results indicated only valid differences and that such differences were not neglected. Thus, the study implemented a Bonferroni adjustment of correction for the multiple comparisons, and the following was implemented for the multiple comparisons, where it

was decided that p-values be deemed significant if p-values were less than 0.025. (The calculation is illustrated below).

Significance level: 0.05 divided by 2 = 0.025

Lastly, **means plots** (Appendix 3) were utilised to compare the mean differences between the generational cohorts, as this graphical depiction allows for a more straightforward comparison (Pallant, 2016). However, the literature cautions that this should be used with preservation due to its misleading nature, where variances can be exaggerated (Pallant, 2016).

4.7 Multiple Regression Analysis

Adopting the multi-regression technique was adequate, as this method for analysis examines the connection between intention and independent factors (Hair et al., 2010). A key objective of this technique aligns with this study, as it is concerned with predicting how changes in intention respond to changes in environmental attitude, subjective norms, recycling confidence, facility access, marketing, and awareness of consequences across generational cohorts (Hair et al., 2010). The regression analysis used age as a control variable to address the observed differences across groups. Multiple regression holds multiple assumptions that should not be violated (Pallant, 2016). The most pertinent assumptions for this study are discussed below.

4.7.1 Multiple Regression Assumptions

4.7.1.1 Outliers

The first assumption relates to values that are either very high or low and can be identified in the standardised residual plots (Pallant, 2016). The analysis assumes that there should not be any outliers. However, any outliers should be identified and addressed, which may include exclusion or the application of regression techniques to minimise their influence (Williams et al., 2013). Residual values above or equal to 3.3 or less than -3.3 are considered outliers (Pallant, 2016).

4.7.1.2 Correlations

This analysis assumed that the variables should have a significant correlation. It also examined how subjective norms, marketing campaigns, and environmental attitudes relate to one another and intention. The p-value was evaluated by comparing the independent and dependent variables to evaluate relationships among variables. A p-value below 0.05 signifies a correlation (Pallant, 2016).

Pearson's r-test assessed the correlation coefficients between the variables (Pallant, 2016). Schober et al. (2018) refer to monotonic relationships between variables where the following occurs: as one variable increases, it corresponds to an increase or decrease in another value (Schober et al., 2018). This is illustrated in Table 2.

Table 2: Pearson's r Interpretation

Value	Relationship	Interpretation
+1	Positive	A positive correlation
-1	Negative	A negative correlation
0	none	No correlation

Source: Adapted from (Senthilnathan, 2019)

4.7.1.3 Multicollinearity

The third assumption relates to multicollinearity and considers the relationships among the independent variables (Pallant, 2016). It is assumed that the independent variables should not correlate too highly. Multicollinearity indicates that a least squares estimate cannot be determined (Williams et al., 2013) The multiple regression computations include collinearity statistics focusing on the tolerance and variance inflation factor (VIF) deemed appropriate if it is closest to one (Pallant, 2016). Tolerance relates to the variability between the independent variables, and values are between zero and one; similarly, these values should be close to one; values less than 0.10 indicate multicollinearity (Pallant, 2016).

Once all the assumptions were addressed, the R² was determined as part of the model summary, and the coefficients were used to address the study's hypotheses.

4.8 Ethics considerations

The following was adhered to ensure ethical conduct (see Annexure 2 for the ethics approval document).

4.8.1 Data collection and storage

The data was securely stored to prevent mismanagement and misuse. The minimum storage period of ten years aligns with the recommended period; the data will be deleted afterwards. The identity of respondents was not disclosed, and aggregate data was reported anonymously without identifiers other than age groups, device ownership, and geographic location to describe the sample's profile.

4.8.2 Informed consent and anonymity

A cover letter was enclosed to ensure the purpose of the study was well understood it outlined the study's context, importance and objective. This was distributed with the questionnaire. The questionnaire's introduction clarified that the respondent's participation is voluntary. Respondents were required to provide selected information to profile the sample, namely gender (to ensure a balanced sample), age (to include adequate numbers across the age cohorts), the number of electronic devices they own/use, and confirmation that they have replaced and disposed of any of the devices in the past. The return of a completed questionnaire commonly implies participant consent (Saunders and Lewis 2018). Respondents were guaranteed that participation was anonymous and that the data would be aggregated. The questionnaire's introduction also reiterated that participation is anonymous and responses are confidential. The questionnaire's cover page included the researcher's affiliation and contact numbers to verify the study's legitimacy. In addition, the estimated time commitment required from respondents was included (derived from the pilot test), and it was clearly stated that there would be no incentives or remuneration for participation.

4.8.3 Limitations

The study's limitations include the following. Access to mobile data to access the online survey may impact respondents' participation. Second, the definition of generational cohorts varies across the literature, which presents some fluctuation. Third, the studies on recycling behaviour across two or more generational cohorts concur that using multiple generational cohorts generally results in uneven responses (Ivanova et al., 2019). This researcher aimed to monitor the numbers and intentionally increase specific age categories if necessary. Fourth, the study targeted respondents across South Africa, but it may be that the urban representation is more extensive; comparisons of urban versus those located in smaller towns will, therefore, only be made descriptively as the sample size may be insufficient to discriminate differences using inferential analyses. The study does not measure actual consumer behaviour regarding e-waste recycling. Instead, intention is considered as it drives behaviour (Aboelmaged, 2021; Laeequddin et al., 2022; Lou et al., 2022).

4.8.4 Conclusion

This chapter comprehensively outlined and defended the study's methodology to address the research problem. Data analysis commenced with the treatment of the collected data, including the screening and cleaning, before further analysis was conducted. The factor analysis assessed suitability and commonalities, and the extraction and rotation methods were discussed. Validity and reliability were established by presenting the Cronbach Alpha tests. This chapter also explained the various techniques, including normality, correlation and multiple regression. The chapter concludes with how ethical conduct was upheld and the limitations were considered. The succeeding chapter presents the results from the data analysis discussed.

Chapter 5: FINDINGS OF THE STUDY

5.1 Introduction

This chapter outlines empirical results from the analysis. It begins by determining the sample and its descriptions, examining the exploratory analysis and empirical reliability, and presenting the revised conceptual model. Normality is tested, and the generational cohorts are compared. The chapter concluded with the regression analysis and tested hypotheses, determining the significant predictors of intention.

5.2 Data collection

Data was collected from individuals residing in South Africa across all the provinces. The total number of respondents amounted to 311. Respondents from the pilot study consisted of ten respondents who were not part of the total sample. After filtering and cleaning the data, the total number of respondents analysed was 252.

5.3 Sample Determination

The final sample was determined by excluding responses that failed the set criteria. Of the total number, 59 respondents were omitted for not meeting the qualifying criteria: relevant age, device ownership, and device disposal behaviour. Table 3 presents the final number of responses analysed.

Table 3: Sample Results

Sample Results	
Total number of respondents	311
Less exclusion form screening questions	-1
Total	310
Less exclusions based on device ownership	-1
Total	309
Less exclusions based on device disposal	-57
Final data to be analysed	252

5.4 Profile of Respondents

The largest generational cohort represented is the millennials (28-34), contributing 51.45% of the sample; this was followed by Gen X (44-59), 19.94%. Gen Z (18-27) represents the second lowest cohort, with a participation rate of 16.72% and Baby Boomers (60-78), the lowest-represented cohort, constituting only 11.58%. One response was omitted from the collected data because it did not meet the age criteria.

Regarding the gender distribution, the largest gender segment comprised females, at 53.97%, while males represented 45.24% of the sample. 0.8% of the respondents opted not to disclose their gender.

Most respondents, 78.17%, reside in Gauteng province, making it the highest-represented province in the study. This was followed by the Western Cape, at 5.95%, and KwaZulu-Natal, at 4.37%. The Northern Cape was the lowest-represented province, which accounted for 0.40% of responses.

The majority of the respondents, 97.42%, have previously owned more than one electronic device. Only 2.26% owned one electronic device, and 0.32% have never owned one. The latter was omitted because it did not meet the qualifying criteria.

Most respondents, 81.55%, reported having previously replaced or disposed of electronic devices, while 14.56% had not, and 3.88% were unsure.

A profile of the respondents is presented in Table 4.

Table 4: Profile of respondent

		Frequency	Percent Frequency
Age	0 – 17	1	0,32
	18 – 27 [Gen Z]	52	16,72
	28 – 43 [Millennial]	160	51,45
	44 – 59 [Gen X]	62	19,94
	60 – 78 [Baby Boomer]	36	11,58
Gender	Male	114	45,24
	Female	136	53,97
	Prefer not to say	2	0,79
Province	Eastern Cape	5	1,98
	Free State	8	3,17
	Gauteng	197	78,17
	Limpopo	6	2,38
	Mpumalanga	6	2,38
	North-West	3	1,19
	Northern Cape	1	0,40
	Western Cape	15	5,95
	KwaZulu Natal	11	4,37
Have you owned any of the following electronic devices in the past (mobile phones, tablets, laptops and smartwatches)?	Never owned an electronic device	1	0,32
	One electronic device	7	2,26
	More than one electronic device	302	97,42
Have you replaced or disposed of any of the following electronic devices in the past (mobile phones, tablets, laptops and smartwatches)?	Yes	252	81,55
	No	45	14,56
	Not sure	12	3,88

5.5 Descriptive Statistics (Section B1- B8)

This section presents the descriptive statistics for every item in the questionnaire, covering sections B1 to B8. The dependent and independent items were assessed utilising a Likert-type scale, and average scores were calculated per item (Appendix 4).

5.5.1 Section B1: Attitude towards e-waste recycling (B1.1 – B1.3)

Table 5 outlines the descriptive statistics for the first independent variable, 'attitude towards e-waste recycling,' which encompassed three items. The mean scores are arranged from highest to lowest to reflect the level of agreement. The findings reveal a more substantial consensus for item B1.2, "I recommend recycling e-waste," which has a mean score above average (M = 4.24, SD = 0.93).

Table 5: Descriptive statistics for Attitude towards e-waste recycling

Construct	Item	Mean (M)	Standard Deviation(SD)
Attitude	B1.2	4,24	0,93
	B1.3	4,04	1,06
	B1.1	4,02	1,02

5.5.2 Section B2: Environmental concern (B2.1 – B2.5)

Table 6 presents the descriptive statistics for the second independent variable, 'environmental concern', which comprised of five items. The mean scores descend from highest to lowest. The findings indicate a greater extent of agreement for item B2.3, 'Human beings must live in harmony with nature to ensure their future', with a mean score above average (Mean = 4.28, SD = 0.82). While B2.3 is the item with the highest rating, all the items in B2 are between agree and above.

Table 6: Descriptive statistics for Environmental concern

Construct	Item	Mean (M)	Standard Deviation (SD)
Environmental Concern	B2.3	4,48	0,82
	B2.5	4,42	0,73
	B2.4	4,34	0,82
	B2.2	4,11	0,98
	B2.1	4,02	0,97

5.5.3 Section B3: Subjective Norms (B3.1 – B3.4)

Subjective norms were the third independent variable; the descriptive statistics, which consisted of four items, are outlined in Table 7. With a mean score ordered from highest to lowest, the results from the descriptive statistics indicate that B3.1, 'If my family and friends recycle e-waste, I will also do it,' had the most significant extent of agreement (M = 4,04 and SD 0,93). Two items are rated the lowest B3.2, 'My local community inspires me to participate in recycling e-waste' with a mean score towards disagree (M =2,75 and SD 2,20) and B3.3, 'My friends/peers encourage me to recycle e-waste' (M =2,75 and SD 1,12).

Table 7: Descriptive statistics for Subjective Norms

Construct	Item	Mean(M)	Standard Deviation (SD)
Subjective Norms	B3.1	4,04	0,93
	B3.4	3,45	1,08
	B3.2	2,75	1,2
	B3.3	2,75	1,12

5.5.4 Section B4: Perceived behaviour control (B4.1 - B4.3)

Table 8 depicts the fourth independent variable, 'perceived behavioural control,' which consisted of three items. The mean scores were ordered from highest to lowest. The descriptive statistics for this variable indicate that B4.3, 'I have no obstacles preventing me from responsibly recycling my electronic waste' (M = 3,31 and SD = 1,09).

Table 8: Descriptive statistics for Perceived behaviour control

Construct	Item	Mean (M)	Standard Deviation (SD)
Perceived behavioural control	B4.3	3,31	1,09
	B4.1	3,25	1,2
	B4.2	2,94	1,18

5.5.5 Section B5: Access to recycling facilities (B5.1 - B5.3)

The descriptive statistics for B5, the fifth independent variable, 'Access to recycling facilities', are presented in Table 9. B5 consisted of three items; the mean score is ordered from highest to lowest. All items in B5 fall within disagree and neutral on the Likert scale. B5.2 'It is easy for me to find information on e-waste recycling facilities' is the item with the highest score (M = 2,81 and SD = 1,13).

Table 9: Descriptive statistics for access to recycling facilities

Construct	Item	Mean (M)	Standard Deviation (SD)
Access to recycling facilities	B5.2	2,81	1,13
	B5.3	2,53	1,11
	B5.1	2,5	1,13

5.5.6 Section B6: E-waste recycling marketing campaigns (B6.1 - B3.3)

The study's sixth independent variable was B6, titled 'e-waste marketing campaigns', which consisted of three items. Descriptive statistics appear in Table 10, with mean scores arranged from highest to lowest. All mean values fall below agree (4) on the Likert-type scale, indicating responses lean towards disagree and neutral. The highest mean score was B6.2: 'Marketing campaigns, such as advertising on e-waste recycling, prompt me to recycle e-waste responsibly' (M = 2.81, SD = 1.19).

Table 10: Descriptive statistics for e-waste recycling marketing campaigns

Construct	Item	Mean (M)	Standard Deviation (SD)
Marketing campaigns	B6.2	2,81	1,19
	B6.3	2,81	1,09
	B6.1	2,7	1,15

5.5.7 Section B7: Awareness of consequences (B7.1 - B7.5)

The study's final independent variable was B7, 'awareness of consequences,' presented in Table 11. B7 consisted of five items; the mean scores were arranged from highest to lowest. All items were rated above the agreed threshold (3.5) on the Likert-type scale.

The item with the greatest extent of agreement is B7.5: 'Recycling mobile phones, tablets, laptops and smartwatches guards against toxic substances at landfills' (M = 4.21, SD = 0.78). Closely followed by B7.1, which has the second highest mean score, 'Recycling mobile phones, tablets, laptops, and smartwatches ensures that the environment is not negatively affected' (M = 4.20, SD = 0.74).

Table 11: Descriptive statistics for awareness of consequences

Construct	Item	Mean (M)	Standard Deviation (SD)
Awareness of consequences	B7.4	4,21	0,78
	B7.1	4,2	0,74
	B7.2	4,18	0,74
	B7.5	3,99	0,79
	B7.3	3,89	0,91

5.5.8 Section B8: E-waste recycling intention (B8.1 - B8.4)

The study had one dependent variable, 'e-waste recycling intention'; it presented in Table 12. Section B8 consisted of four items, and the mean scores were ordered from highest to lowest. The item with the highest agreement was B8.1, 'I am keen to participate in electronic waste recycling initiatives' (M = 4.21, SD = 0.78).

Table 12: Descriptive statistics for e-waste recycling intention

Construct	Item	Mean(M)	Standard Deviation(SD)
E-waste recycling intention	B8.1	4,17	0,75
	B8.2	3,98	0,79
	B8.3	3,97	0,81
	B8.4	3,84	0,89

(See Appendix 4 for dependent and independent descriptive statistics results utilising a Likert-type scale)

5.6 Exploratory Factor Analysis

The exploratory analysis (EFA) examined in this section aimed at validating the measurement instrument. EFA was conducted to explore the adapted instrument's factor structures. As noted in the methodological chapter of the study, for EFA to be deemed appropriate, a considerable number of correlations must exceed 0.3 (Watkins, 2018; Hair et al., 2010).

5.6.1 EFA for dependant variable B8: E-waste recycling intention (B8.1 - B8.4)

A correlation analysis was conducted to evaluate the **scale validity**. The dependent variable consisted of four items, and all the factors theoretically grouped. Table 13 presents the EFA findings for section B.

The **correlation matrix** findings were all above 0.3; thus, this was appropriate for the factor analysis. **KMO** was 0.820, above the threshold, and suitable for factor analysis.

For **Bartlett's Test of Sphericity analysis**, p-value was 0.000, confirming suitability for factor analysis. The approx. Chi-square was 680.408, and the degrees of freedom (df) were 6.

For the **anti-image correlation**, the MSAs are all above 0.5; thus, no weak items were omitted. The commonalities utilised the **Principal Axis Factoring (PAF)** to extract factors from the data. At extraction, they are all above 0.3, ranging between 0.495 and 0.867, indicating that a 49.5%—86.7% common variance is shared between the items.

Table 13: EFA results for section B8: E-waste recycling intention

Correlation Matrix					
		B8.1	B8.2	B8.3	B8.4
Correlation	B8.1	1	0,66	0,643	0,552
	B8.2	0,66	1	0,805	0,716
	B8.3	0,643	0,805	1	0,797
	B8.4	0,552	0,716	0,797	1

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0,82
Bartlett's Test of Sphericity	Approx. Chi-Square	680,408
	df	6
	p-value	0

Anti-image Matrices	B8.1	B8.2	B8.3	B8.4
B8.1	,896 ^a	-0,303	-0,202	-0,023
B8.2	-0,303	,825 ^a	-0,458	-0,19
B8.3	-0,202	-0,458	,766 ^a	-0,518
B8.4	-0,023	-0,19	-0,518	,827 ^a

Measures of Sampling Adequacy(MSA)

Communalities		Extraction
B8.1		0,495
B8.2		0,782
B8.3		0,867
B8.4		0,677

Extraction Method: Principal Axis Factoring.

The eigenvalues for B8 determined how many factors were extracted. Outlined in Table 14 along with the factor matrix and rotated factor matrix. The findings show one eigenvalue above 1, 3.095; thus, one factor was extracted. The extracted factor explains 77.36% of the variance. The Scree plot is presented in Appendix 5).

The factor matrix presented in Table 14 outlines the factor loadings on the one extracted factor (rotation was, therefore, not required). The findings indicate that B8.3, 'I intend to put extra effort into the responsible recycling of electronic waste,' loaded the highest at 0.931, and B8.1, 'I am keen to participate in electronic waste recycling initiatives,' loaded the lowest at 0.703; however, the loadings are above 0.4.

Table 14: Total Variance Explained for B8: E-waste recycling intention

Total Variance Explained						
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,095	77,363	77,363	2,821	70,52	70,52
2	0,476	11,89	89,252			
3	0,261	6,515	95,768			
4	0,169	4,232	100			

Extraction Method: Principal Axis Factoring.

Factor Matrix ^a			Factor
			1
B8.3	I intend to put extra effort into the responsible recycling of electronic waste		0,931
B8.2	I intend to make plans to recycle electronic waste responsibly		0,884
B8.4	I intend to make responsible recycling of electronic devices a priority, even if it is not convenient		0,823
B8.1	I am keen to participate in electronic waste recycling initiatives		0,703

Extraction Method: Principal Axis Factoring. a. 1 factor extracted. 7 iterations required.

Rotated Factor Matrix ^a	
a. Only one factor was extracted. The solution cannot be rotated.	

5.6.2 EFA for section independent variables (B1 – B7)

The EFA findings are discussed in this section for the seven independent factors. Similar to the dependent variables, all the theoretical factors grouped accordingly. For the commonalities, PAF was utilised, and two items were omitted due to commonalities less than 0.3, namely B7.3: 'Recycling mobile phones, tablets, laptops, and smartwatches is a way to make electronic products available to others at affordable prices' (commonality, 0.257) and B3.1 'If my family and friends recycle e-waste, I will also do it' (commonality, 0.287).

A considerable number of correlations exceeded 0.3 regarding the **correlation matrix**, suitable for factor analysis.

The **KMO** was 0.860, above the threshold and deemed appropriate.

For **Bartlett's Test of Sphericity analysis**, p-value was 0.000, indicating suitability for factor analysis. The approx. Chi-square was 3412,705, and the degrees of freedom (df) were 276.

The **anti-image correlation** values exceeded 0.5; there was no requirement to omit additional items, as two were already omitted (B7.3 and B3.1).

The **commonalities** are all above 0.3 post-extraction, ranging between 0.317 and 0.964, indicating that a 31.7%—96.4% common variance is shared between the items. (Appendix 6 presents the EFA findings for the independent variables.)

Presented in Table 15 are the **eigenvalues** for independent variables, which determined how many factors were extracted. The findings indicate five eigenvalues greater than 1, accounting for 65.61% of the variance before rotation and 57.63% post-rotation. The Scree plot suggested three to five factors; this is presented in (Appendix 5). The remainder of the independent factors were subjected to a PFA with varimax rotation.

The **rotated factor matrix** outlines the factor loadings on the five empirical factors. As discussed methodology chapter (section 4.4.4.4), B1 and B2 are highly correlated (attitude towards e-waste recycling with environmental concern), similarly with B5 and B4 (perceived behavioural control with access to recycling facilities). Based on the new groupings, the factors were identified as environmental attitude (EA), recycling confidence and facility access (RF), awareness of consequences (AOC), e-waste marketing campaigns (MC), and subjective norms (SN).

Table 15: Total Variance Explained for B1-B7

Total Variance Explained									
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6,937	28,903	28,903	6,530	27,209	27,209	4,057	16,902	16,902
2	4,472	18,633	47,536	4,081	17,006	44,215	3,323	13,844	30,746
3	1,772	7,384	54,920	1,360	5,668	49,883	2,554	10,641	41,388
4	1,469	6,123	61,043	1,085	4,522	54,405	2,180	9,084	50,471
5	1,095	4,564	65,606	0,774	3,226	57,631	1,718	7,160	57,631
6	0,967	4,029	69,636						
7	0,944	3,934	73,569						
8	0,669	2,786	76,355						
8	0,641	2,673	79,028						
10	0,627	2,612	81,641						
11	0,521	2,172	83,812						
12	0,490	2,041	85,853						
13	0,444	1,850	87,703						
14	0,427	1,778	89,481						
15	0,358	1,493	90,974						
16	0,341	1,419	92,393						
17	0,322	1,342	93,735						
18	0,276	1,148	94,884						
19	0,252	1,051	95,934						
20	0,239	0,998	96,932						
21	0,207	0,863	97,795						
22	0,197	0,823	98,618						
23	0,189	0,788	99,406						
24	0,143	0,594	100,000						

Extraction Method: Principal Axis Factoring

Rotated Factor Matrix ^a					
	Factor				
	1	2	3	4	5
B2.3 Human beings must live in harmony with nature to ensure their future	0,807	-0,057	0,005	0,078	-0,038
B2.5 The balance of nature should be respected more attentively to ensure a better future	0,780	-0,073	0,159	-0,101	-0,039
B2.2 I am worried about what the current state of the environment will mean for my future	0,749	0,010	0,107	0,068	0,066
B2.1 I am a keen supporter of environmental protection initiatives	0,715	0,078	0,144	0,149	0,111
B1.2 I recommend recycling e-waste	0,634	0,002	0,348	0,161	0,110
B1.3 I consider the recycling of e-waste a serious responsibility	0,623	0,022	0,443	0,118	0,119
B2.4 Human beings that interfere with nature cause unfortunate consequences for the future	0,621	-0,061	0,160	-0,110	-0,029
B1.1 Recycling e-waste responsibly makes me feel good	0,540	0,084	0,358	0,147	0,225
B5.1 I have easy access to an e-waste recycling facility	-0,059	0,819	0,058	0,063	0,213
B5.3 It is easy for me to recycle e-waste responsibly in my area	-0,005	0,773	-0,003	0,129	0,212
B5.2 It is easy for me to find information on e-waste recycling facilities	0,015	0,737	0,043	0,187	0,119
B4.2 I know how to recycle my electronic waste responsibly	-0,024	0,661	0,244	0,197	0,041
B4.3 I have no obstacles preventing me from responsibly recycling my electronic waste	-0,075	0,534	0,020	0,110	0,121
B4.1 I know which electronic waste can be recycled	0,152	0,438	0,301	0,168	0,039
B7.2 Recycling mobile phones, tablets, laptops, and smartwatches is a way in which I can help to give back to the society of the future	0,265	0,072	0,727	0,069	0,091
B7.1 Recycling mobile phones, tablets, laptops, and smartwatches ensures that the environment is not negatively affected	0,232	0,083	0,721	0,070	0,084
B7.4 Recycling mobile phones, tablets, laptops and smartwatches guards against toxic substances at landfills	0,127	0,108	0,680	-0,039	-0,037
B7.5 Recycling mobile phones, tablets, laptops, and smartwatches contributes to job creation	0,170	0,089	0,513	0,131	0,127
B6.2 Marketing campaigns, including advertising about e-waste recycling, remind me to recycle e-waste responsibly	0,067	0,280	0,047	0,922	0,168
B6.1 Media messages and programmes motivate me to recycle e-waste responsibly	0,053	0,376	0,092	0,697	0,213
B6.3 Marketing campaigns, including advertising, are useful in making me more aware of the importance of responsible e-waste recycling	0,099	0,206	0,136	0,625	0,231
B3.3 My friends/peers encourage me to recycle e-waste	0,085	0,336	0,095	0,224	0,795
B3.2 My local community inspires me to participate in recycling e-waste	0,007	0,367	0,045	0,201	0,665
B3.4 People who are important to me would want me to recycle e-waste responsibly	0,179	0,173	0,235	0,288	0,514

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalisation^a

a. Rotation converged in 7 iterations.

5.7 Reliabilities

Results from Cronbach Alpha based on empirical factors

The Cronbach Alpha for independent and dependent factors obtained in the factor analysis is reported in Table 16. The Cronbach values were above 0.7 and were acceptable (Hair et al., 2010).

The empirical reliabilities are based on factor analyses and consist of five constructs due to attitude and environmental concern perceived behavioural control, and access to facilities assimilating as a single construct. This approach is appropriate as it mitigates against multicollinearity issues in the regression analysis.

The reliabilities obtained are above the 0.7 consistency level. Notably, the dependent variables consisted of one construct for empirical reliabilities with a reliable Cronbach Alpha of 0,901.

Table 16: Cronbach Alpha empirical reliability test for independent and dependent variables

Independent Variables	Cronbach Alpha Value
Environmental Attitude	0.892
Recycling confidence and facility access	0,845
Awareness of Consequences	0,795
Marketing Campaigns	0,873
Subjective Norms	0,809
Dependant Variable	Cronbach Alpha
Intention to recycle	0,901

The updated model and hypotheses tested in the study are graphically depicted below. The model comprises five factors predicting e-waste recycling intention across generational cohorts.

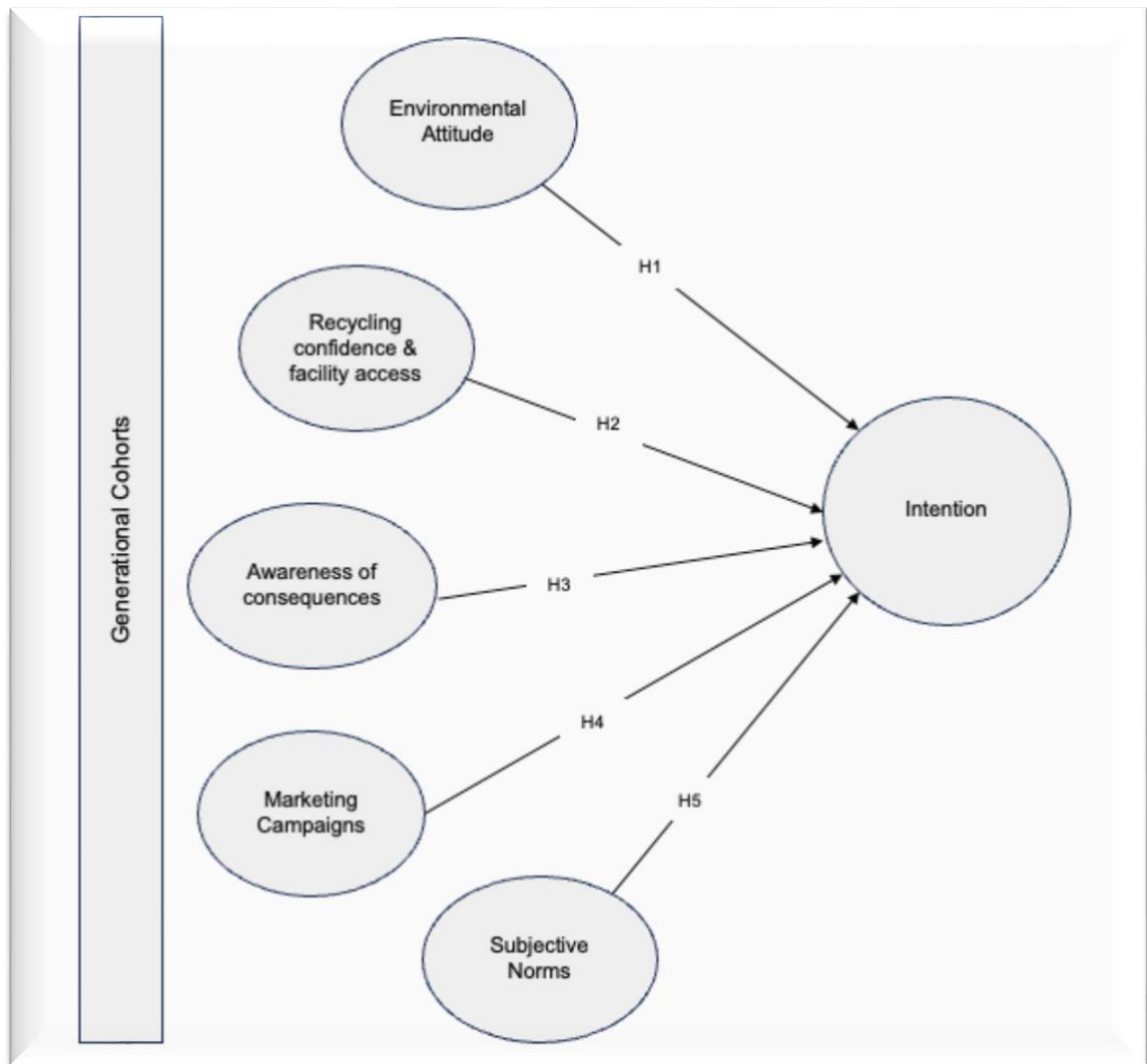


Figure 3: Revised conceptual model

(Author's design)

5.8 Descriptive statistics on scales

The overall scores were calculated based on empirical factors from the factor analysis. Table 22 presents the mean scores per empirical factor. The mean score for environmental attitude was (M = 4.21), awareness of consequences (M = 4.14), and for the dependent variable, e-waste recycling intention (M = 3.99), indicating agreement on the intention to recycle. Recycling confidence, facility access (M = 2.89), and e-waste recycling marketing campaigns (M = 2.77) indicate lower agreement, falling below neutral. In contrast, subjective norms influencing e-waste recycling (M = 2.98) reflect a neutral stance.

Table 17: Model Statistics

	Mean (M)	Standard Deviation
Environmental Attitude	4,21	0,7
Recycling confidence and Access to facilities	2,89	0,86
Awareness of consequences	4,14	0,6
E-waste recycling marketing campaigns	2,77	1,02
Subjective Norms influencing e-waste recycling	2,98	0,97
E-waste recycling intention	3,99	0,71

5.9 Normality Tests

Testing for normality was essential before continuing with the regression tests. Normality tests were conducted on the independent and dependent empirical factors utilising Shapiro-Wilk and Kolmogorov-Smirnov to assess for normality. As discussed in the methodology chapter (section: 4.6). This is presented in Table 18.

Table 18: Normality Tests

		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Environmental Attitude	18 – 27 [Gen Z]				0,980	34	0,788
	28 – 43 [Millennial]	0,102	50	0,200			
	44 – 59 [Gen X]	0,231	53	0,000			
	60 – 78 [Baby Boomer]				0,854	32	0,001
Recycling confidence & facility access	18 – 27 [Gen Z]				0,972	34	0,518
	28 – 43 [Millennial]	0,233	50	0,000			
	44 – 59 [Gen X]	0,081	53	0,200			
	60 – 78 [Baby Boomer]				0,961	32	0,287
Awareness of consequences	18 – 27 [Gen Z]				0,833	34	0,000
	28 – 43 [Millennial]	0,197	50	0,000			
	44 – 59 [Gen X]	0,119	53	0,057			
	60 – 78 [Baby Boomer]				0,912	32	0,013
E-waste recycling marketing campaigns	18 – 27 [Gen Z]				0,945	34	0,084
	28 – 43 [Millennial]	0,106	50	0,200			
	44 – 59 [Gen X]	0,131	53	0,024			
	60 – 78 [Baby Boomer]				0,972	32	0,568
Subjective Norms influencing e-waste recycling	18 – 27 [Gen Z]				0,969	34	0,434
	28 – 43 [Millennial]	0,125	50	0,051			
	44 – 59 [Gen X]	0,131	53	0,024			
	60 – 78 [Baby Boomer]				0,952	32	0,165
E-waste recycling intention	18 – 27 [Gen Z]				0,882	34	0,002
	28 – 43 [Millennial]	0,223	50	0,000			
	44 – 59 [Gen X]	0,183	53	0,000			
	60 – 78 [Baby Boomer]				0,910	32	0,011

a. Lilliefors Significance Correction

5.10 Comparisons between the Generational Cohorts

5.10.1 ANOVA Results

For each factor, the findings indicate that all the p-values were above 0.05, and all the variances were equal and suitable for the ANOVA. A one-way ANOVA parametric test was conducted on the mean scores to assess statistically significant differences among the generational cohorts. (For justifications, see the methodology chapter, section 4.6 on normality and comparisons.) Table 19 presents the findings, showing significant differences between the cohorts: Environmental attitude (p-value = 0.001), recycling confidence & facility access (p-value = 0.002), awareness of consequences (p-value =

0.001), subjective norms (p-value = 0.000), and e-waste recycling intention (p-value = 0.009). However, e-waste recycling marketing campaigns had a p-value of 0.05 (p-value = 0.083), indicating no statistical difference between the cohorts for marketing campaigns. This was also evident in the descriptive statistics (Appendix 4).

Table 19: ANOVA for comparison

		Sum of Squares	df	Mean Square	F	Sig.
Environmental Attitude	Between Groups	7,599	3	2,533	6,425	0,000
	Within Groups	65,054	165	0,394		
	Total	72,653	168			
Recycling confidence & facility access	Between Groups	11,437	3	3,812	5,164	0,002
	Within Groups	121,809	165	0,738		
	Total	133,245	168			
Awareness of consequences	Between Groups	5,453	3	1,818	5,947	0,001
	Within Groups	50,433	165	0,306		
	Total	55,886	168			
E-waste recycling marketing campaigns	Between Groups	7,243	3	2,414	2,262	0,083
	Within Groups	176,071	165	1,067		
	Total	183,314	168			
Subjective Norms influencing e-waste recycling	Between Groups	26,582	3	8,861	10,315	0,000
	Within Groups	141,729	165	0,859		
	Total	168,310	168			
E-waste recycling intention	Between Groups	5,935	3	1,978	3,986	0,009
	Within Groups	81,887	165	0,496		
	Total	87,822	168			

5.10.2 Multiple comparisons

Having established the differences, a **Scheffe post-hoc** test with **Bonferroni adjustment** was conducted to compare each group against the others and to identify the specific areas of difference. Comparisons were significant if the p-value (sig.) was below 0.025. (Refer to methodology chapter section 4.6 normality and comparison for justifications). The results are reported below.

Multiple Comparisons on Environmental Attitude

Regarding environmental attitude, the findings indicate that Gen Z significantly differs from Gen X (p-value = 0.012) and Boomers (p-value = 0.001). Gen X differs from Gen Z (p-value = 0.012), and Boomers significantly differ from Gen Z (p-value = 0.001). There were no differences found for millennials. These findings are presented in Table 20.

Table 20: Multiple Comparisons on Environmental Attitude

Scheffe		Mean Difference (I-J)	Sig.
Dependent Variable			
18 – 27 [Gen Z]	28 – 43 [Millennial]	-0,359	0,090
	44 – 59 [Gen X]	-,464*	0,012
	60 – 78 [Baby Boomer]	-,648*	0,001
28 – 43 [Millennial]	18 – 27 [Gen Z]	0,359	0,090
	44 – 59 [Gen X]	-0,105	0,869
	60 – 78 [Baby Boomer]	-0,290	0,250
44 – 59 [Gen X]	18 – 27 [Gen Z]	,464*	0,012
	28 – 43 [Millennial]	0,105	0,869
	60 – 78 [Baby Boomer]	-0,185	0,632
60 – 78 [Baby Boomer]	18 – 27 [Gen Z]	,648*	0,001
	28 – 43 [Millennial]	0,290	0,250
	44 – 59 [Gen X]	0,185	0,632

Multiple Comparisons on Recycling confidence and facility access

Table 21 presents the findings for the multiple comparison results on recycling confidence and facility access, revealing significant differences between Millennials and Gen X (p = 0.019) and Millennials and Baby Boomers (p = 0.018) regarding recycling confidence and facility access. Gen X differs from Millennials (p = 0.019), and Baby Boomers differ from Millennials (p = 0.018).

Table 21: Multiple Comparisons on Recycling confidence and facility access

Scheffe		Mean Difference (I-J)		Sig.
Dependent Variable				
18 – 27 [Gen Z]	28 – 43 [Millennial]	0,178		0,832
	44 – 59 [Gen X]	-0,365		0,296
	60 – 78 [Baby Boomer]	-0,448		0,218
28 – 43 [Millennial]	18 – 27 [Gen Z]	-0,178		0,832
	44 – 59 [Gen X]	-,543*		0,019
	60 – 78 [Baby Boomer]	-,626*		0,018
44 – 59 [Gen X]	18 – 27 [Gen Z]	0,365		0,296
	28 – 43 [Millennial]	,543*		0,019
	60 – 78 [Baby Boomer]	-0,084		0,979
60 – 78 [Baby Boomer]	18 – 27 [Gen Z]	0,448		0,218
	28 – 43 [Millennial]	,626*		0,018
	44 – 59 [Gen X]	0,084		0,979

Multiple Comparisons on Awareness of Consequences

The findings regarding awareness of consequences indicate that Gen Z differs significantly from Gen X (p-value = 0.002). This cohort also differs from Boomers (p-value = 0.011). Gen X differs from Gen Z (p-value = 0.002). Additionally, Boomers differ from Gen Z (p-value = 0.011). The findings are presented in Table 22.

Table 22: Multiple Comparisons on Awareness of Consequences

Scheffe		Mean Difference (I-J)		Sig.
Dependent Variable				
18 – 27 [Gen Z]	28 – 43 [Millennial]	-0,346		0,052
	44 – 59 [Gen X]	-,480*		0,002
	60 – 78 [Baby Boomer]	-,463*		0,011
28 – 43 [Millennial]	18 – 27 [Gen Z]	0,346		0,052
	44 – 59 [Gen X]	-0,134		0,678
	60 – 78 [Baby Boomer]	-0,117		0,831
44 – 59 [Gen X]	18 – 27 [Gen Z]	,480*		0,002
	28 – 43 [Millennial]	0,134		0,678
	60 – 78 [Baby Boomer]	0,017		0,999
60 – 78 [Baby Boomer]	18 – 27 [Gen Z]	,463*		0,011
	28 – 43 [Millennial]	0,117		0,831
	44 – 59 [Gen X]	-0,017		0,999

Multiple Comparisons on Subjective Norms influencing e-waste recycling

Extensive differences were found in subjective norms between the generational cohorts. Gen Z significantly differs from Boomers (p-value = 0.001); Millennials differ from Gen X (p-value = 0.010); and they also significantly differ from Boomers (p-value = 0.000). Gen X differs from Millennials (p-value = 0.010), while Boomers significantly differ from Millennials (p-value = 0.000) and Gen Z (p-value = 0.001). The findings are presented in Table 23.

Table 23: Multiple Comparisons on Subjective Norms

Scheffe		Mean Difference (I-J)	Sig.
Dependent Variable			
18 – 27 [Gen Z]	28 – 43 [Millennial]	0,029	0,999
	44 – 59 [Gen X]	-0,598	0,038
	60 – 78 [Baby Boomer]	-,963*	0,001
28 – 43 [Millennial]	18 – 27 [Gen Z]	-0,029	0,999
	44 – 59 [Gen X]	-,627*	0,010
	60 – 78 [Baby Boomer]	-,991*	0,000
44 – 59 [Gen X]	18 – 27 [Gen Z]	0,598	0,038
	28 – 43 [Millennial]	,627*	0,010
	60 – 78 [Baby Boomer]	-0,365	0,381
60 – 78 [Baby Boomer]	18 – 27 [Gen Z]	,963*	0,001
	28 – 43 [Millennial]	,991*	0,000
	44 – 59 [Gen X]	0,365	0,381

Multiple Comparisons on E-waste Recycling Intention

Regarding intention, the findings reveal only two significant differences: Gen Z differs from Baby Boomers (p-value = 0.024); similarly, Baby Boomers differ from Gen Z (p-value = 0.024). The findings are presented in Table 24.

Table 24: Multiple Comparisons on Intention

Scheffe		Mean Difference (I-J)	Sig.
Dependent Variable			
18 – 27 [Gen Z]	28 – 43 [Millennial]	-0,421	0,069
	44 – 59 [Gen X]	-0,435	0,052
	60 – 78 [Baby Boomer]	-,541*	0,024
28 – 43 [Millennial]	18 – 27 [Gen Z]	0,421	0,069
	44 – 59 [Gen X]	-0,015	1,000
	60 – 78 [Baby Boomer]	-0,120	0,903
44 – 59 [Gen X]	18 – 27 [Gen Z]	0,435	0,052
	28 – 43 [Millennial]	0,015	1,000
	60 – 78 [Baby Boomer]	-0,106	0,930
60 – 78 [Baby Boomer]	18 – 27 [Gen Z]	,541*	0,024
	28 – 43 [Millennial]	0,120	0,903
	44 – 59 [Gen X]	0,106	0,930

(Descriptive statistics per cohort are presented in Appendix 7).

5.11 Regression Analysis

5.11.1 Multiple Regression Assumptions

- **Outliers:** One outlier was identified; the regression standardised residuals were between -3.937 and 2.880. Illustrated in Figure 4

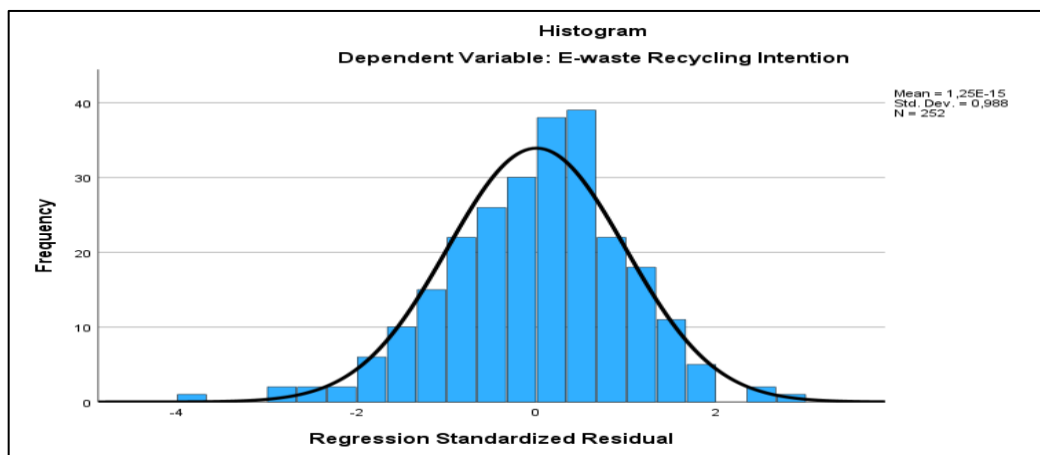


Figure 4: Regression Standardised Residuals

This outlier was omitted, the data was re-run, and all the standardised residuals were between -3 and 3, indicating no outliers.

- **Correlations findings:** The second assumption addressed correlations, confirming that each independent variable was significantly related to the

dependent variable (p-value = 0.000) with positive correlation coefficients. All correlations were positive, and the results indicated that all factors impacted intention, the most noteworthy being awareness of the consequences and environmental attitudes.

- **Multicollinearity findings:** The collinearity statistics verified that multicollinearity was absent. While tolerance values were greater than 0.02, VIF values fell below 0.10, demonstrating no multicollinearity.

5.11.2 Regression Results

Model Summary

Table 25 presents the model summary findings, which indicated that the independent variables account for 43.4% of the variance in the intention to recycle. (R Square = 0.434). While the model is reasonably strong, recycling intention has a 56% variance.

Table 25: Model Summary

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,659 ^a	0,434	0,420	0,531

a. Predictors: (Constant), Subjective Norms, Environmental Attitude, Age, Recycling confidence & facility access, Awareness of consequences, Marketing. b. Dependent Variable: Intention

ANOVA

Table 26 presents the model's significance, indicating it is statistically significant with a p-value less than 0.01. This implies that the independent variables as a group are crucial for explaining the dependent variable.

Table 26: ANOVA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52,899	6	8,816	31,216	<,001 ^b
	Residual	68,913	244	0,282		
	Total	121,812	250			

a. Dependent Variable: Intention b. Predictors: (Constant), Subjective Norms, Environmental Attitude, Age, Recycling confidence & facility access, Awareness of consequences, Marketing.

5.11.3 Regression Coefficients

The standardised coefficients (Beta) were examined to determine which independent variable predicts intention, and the p-value (sig.) was assessed to ascertain which independent variables contributed significantly to the dependent variable.

5.11.3.1 Summary of Coefficients Results

Table 27 presents the regression coefficients that address the study's hypotheses. The constant value was significant at 0.587. The findings indicate three substantial predictors of intention that support the study's hypotheses: Environmental attitude (B = 0.155 and p-value = 0.007). The positive coefficient indicates an increased environmental attitude raises the dependent variable (intention). Awareness of consequences (B = 0.464 and p-value = 0.000); the findings show that this independent variable is the strongest predictor of intention. Although subjective norms (B = 0.153 and p-value = 0.017) have a positive coefficient, it is moderate. Regarding the other independent variables, age was added as a control variable (see 4.7 multiple regression analysis in the methodology chapter for justifications); the findings indicate non-significance in predicting intention (p-value = 0.902), while recycling confidence and facility access (p-value = 0.605) are above 0.05, as is marketing (p-value = 0.227) which does not support the study's hypotheses.

Table 27: Coefficients

Coefficients ^a								
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics		
	B	Std. Error	Beta			Tolerance	VIF	
1 (Constant)	0,587	0,270		2,169	0,031			
Age	-0,005	0,042	-0,006	-0,124	0,902	0,842	1,187	
Environmental Attitude	0,155	0,057	0,155	2,727	0,007	0,720	1,389	
Recycling confidence & facility access	0,025	0,048	0,031	0,518	0,605	0,660	1,515	
Awareness of consequences	0,539	0,066	0,464	8,139	0,000	0,713	1,402	
Marketing	0,050	0,041	0,073	1,211	0,227	0,634	1,577	
Subjective Norms	0,111	0,046	0,153	2,402	0,017	0,570	1,753	

a. Dependent Variable: Intention

5.12 Summary of Hypothesis

Below is a summary of the tested hypotheses based on the empirical factors comprising five factors that predicted e-waste recycling intention across generational cohorts. Of the five tested hypotheses, three were supported. Table 28 outlines the summary.

H1: A positive environmental attitude significantly enhances consumers' intention to recycle e-waste responsibly. This was supported.

(Vijayan et al., 2023; Aboelmaged, 2021; Koshta et al., 2022 ; Zhang et al., 2019)

H2: Prevailing subjective norms significantly influence consumers' e-waste recycling intention. This was supported.

(Laeeuyddin et al. 2022; Aboelmaged, 2021).

H3: Consumers' recycling confidence and access to facilities significantly influence e-waste recycling intention. This was rejected.

(Zhang et al., 2019; Vijayan et al., 2023).

H4: Marketing campaigns significantly enhance consumers' intent to recycle e-waste responsibly. This was rejected.

(Sujata et al., 2019).

H5: Consumers' awareness of the consequences of their behaviour has a significant positive influence on their intention to recycle e-waste. This was supported.

(Khan et al., 2019; Kumar, 2019)

Table 28: Summary of Hypotheses results

Research Question	Hypothesis	Supported / Rejected by the research
<p>RQ1: How do consumers' attitude towards recycling influence their intention to recycle e-waste sustainably?</p> <p>RQ2: How does environmental concern influence consumers' intention to recycle e-waste sustainably?</p>	<p>H1: A positive environmental attitude significantly enhances consumers' intention to recycle e-waste responsibly. Supported</p>	<p>Vijayan et al., 2023 Aboelmaged, 2021 Koshta et al., 2022 Zhang et al., 2019</p>
<p>RQ 3: How do subjective norms influence consumers' intention to recycle e-waste sustainably?</p>	<p>H2: Prevailing subjective norms significantly influence consumers' e-waste recycling intention. Supported.</p>	<p>Laeeyuddin et al. 2022 Aboelmaged, 2021</p>
<p>RQ 4: How does perceived behavioural control influence consumers' intention to recycle e-waste sustainably?</p> <p>RQ 5: How does access to recycling facilities influence consumers' intention to recycle e-waste sustainably?</p>	<p>H3: Consumers' recycling confidence and access to facilities significantly influence e-waste recycling intention. Rejected.</p>	<p>Zhang et al., 2019 Vijayan et al., 2023</p>
<p>RQ 6: How do marketing campaigns influence consumers' intention to recycle e-waste sustainably?</p>	<p>H4: Marketing campaigns significantly enhance consumers' intent to recycle e-waste responsibly. Rejected.</p>	<p>Sujata et al., 2019</p>
<p>RQ 7: How does awareness of the consequences of e-waste disposal influence consumers' intention to sustainably recycle e-waste?</p>	<p>H5: Consumers' awareness of the consequences of their behaviour has a significant positive influence on their intention to recycle e-waste. Supported.</p>	<p>Khan et al., 2019 Kumar, 2019</p>

Chapter 6: DISCUSSION OF RESULTS

6.1 Introduction

This chapter begins with a review of findings, encompassing statistical and descriptive statistics. The conclusions drawn from the tested hypotheses are discussed, highlighting the significant differences among generational cohorts.

6.2 Summary of Results

6.2.1 Data collection

The final sample data that was analysed consisted of 252 respondents; however, in addressing the multiple regression assumptions, one case was omitted due to the presence of an outlier. The final sample used for statistical analyses was 251. This aligns with observations in the literature where e-waste recycling research typically uses a sample size of 250 – 500; however, many studies use less than 250 (Gilal et al., 2022). This is evident in Kumar's (2019) study that explored e-waste recycling among young adults by studying a Chinese and Indian sample. The author administered 300 questionnaires per group, with 101 usable for the Chinese sample and 105 for the Indian sample (Kumar, 2019). In a study using the TPB to investigate the e-waste behavioural intention of households in Southern India, the researcher utilised a sample of 228 deemed suitable for statistical analysis (Vijayan et al., 2023).

6.2.2 Descriptive statistics

The sample was appropriate since 97.4% of the respondents have previously owned electronic devices, which concurs with census data on device ownership in South Africa, which was found to be 92% (StatsSA, 2022). At the same time, 81,6% have disposed of or replaced electronic devices. The sample was appropriate as it comprised 45.2% of males and 54.0% of females, representing the South African population, where females represent a larger share at 51.5% compared to males at 48.5% (StatsSA, 2022). While the location of the respondents was skewed towards Gauteng (78.20%), there was representation across all the provinces, although marginal for Northern Cape, North-

West and Eastern Cape. The sample was also relevant as all the generational cohorts were represented: 51.4% comprised millennials and 19.9% Gen X, Gen Z 16.7% and the Boomers had the smallest representation among the cohorts at 11.6%. The uneven response rates in studies utilising multiple generational cohorts were expected and noted as a study limitation (Ivanova et al., 2019).

6.3.3 Factor analysis

The study identified seven theoretical constructs grounded in the expanded TPB's theoretical framework, which formed the basis of the hypotheses. However, the factor analysis revealed strong correlations between certain constructs' attitudes towards e-waste recycling with environmental concerns and perceived behavioural control with access to facilities. These high correlations suggest minimal distinction between the constructs, which were combined into single constructs to mitigate multicollinearity in the regression analysis. Thus, five empirical constructs emerged: awareness of consequences, environmental attitude, recycling confidence and facility access, marketing campaigns and subjective norms (Illustrated in the revised conceptual model Figure 3 in section 5.7).

6.3.4 Comparison between Generational Cohorts

The differences among generational cohorts were first assessed to answer the research question of how generational cohorts differ regarding attitude, environmental concern, subjective norms, perceived behavioural control, access to recycling facilities, marketing campaigns, awareness of consequences, and intention to recycle. The one-way ANOVA parametric test revealed notable differences between the cohorts for all factors apart from marketing here; the data showed no significant difference regarding marketing campaigns and their possible influence on intention. Through the Scheffe post-hoc test with Bonferroni adjustment, the cohorts were further compared to identify the specific differences, and a key finding was that Gen Z differs significantly from Boomers and Gen X in all the factors.

6.4 Hypothesis Testing

The five hypotheses tested revealed three significant predictors of intention, while two were rejected. The findings are discussed below.

6.4.1 Environmental attitude and e-waste recycling intention (H1)

The coefficient results revealed a strong predictive relationship between environmental attitude and intention ($B = 0.155$ and $p\text{-value} = 0.007$). Findings suggest that a positive environmental attitude increases the inclination to recycle e-waste. Hypothesis 1 was supported.

Numerous studies have broadened the TPB to incorporate environmental concerns when assessing recycling and purchase intentions. These studies also found a favourable relationship between environmental concern and intention and between attitude and intention (Aboelmaged, 2021; Koshta et al., 2022; Vijayan et al., 2023; Zhang et al., 2019). The findings of this study confirmed that consumers with high regard for the environment also displayed positive attitudes, indicating a strong positive connection between attitude and environmental concern (Zhang et al., 2019). This study supports these findings regarding the correlation between attitude and ecological concern and its effect on intention. Additionally, the overall mean scores further support these findings ($M = 4.21$) for environmental attitude, indicating the highest agreement compared to the other independent factors.

Therefore, this study confirmed that a positive environmental attitude increases the inclination. Consistent with prior studies (Aboelmaged, 2021; Koshta et al., 2022; Vijayan et al., 2023; Zhang et al., 2019).

6.4.2 Subjective norms and e-waste recycling intention (H2)

The coefficient results indicated that subjective norms positively predict intention ($B = 0.153$ and $p\text{-value} = 0.017$). Although moderate, with an overall mean score of 2.89, the data suggests that subjective norms predict intentions. Hypothesis 2 was supported.

In their research on the factors influencing the safe disposal of mobile phones, Laeequddin et al. (2020) found that subjective norms are predicted intentions. Thus, the study confirms the literature. In contrast, a survey conducted in the United Arab Emirates by Aboelmaged (2021) revealed the relationship between subjective norms and intention was insignificant. However, the author notes that while subjective norms could be influential, they are context-dependent and may differ based on culture and socioeconomic factors (Aboelmaged, 2021).

Therefore, this study confirmed that subjective norms strongly predicted e-waste recycling intention consistent with Laeequddin et al. (2020).

6.4.3 Recycling confidence, access to facilities and e-waste recycling intention (H3)

The coefficient results indicated that recycling confidence and access to facilities, which comprise (perceived behavioural control and access to facilities) were insignificant in predicting intention ($B = 0.031$ and $p\text{-value} = 0.605$). Hypothesis 3 was rejected.

Vijayan et al. (2023) reported findings contradicting this study's findings. The authors noted that convenient access to recycling facilities strongly predicts behavioural intention for recycling e-waste. However, considering that the context of this finding is based on evidence from Indian households (Vijayan et al., 2023). Furthermore, data was collected from males only, while this study considered males and females across different generational cohorts (Vijayan et al., 2023). Lastly, the country's context is also vital, as recycling infrastructure may be conveniently available (Kumar, 2019).

Regarding perceived behavioural control, Zhang et al. (2019) also contradicted this study's findings and reported that perceived behavioural control significantly influences intention. Perceived behavioural control and access to facilities are closely related, as consumers' perceived control reduces due to the availability of resources such as recycling facilities (Phulwani et al., 2021). Compared to developed countries, recycling infrastructure in South Africa is underdeveloped (Forti et al., 2020). An analysis of the overall mean score revealed a lower agreement for recycling confidence and access to facilities on the intention to recycle ($M = 2.89$). These items also had mean scores between disagree and neutral, indicating that recycling confidence and access to

facilities had an insignificant relationship. Thus, it is assumed that the lack of infrastructure would influence the consumer's perceived control; this assumption is supported by Kumar (2019), who found that perceived behavioural control and convenient access to recycling facilities did not influence intention primarily due to the lack of infrastructure (Kumar, 2019).

Therefore, this study's findings contradicted prior research findings (Vijayan et al., 2023; Zhang et al., 2019). It is essential to recognise that these studies took place in various cultural settings with better access to recycling facilities. Thus, the hypothesis for recycling confidence and access to facilities was not supported. The findings highlight the urgent need for recycling infrastructure in South Africa to strengthen consumers' recycling confidence and access to facilities' intention.

6.4.4 Marketing campaigns and e-waste recycling intention (H4)

Regarding marketing campaigns, the coefficient results indicated that it is insignificant in predicting intention ($B = 0.073$ and $p\text{-value} = 0.227$), with an overall mean score of 2.77, making it the lowest-rated factor. Hypothesis 4 was rejected.

This study contradicts the findings of Sujata et al. (2019), who reported that marketing campaigns strongly predict intention. However, it would be remiss to disregard insights from previous research findings similar to this study. Muthukumari et al. (2024) argue that marketing campaigns do not directly predict recycling behaviours. Instead, it affects perceived behavioural control and attitude, which affect consumers' recycling intentions (Muthukumari et al., 2024). While marketing is an effective communication tool, marketing campaigns can be ineffective without a thorough marketing messaging strategy (Trivedi et al., 2018).

Therefore, this study contradicts the findings from prior studies (Sujata et al., 2019). However, this study aligns with the notion that marketing campaigns do not directly influence intention; instead, the influence is indirect (Muthukumari et al., 2024).

6.4.5 Awareness of the consequences and e-waste recycling intention (H5)

The finding revealed that understanding the outcomes or consequences of behaviour was the most influential predictor of intention ($B = 0.464$ and $p\text{-value} = 0.000$), indicating a positive relationship with intention. Hypothesis 5 was supported.

The findings were consistent with the previous research. Khan et al. (2019) reported that awareness of consequences does predict intention. However, it contradicts the findings of Kumar (2019), who reported that awareness of consequences did not influence intention. The assumption was that the sharp contrast was due to the differing sample characteristics; while this study focused on all the generational cohorts, Kumar (2019) focused on young adults only.

It was evident that the cohorts have a heightened awareness about the consequences of their behaviours, and their behaviours are guided by an evaluation of possible outcomes, indicating that the awareness of an outcome influences intention (Ajzen, 1991). Khan et al. (2019) also found a positive connection between environmental concern and attitude, suggesting that the consequences are perceived to be positive, which results in a positive attitude. Analysing the overall mean scores per empirical factor indicated a mean score of 4.14, suggesting a greater extent of agreement and a significant relationship between intention and awareness of consequences. This supports the theory put forward by Ajzen (1991).

Therefore, while contradictory findings were apparent, this research supports the conclusions drawn by Khan et al. (2019).

6.4.6 Difference between the Generational Cohorts' intention to recycle e-waste

The factor analysis revealed a high overall agreement on recycling intention ($M = 3.99$); the item with the highest extent of agreement was B1, 'I am keen to participate in electronic waste recycling initiatives' ($M = 4.21$, $SD = 0.78$). This indicates that all the cohorts positively intend to partake in e-waste recycling initiatives. However, there were differences in intention ($p\text{-value} = 0.009$). The most significant difference was between Gen Z and Boomers ($p\text{-value} = 0.024$) and Boomers and Gen Z (0.024). Additionally, Boomers had a higher average mean score regarding the intention to recycle (4.20) than the other cohorts, as with all the different variables. This confirms that older generations

tend to engage more in sustainable recycling practices (StatsSA, 2018). Conversely, Gen Z recorded the lowest average mean score regarding intention ($M = 3.65$), as was the case with all the different variables. Although moderate, it highlights a difference in their intention to recycle e-waste.

Regarding Gen X, no fundamental difference was found between millennials and the other cohorts regarding intention. The extent of agreement regarding intention to recycle e-was marginally different with Gen X ($M = 4.09$) and millennials (4.08). However, there were differences between these cohorts across the various variables, which are discussed below.

6.4.7 Difference between the Generational Cohorts across independent factors

6.4.7.1 Environmental attitude and e-waste recycling intention

The literature review established distinct differences among generational cohorts (refer to chapter two - The Role of Generational Cohorts). The results of the statistical analysis of their intention to recycle e-waste were valid. The ANOVA comparison revealed differences among the cohorts in most factors, including environmental attitude, which showed a notable distinction between the cohort's p-value of 0.000. The post-hoc test with Bonferroni adjustment established that Gen Z differs significantly from Boomers and Gen X regarding environmental attitudes. Boomers had the greatest extent of agreement for environmental attitude ($M = 4.52$), followed by Gen X (4.33). This is consistent with the findings regarding older cohorts (Ham et al., 2022; Parzonko et al., 2021; Wang et al., 2022). The other cohorts had agreement levels of above average, indicating that environmental attitude does predict intention across cohorts. This study also extends the literature through a South African lens, outlining the unique differences among generational cohorts' e-waste recycling intentions and highlighting the requirements for different strategies to influence Gen Z intention.

6.4.7.2 Subjective norms and e-waste recycling intention

Generational cohorts differ substantially regarding the perceptions of social pressure from friends, family and society, as the data revealed when comparisons were conducted (p-value = 0.000). The data showed that Gen Z differs from Boomers (p-value = 0.001),

and millennials differ significantly from Boomers (p -value = 0.000) and Gen X (p -value = 0.010). This indicates similarities between millennials and Gen Z regarding subjective norms; additionally, the data showed that these cohorts rated the lowest extent of agreement regarding the influence of subjective norms. An unexpected key finding in this study regarding generational differences in e-waste recycling intention is that subjective norms do not predict intention for younger South African cohorts. Kumar (2019) found that subjective norms predict e-waste recycling intention among Chinese and Indian Gen Z. These differences highlight the role of country context and culture; subjective norms are more influential in cultures where behaviour is legitimised and confirmed (Aboelmaged, 2021).

In contrast, subjective norms are more likely to predict intention for older cohorts. Boomers ($M = 3.70$) and Gen X ($M = 3.33$) agreed more regarding subjective norms, suggesting that social pressure from family or the local community will influence the intention to engage in e-waste recycling initiatives among Boomers and Gen X.

6.4.7.3 Recycling confidence, access to facilities and e-waste recycling intention

Generational cohorts differ significantly regarding recycling confidence and access to facilities, as revealed when the ANOVA for comparisons were conducted (p -value = 0.002). The data also showed differences between Gen X and millennials (p -value = 0.0019) and Boomer and millennials (p -value = 0.018). The millennial cohort differed from other cohorts such as Gen X (p -value = 0.019) and Boomers (p = value 0.018). All the cohorts had neutral to low levels of agreement regarding recycling confidence and access to facilities; millennials' extent of agreement regarding this factor was marginally lower ($M = 2.58$). Research on South African millennials and their e-waste recycling intentions is scantily available. A study on Lithuanian millennials' recycling intentions revealed a positive connection between perceived behavioural control and intention (Bhutto et al., 2023). Access to facilities and the lack of convenience can thus also be the reason for the low extent of agreement among South African cohorts regarding recycling confidence and access to facilities, as is the case across all cohorts (Kumar, 2019).

6.4.7.4 Marketing campaigns and e-waste recycling intention

Concerning marketing, the data revealed no statistical differences between the generational cohorts (p-value = 0.083). All the cohorts rated this factor below average, indicating that marketing campaigns do not predict intention. It can thus be assumed that the observation from Muthukumari et al. (2024) validated that marketing campaigns indirectly influence intention.

6.4.7.5 Awareness of the consequences and e-waste recycling intention

The statistical analysis revealed a notable difference between groups regarding awareness of consequences (p-value = 0.001). While most of the cohorts rated above agree, the post-hoc test with Bonferroni adjustment revealed that Gen Z differs significantly from Boomers (p-value = 0.011) and Gen X (p-value = 0.002). Awareness of consequences was a significant predictor of intention across all the cohorts.

6.5 Conclusion

The study focused on identifying the major factors that elevate consumers' intentions to partake in e-waste recycling activities and the differences between generational cohorts. This was accomplished as the study uncovered three major factors that influence intention. This chapter summarised the descriptive and statistical findings outlined in Chapter 5. Five empirical constructs that emerged from the factor analysis and the conclusions of the tested hypotheses were discussed comprehensively. Of the five hypotheses, three were supported: environmental attitude, subjective norms and awareness of consequences. The two rejected hypotheses, marketing campaigns and recycling confidence and access to facilities, highlight the need to improve e-waste recycling facilities in South Africa. The chapter concluded by providing an overview of the differences between the cohorts concerning intention to recycle. All the generational cohorts had a great extent of agreement, indicating the presence of intention across all cohorts.

The study's findings made a notable contribution to the literature, specifically in understanding the nuances between generational cohorts regarding e-waste recycling

intention in South Africa. However, it highlighted the challenges in South Africa and emphasised the need for segmented approaches to appeal to the different cohorts, as in subjective norms.

Chapter 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The final chapter of this research study starts with a concise summary of its significance outlined in the principal conclusions. The chapter revisits the main and sub-research questions, demonstrating how they were addressed in the study and the methods used. Theoretical contributions, business implications, limitations, and recommendations for future research are also discussed.

7.2 Principal conclusions

It was evident in the existing literature that additional insights and knowledge were paramount to understanding how to address the pressing e-waste problem (Phulwani et al., 2021). This study sought to answer the questions constructed based on the expanded TPB (Ajzen, 1991). Despite its criticism, the TPB was the theoretical anchor of this study; understanding that behaviour is complex and multifaceted, the TPB was extended to guide the formulation of the research questions and the hypotheses that directed the study's data gathering and analysis. The role of consumers is well understood as their purchase decisions, consumption levels, and disposal methods directly impact environmental sustainability (Trudel, 2019).

Thus, the study set out to understand the factors influencing the consumer's intention at a generational cohort level for precise insights into the differences in intention that ultimately affect actions. Furthermore, since intention drives behaviour and represents motivation to engage in specific behaviours, it was thus critical to understand the factors influencing e-waste recycling intention (Ajzen, 1991; Aboelmaged, 2021; Lou et al., 2022). To address the research question/problem, a quantitative mono-method approach grounded in positivist philosophy was employed, which aligned with previous studies where similar quantitative relationships were investigated; the study utilised a survey and a deductive approach (Casalegno et al., 2022).

This research answered the research questions, fulfilling the purpose set out initially.

- Attitude and environmental concerns were addressed as one due to the strong correlations found. The findings showed that a positive attitude and solid environmental concern influence consumers' intention to recycle e-waste. Consumers consider their actions and their ecological impact, and this concern signifies their attitude towards engaging in sustainable activities (Zhang et al., 2019). The study findings revealed that consumers regard the environment and assume their actions can result in positive outcomes. This confirms Ajzen's (1991) theory, which holds that when consumers assume positive outcomes, the likelihood of engaging in recycling initiatives increases. This also confirms the findings from Vijayan et al. (2023) and Aboelmaged (2021).
- While the literature differed on the influence of subjective norms, this study revealed that South African consumers are concerned with the opinions, approval, or disapproval of others regarding e-waste recycling (Aboelmaged, 2021). Essentially, the perceived pressure from significant others influences consumers' recycling intentions, particularly when a positive response is anticipated (Seoke, 2022). The study's key finding indicated that the e-waste recycling intentions of Boomers and Gen X are most likely to be influenced by subjective norms compared to those of millennials and Gen Z.
- Perceived behavioural control and access to facilities were also addressed as one due to the high correlations found during the statistical analysis, and it was addressed as (recycling confidence and access to facilities). Recycling confidence and access to facilities did not influence consumers' recycling intentions. While this contradicts Vijayan et al. (2023) and Zhang et al. (2019), it reflects the realities South African consumers face. The literature established an undeniable connection between the availability of resources, such as recycling infrastructure, and the consumer's perceived control (Phulwani et al., 2021). This finding suggests consumers have low self-efficacy and control beliefs, fundamentally shaping the likelihood of participating in e-waste recycling initiatives (Phulwani et al., 2021). This is worsened by situational factors such as convenient access to recycling activities.
- Marketing campaigns can be a powerful tool for reaching consumers with relevant messaging about e-waste. However, they were found to have no impact on consumers' intentions. Muthukumari et al. (2024) and Trivedi et al. (2018) highlighted vital contributing factors, which include effective messaging strategies and the indirect influence of marketing on recycling behaviours. Only when these are addressed can marketing's influence be significant.

- The most significant predictor of intention was awareness of consequences. Findings revealed that consumers are highly conscious of the consequences of unsustainable behaviours. Awareness plays a vital role as consumers decide based on what they know and the information available (Seake, 2022).
- Lastly, the study addressed the research question regarding the distinctions between Boomers, Gen Z, Gen X, and millennials regarding factors influencing intention. Boomers and Gen Z differed substantially, signifying a difference in their intention levels. Boomers were found to have a relatively higher inclination to recycle their e-waste, confirming that Boomers seek to engage in more sustainable behaviours proactively; the cohort's environmental concern is reported to be the highest (Ham et al., 2022; Parzonko et al., 2021; Skeiryte et al., 2022; Wang et al., 2021).

The major influences that drive consumers' e-waste recycling intention were identified to be environmental attitude, subjective norms and awareness of the consequences, confirming the findings in the literature (Aboelmaged, 2021; Khan et al., 2019; Koshta et al., 2022; Kumar, 2019; Laeequddin et al., 2022; Vijayan et al., 2023; Zhang et al., 2019). These three predictors of e-waste recycling intention also interlink closely because environmental concern starts with awareness. When consequences are perceived as positive or result in positive outcomes, a positive attitude is developed, and awareness reinforces the attitude, resulting in sustained sustainable behaviour. Additionally, generational cohorts differ regarding their intentions; Boomers were found to have a relatively higher inclination to recycle their e-waste, while Gen Z had a moderately lower intention. Thus, addressing the main research question: *'What major influences drive consumers' e-waste recycling intention, and how do e-waste recycling intentions differ across generational cohorts?'*

7.3 Theoretical contribution

The rise of e-waste is an increasing global concern, and in South Africa, the issue is intensifying, with the nation generating around 360,000 tonnes each year (Stickland, 2024). This study heeded the call for an enhanced understanding and knowledge of e-waste recycling intentions (Phulwani et al., 2021).

This research's finding contributes to the literature as it expands on the TPB by incorporating environmental concerns, access to facilities, marketing campaigns, and awareness of consequences, providing a more robust model to understand the factors driving intention. Incorporating situational factors, which the TPB does not typically account for, uncovers additional insights beyond the theory, enhancing the knowledge of e-waste recycling intention.

As revealed in prior studies, awareness of consequences is often used to expand on the TPB. Khan et al. (2019) and Kumar's (2019) study demonstrated its predictive power to influence intention, highlighting the importance of its use in behavioural models examining consumer recycling intention.

Research on e-waste recycling intentions is scarcely conducted in South Africa. This study's findings contribute to the literature by providing a more nuanced perspective relevant to South African scholars regarding consumers' e-waste recycling intentions.

Generational cohorts are commonly studied in the context of workplace behaviours or the broad and general context of responsible consumption or pro-environmental behaviour (Rudolph et al., 2021; Casalegno et al., 2022). This study focuses explicitly on e-waste recycling intention across generational cohorts. Behavioural e-waste research has predominantly focused on only two generational cohorts: Millennials and Generation Z (Ivanova et al., 2019; Newaz & Appolloni, 2024). This study fills the gaps in the existing literature as it studies multiple cohorts, including Boomers and Gen X. The study compared the differences in their intention and determined the influence of the different factors per cohort, thus contributing to the body of knowledge with new insights regarding the factors that influence intention per cohort. Furthermore, the study highlights the relevance and importance of Boomers, who were found to have a higher inclination to participate in e-waste recycling initiatives, offering vital behavioural insights into the differences between cohorts.

7.4 Business implications

7.4.1 Marketing Specialists

The study's results indicated that marketing campaigns did not significantly affect the intention to recycle e-waste. However, marketing and advertising mediums are still practical tools for disseminating information. The impact of marketing alone is insufficient to predict recycling intention; marketing influences factors, such as perceived behavioural control and attitude, affecting consumers' eventual recycling intentions Muthukumari et al. (2024). To enhance the influence of marketing on consumers' recycling intention, marketing specialists must focus their campaigns on influencing consumers' perceived behavioural control by providing information and education regarding e-waste (Muthukumari et al., 2024).

To further enhance consumers' awareness of consequences and environmental concerns, awareness campaigns focusing on educating consumers about the advantages of recycling e-waste are vital to improving attitudes towards recycling e-waste. Considering that subjective norms predict intention, marketers can leverage this by developing campaigns utilising relevant social influencers specifically for Boomers and Gen X. Trivedi et al. (2018) emphasise the importance of strategic messaging strategies to enhance the influence of marketing campaigns; thus, marketers can use strategic messaging to target different cohorts with relevant messages to strengthen the impact of marketing. Lastly, the study showed differences between generational cohorts in their intention. These insights should be leveraged for segmentation strategies, ensuring relevant messaging per segment through segment-relevant marketing mediums such as social media and digital marketing to target younger cohorts or traditional marketing mediums that may appeal more to the older cohorts.

7.4.2 Manufactures, retailers and resellers

This study has implications for device manufacturers as they are vital stakeholders in the generation of e-waste through business models that consider the complete lifecycle of electronic devices (Parajuly et al., 2019). This study's findings revealed that consumers are concerned about the environment, which indicates a solid intention to engage in sustainable behaviours. Manufacturers can design electronic devices to reduce the replacement frequency, enabling repairs instead of disposal. Manufacturers also

contribute significantly to raising awareness and education through product manuals, including repair instructions and information on the availability of repair services and recycling centres.

Consumers with high environmental attitudes and awareness of consequences are more inclined to participate in sustainable behaviours (Khan et al., 2019; Koshta et al., 2022; Zhang et al., 2019). Retailers and resellers can develop trade-in programmes, buy-back, or leasing models relevant to increasing e-waste recycling. This, in turn, also benefits the manufacturers as it increases alternative revenue streams.

7.4.3 E-waste recycling companies

Access to facilities is a substantial barrier that negatively impacts the intention to recycle e-waste (Kumar & Dixit, 2018). E-waste recycling companies can significantly affect consumers' recycling intentions. Providing convenient drop-off or collection methods for unwanted electronics can significantly increase e-waste recycling intention.

7.4.4 Regulation and Legislation

With awareness of consequences being a significant influencer of consumers' e-waste recycling intentions, policy and decision-makers, specifically at a local or national government level, can enforce policies to mandate awareness campaigns at the manufacturer, retailer, and reseller levels, which can be linked to incentives such as tax breaks or subsidies to increase compliance. Policy and decision-makers can design interventions at a provincial level to drive sustainable recycling behaviours across the country. The lack of e-waste recycling facilities can also be addressed at a local and national government level. Government agencies are essential in enhancing recycling infrastructure in South Africa, as this poses a major challenge to e-waste recycling efforts.

7.5 Limitations

Alongside the limitations discussed in chapter four, further limitations were identified.

This study utilised a questionnaire for data gathering, distributed online to collect the maximum number of complete questionnaires across South Africa (Saunders & Lewis, 2018). However, the majority of the respondents, 78.20%, consisted of respondents based in Gauteng; only 6.00% were based in the Western Cape and 4.40% in KwaZulu Natal, while the rest were marginally represented.

The study does not measure actual consumer behaviour regarding e-waste recycling. Instead, the intention is considered to drive behaviour (Aboelmaged, 2021; Laeequddin et al., 2022; Lou et al., 2022). However, gaps may exist between intention and actual behaviour.

Although all the generational cohorts are represented in the study, millennials had the most significant representation at 51.40%, while boomers were the least at 11.60%

Consumers' e-waste recycling intention is considered at a point in time, not considering respondents' change in intentions over time, which lacks causality (Spector, 2019). A longitudinal study could have provided more insights into consumers' changes in intention.

Although questionnaires are commonly used in e-waste studies (Gilal et al., 2022) self-administered questionnaires may be subject to response bias (Story & Tait, 2019).

7.6 Suggestions for future research

The literature debates the existence of the 'intention-behaviour gap', which holds that consumers may want to recycle or intend to recycle e-waste; however, gaps may exist between the consumers' intentions and their actual behaviour (Zhang et al., 2020). Future research should explore and examine the factors influencing consumer recycling behaviours.

E-waste is a worldwide issue with dire long-term impacts (Newaz & Appolloni, 2024). To address this problem, particularly in Africa, a more profound understanding and insights are needed; studies related to e-waste recycling are predominantly prevalent internationally (Aboelmaged, 2021). Thus, it is recommended that future research be conducted across Africa to provide insights for policymakers, the business environment, and researchers on promoting and encouraging sustainable e-waste behaviours in Africa.

Gen Z had the lowest average mean score regarding recycling intention and all the other factors. Future research could expand on these findings and investigate alternative factors to understand the drivers of e-waste recycling intention for Gen Z.

7.7 Conclusion

The e-waste dilemma is a real and complex problem. Anchored by the TPB, this study sought to determine the major influences that drive consumers' e-waste recycling intentions. These differ across generational cohorts. The study achieved its purpose and discovered that three factors, environmental attitude, subjective norms and awareness of consequences, predict consumers' intentions. The study detailed the critical differences across generational cohorts regarding their intention, providing insights contextualised for South Africa. Even though a cross-sectional route was taken, the insights can be leveraged at theoretical and business levels. The problem of e-waste is mounting, and more knowledge is required to address the problem specifically in an African context.

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Appendices

Appendix 1: Questionnaire and Coding



Dear Respondent,

I am currently a student at the University of Pretoria's Gordon Institute of Business Science and completing my research in partial fulfilment of an MBA. I am conducting research on the factors influencing consumers' e-waste recycling intention across generational cohorts. **E-waste, or electronic waste, refers to electronic devices such as mobile phones, tablets, laptops and smartwatches that have reached the end of their useful life.** To that end, you are requested to participate in a survey that will help us better understand the major influences that drive consumers' e-waste disposal behaviours and how e-waste recycling behaviours differ across different generational cohorts. The survey should take no more than 15 minutes of your time. Your participation is anonymous, names and contact details are therefore not captured and responses will remain confidential.

Your participation is voluntary and does not include any incentive or remuneration. You can withdraw at any time without penalty. All data will be reported without identifiers; only aggregated data will be reported. By completing the survey, you indicate that you voluntarily participate in this research. Upon completion of the study, the data is stored for ten years to allow for scrutiny if necessary. If you have any concerns, please contact my supervisor or me. Our details are provided below.

Researcher name: Victoria Vermeulen
Email: 21828190@mygibs.co.za
Phone: (+27) 83 200 2857

Research Supervisor: Alet Erasmus
Email: ErasmusA@gibs.co.za

Phone: (+27) 12 420 3111

Survey Form (including data coding)

Please mark your choice by putting the {✓} in the appropriate box

E-waste, or electronic waste, refers to electronic devices such as mobile phones, tablets, laptops and smartwatches that has reached the end of its useful life.

Screening Question (SQ)

1. Age

0 – 17 (If you select 0-17, you will not be able to participate in the survey)	1
18 – 27 [Gen Z]	2
28 – 43 [Millennial]	3
44 – 59 [Gen X]	4
60 – 78 [Baby Boomer]	5

Section A: Demographics

1. Have you **owned** any of the following electronic devices in the past (mobile phones, tablets, laptops and smartwatches)?

Never owned an electronic device (If a respondent selects this option, the survey will automatically close, and they will not participate)	1
One electronic device	2
More than one electronic device	3

2. Have you **replaced or disposed** of any of the following electronic devices in the past (mobile phones, tablets, laptops and smartwatches)?

Yes	1
No (If you select no, you will not be able to participate in the survey)	2
Not sure (If you select not sure, you will not be able to participate in the survey)	3

3. Gender

Male	1
Female	2
Prefer not to say	3

4. Location

Eastern Cape	1
Free State	2
Gauteng	3
Limpopo	4
Mpumalanga	5
North-West	6
Northern Cape	7
Western Cape	8
KwaZulu Natal	9

Section B

Please indicate to what extent you agree with each of the statements in the following sections, please mark your choice by putting the {✓} in the appropriate box, indicating:

1. = Strongly Disagree
2. = Disagree
3. = Neutral
4. = Agree
5. = Strongly Agree

E-waste, or electronic waste, refers to electronic devices such as mobile phones, tablets, laptops and smartwatches that has reached the end of its useful life.

	Please mark your choice by putting the {✓} in the appropriate box	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. Attitude towards e-waste recycling (ATT)						
ATT1	Recycling e-waste responsibly makes me feel good	1	2	3	4	5
ATT2	I recommend recycling e-waste	1	2	3	4	5
ATT3	I consider the recycling of e-waste a serious responsibility	1	2	3	4	5
2. Environmental concern (EC)						
EC1	I am a keen supporter of environmental protection initiatives	1	2	3	4	5
EC2	I am worried about what the current state of the environment will mean for my future	1	2	3	4	5
EC3	Human beings must live in harmony with nature to ensure their future	1	2	3	4	5
EC4	Human beings that interfere with nature cause unfortunate consequences for the future	1	2	3	4	5
EC5	The balance of nature should be respected more attentively to ensure a better future	1	2	3	4	5
3. Subjective norms influencing e-waste recycling (SN)						
SN1	If my family and friends recycle e-waste, I will also do it	1	2	3	4	5
SN2	My local community inspires me to participate in recycling e-waste	1	2	3	4	5
SN3	My friends/peers encourage me to recycle e-waste	1	2	3	4	5
SN4	People who are important to me would want me to recycle e-waste responsibly	1	2	3	4	5
4. Perceived behavioural control of e-waste recycling (PBC)						
PBC1	I know which electronic waste can be recycled	1	2	3	4	5
PBC2	I know how to recycle my electronic waste responsibly	1	2	3	4	5
PBC3	I have no obstacles preventing me from responsibly recycling my electronic waste	1	2	3	4	5
5. Access to recycling facilities (ATF)						
ATF1	I have easy access to an e-waste recycling facility	1	2	3	4	5
ATF2	It is easy for me to find information on e-waste recycling facilities	1	2	3	4	5
ATF3	It is easy for me to recycle e-waste responsibly in my area	1	2	3	4	5
6. E-waste recycling marketing campaigns						
MC1	Media messages and programmes motivate me to recycle e-waste responsibly	1	2	3	4	5
MC2	Marketing campaigns, including advertising about e-waste recycling, remind me to recycle e-waste responsibly	1	2	3	4	5

MC3	Marketing campaigns, including advertising, are useful in making me more aware of the importance of responsible e-waste recycling	1	2	3	4	5
7. Awareness of consequences (AOC)						
AOC1	Recycling mobile phones, tablets, laptops, and smartwatches ensures that the environment is not negatively affected	1	2	3	4	5
AOC2	Recycling mobile phones, tablets, laptops, and smartwatches is a way in which I can help to give back to the society of the future	1	2	3	4	5
AOC3	Recycling mobile phones, tablets, laptops, and smartwatches is a way to make electronic products available to others at affordable prices	1	2	3	4	5
AOC4	Recycling mobile phones, tablets, laptops and smartwatches guards against toxic substances at landfills	1	2	3	4	5
AOC5	Recycling mobile phones, tablets, laptops, and smartwatches contributes to job creation	1	2	3	4	5
8. E-waste recycling intention (INT)						
INT1	I am keen to participate in electronic waste recycling initiatives	1	2	3	4	5
INT2	I intend to make plans to recycle electronic waste responsibly	1	2	3	4	5
INT3	I intend to put extra effort into the responsible recycling of electronic waste	1	2	3	4	5
INT4	I intend to make responsible recycling of electronic devices a priority, even if it is not convenient	1	2	3	4	5

Thank you very much for your cooperation.

Appendix 2: Ethical Clearance Approval

GIBS ETHICAL CLEARANCE APPLICATION FORM 2024/25

RESEARCH PROJECT INFORMATION

NAME:	Victoria Vermeulen
STUDENT NUMBER:	21828190
PHONE NUMBER:	
E-MAIL ADDRESS:	21828190@mygibs.co.za
PROPOSED TITLE OF STUDY:	Factors influencing consumers' e-waste recycling intention: A cross-generational study
RESEARCH SUPERVISOR:	Alet Erasmus
E-MAIL OF SUPERVISOR:	ErasmusA@gibs.co.za
RESEARCH CO-SUPERVISOR	
E-MAIL OF CO-SUPERVISOR	

The purpose of this Research Ethics process is to ensure that all research conducted under the auspices of GIBS is done so in an ethical manner, in accordance with the University's policy and in such a way that **the rights of all stakeholders** associated with the research are protected.

In order for the GIBS Research Ethics Committee to assess your application, you are required to submit a **description of your Research Methodology** that must contain sufficient detail to ensure that the required steps have been taken to achieve this purpose, in the research design, data collection, analysis and storage of data used in the conduct of this research.

Please indicate the nature of the output your research is aimed at producing (mark one box only):

- ABP Applied Business Project
- MBA Research Report
- MBA Project Publish Article
- MBA Teaching Case Study
- MBA Entrepreneurship Stream Portfolio
- MBA Consulting Stream Portfolio/MBA Health Stream
- MPhil Research Report

GIBS Ethics Policy distinguishes between FOUR main types of data and THREE main types of methodology. Please complete the table for ALL the data types that you plan to use. Note that all applications must be accompanied by a description of the methodology to be used in the study. Initial all sections that apply to your research

GIBS ETHICAL CLEARANCE APPLICATION FORM 2024/25

G. APPROVALS FOR/OF THIS APPLICATION

When the applicant is a student of GIBS, the applicant must please ensure that the supervisor and co-supervisor (where relevant) has signed the form before submission

STUDENT RESEARCHER/APPLICANT:

29. I affirm that all relevant information has been provided in this form and its attachments and that all statements made are correct.

Student Researcher's Name in capital letters: VICTORIA VERMEULEN

Date: 30 Jul 2024

Supervisor Name in capital letters: ALET C ERASMUS

Date: 30 Jul 2024

Co-supervisor Name in capital letters:

Date: 30 Jul 2024

Note: GIBS shall do everything in its power to protect the personal information supplied herein, in accordance to its company privacy policies as well the Protection of Personal Information Act, 2013. Access to all of the above provided personal information is restricted, only employees who need the information to perform a specific job are granted access to this information.

Decision:

Approved

REC comments:

Date: 05 Aug 2024

	Ethical Clearance Received
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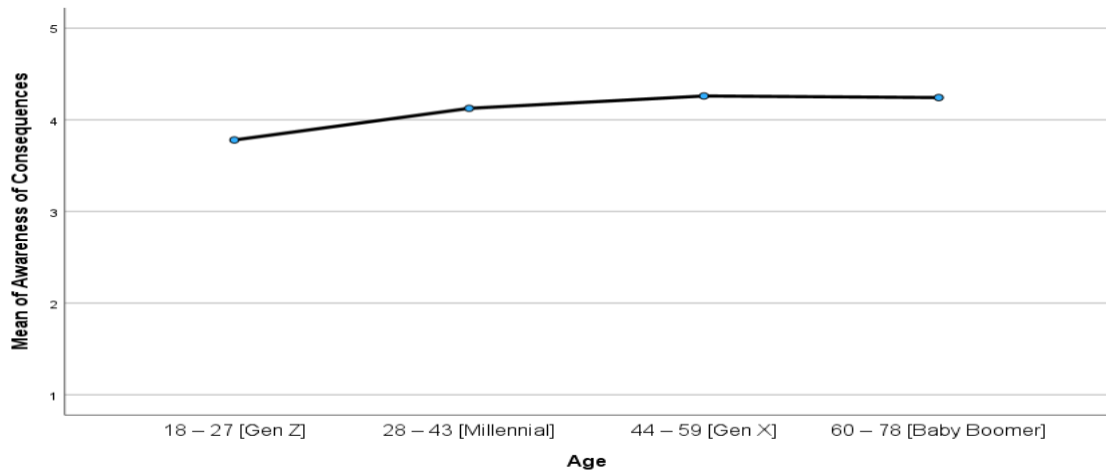
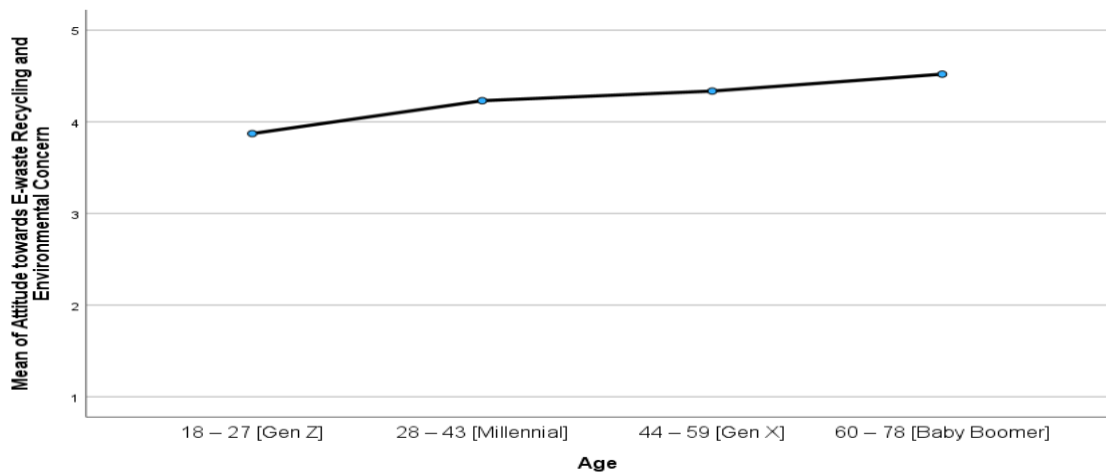
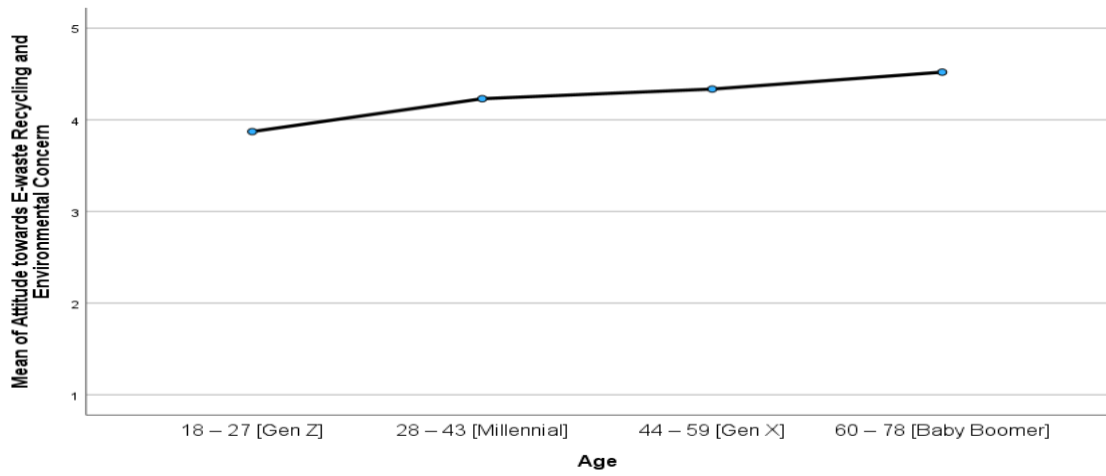
Dear Victoria Vermeulen,

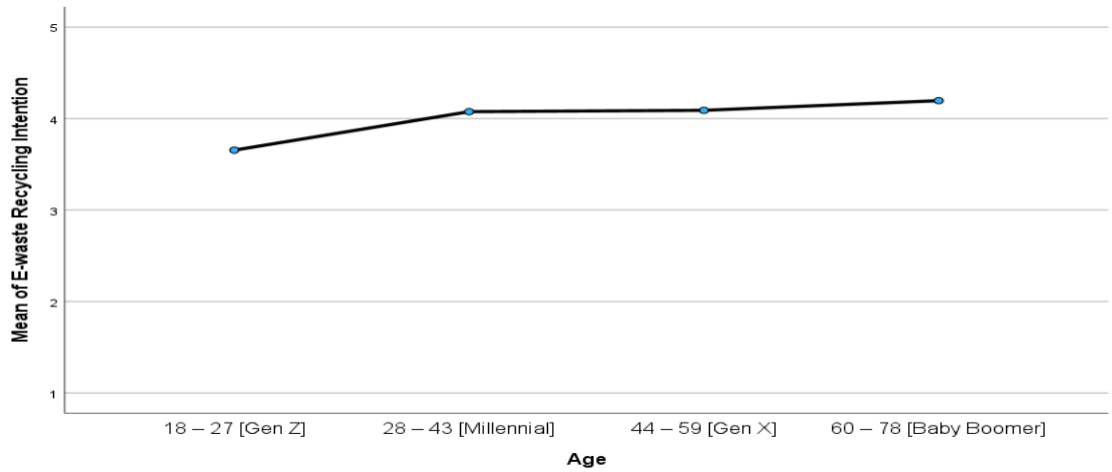
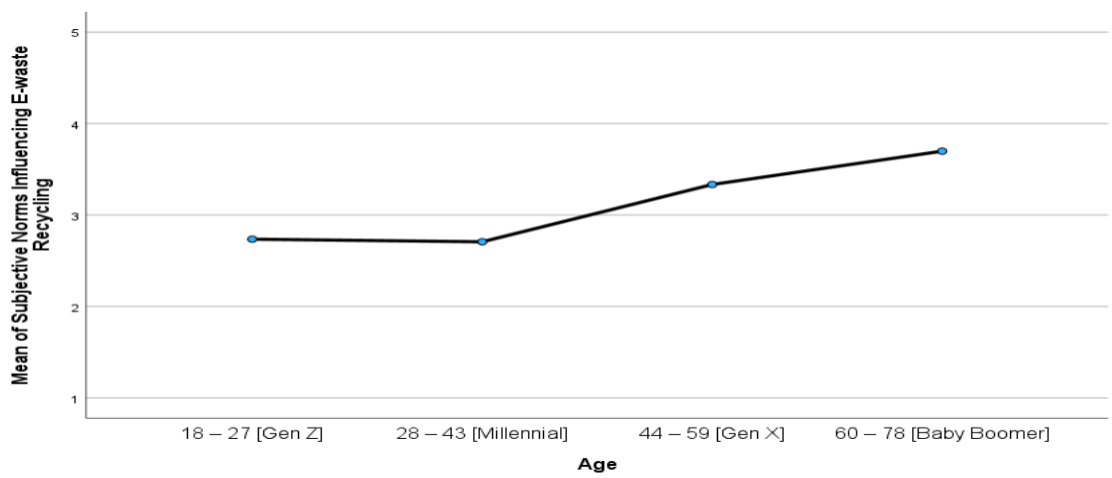
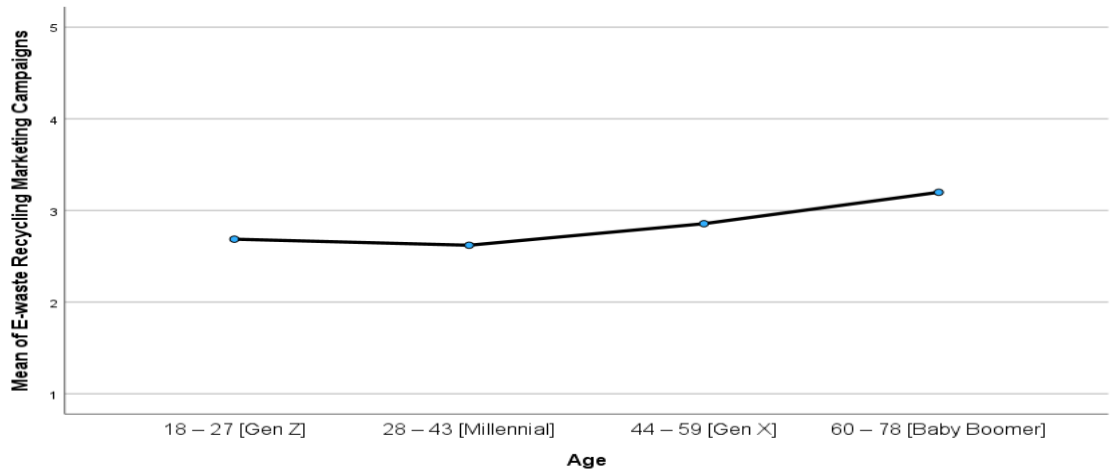
This email serves to confirm that your Ethical Clearance Submission has been sent to your supervisor for approval.

Kind Regards,
Masters Research Team

This email has been sent from an unmonitored email account. If you have any comments or concerns, please contact the GIBS Research Admin team.

Appendix 3: Mean Plots





Appendix 4: Descriptive Statistics - Results for independent and dependent utilising a Likert-type scale.

Descriptive Statistics - Results for independent and dependent utilising a Likert-type scale.								
Likert-type scale			1	2	3	4	5	Total
Attitude	B1.1 Recycling e-waste responsibly makes me feel good	Count	7	11	52	82	100	252
		Row N %	2,8%	4,4%	20,6%	32,5%	39,7%	100,0%
	B1.2 I recommend recycling e-waste	Count	7	7	22	99	117	252
		Row N %	2,8%	2,8%	8,7%	39,3%	46,4%	100,0%
	B1.3 I consider the recycling of e-waste a serious responsibility	Count	8	14	47	75	108	252
		Row N %	3,2%	5,6%	18,7%	29,8%	42,9%	100,0%
Environmental concern	B2.1 I am a keen supporter of environmental protection initiatives	Count	6	13	41	101	91	252
		Row N %	2,4%	5,2%	16,3%	40,1%	36,1%	100,0%
	B2.2 I am worried about what the current state of the environment will mean for my future	Count	6	15	28	100	103	252
		Row N %	2,4%	6,0%	11,1%	39,7%	40,9%	100,0%
	B2.3 Human beings must live in harmony with nature to ensure their future	Count	7	1	7	85	152	252
		Row N %	2,8%	0,4%	2,8%	33,7%	60,3%	100,0%
	B2.4 Human beings that interfere with nature cause unfortunate consequences for the future	Count	4	6	15	102	125	252
		Row N %	1,6%	2,4%	6,0%	40,5%	49,6%	100,0%
	B2.5 The balance of nature should be respected more attentively to ensure a better future	Count	4	1	9	108	130	252
		Row N %	1,6%	0,4%	3,6%	42,9%	51,6%	100,0%
Subjective Norms	B3.1 If my family and friends recycle e-waste, I will also do it	Count	3	18	31	113	87	252
		Row N %	1,2%	7,1%	12,3%	44,8%	34,5%	100,0%
	B3.2 My local community inspires me to participate in recycling e-waste	Count	38	83	60	47	24	252
		Row N %	15,1%	32,9%	23,8%	18,7%	9,5%	100,0%
	B3.3 My friends/peers encourage me to recycle e-waste	Count	27	94	67	42	22	252
		Row N %	10,7%	37,3%	26,6%	16,7%	8,7%	100,0%
	B3.4 People who are important to me would want me to recycle e-waste responsibly	Count	11	38	73	87	43	252
		Row N %	4,4%	15,1%	29,0%	34,5%	17,1%	100,0%

Descriptive Statistics - Results for independent and dependent utilising a Likert-tyle scale. Continue								
Perceived Behavioural Control	B4.1 I know which electronic waste can be recycled	Count	17	68	40	89	38	252
		Row N %	6,7%	27,0%	15,9%	35,3%	15,1%	100,0%
	B4.2 I know how to recycle my electronic waste responsibly	Count	23	88	50	64	27	252
		Row N %	9,1%	34,9%	19,8%	25,4%	10,7%	100,0%
	B4.3 I have no obstacles preventing me from responsibly recycling my electronic waste	Count	13	55	53	103	28	252
		Row N %	5,2%	21,8%	21,0%	40,9%	11,1%	100,0%
Access to recycling facilities	B5.1 I have easy access to an e-waste recycling facility	Count	45	107	43	43	14	252
		Row N %	17,9%	42,5%	17,1%	17,1%	5,6%	100,0%
	B5.2 It is easy for me to find information on e-waste recycling facilities	Count	32	77	65	63	15	252
		Row N %	12,7%	30,6%	25,8%	25,0%	6,0%	100,0%
	B5.3 It is easy for me to recycle e-waste responsibly in my area	Count	45	93	61	41	12	252
		Row N %	17,9%	36,9%	24,2%	16,3%	4,8%	100,0%
Marketing campaigns	B6.1 Media messages and programmes motivate me to recycle e-waste responsibly	Count	35	94	50	58	15	252
		Row N %	13,9%	37,3%	19,8%	23,0%	6,0%	100,0%
	B6.2 Marketing campaigns, including advertising about e-waste recycling, remind me to recycle e-waste responsibly	Count	34	85	47	66	20	252
		Row N %	13,5%	33,7%	18,7%	26,2%	7,9%	100,0%
	B6.3 Marketing campaigns, including advertising, are useful in making me more aware of the importance of responsible e-waste recycling	Count	28	60	130	0	34	252
		Row N %	11,1%	23,8%	51,6%	0,0%	13,5%	100,0%
Awareness of consequences	B7.1 Recycling mobile phones, tablets, laptops, and smartwatches ensures that the environment is not negatively affected	Count	2	4	24	133	89	252
		Row N %	0,8%	1,6%	9,5%	52,8%	35,3%	100,0%
	B7.2 Recycling mobile phones, tablets, laptops, and smartwatches is a way in which I can help to give back to the society of the future	Count	2	1	35	126	88	252
		Row N %	0,8%	0,4%	13,9%	50,0%	34,9%	100,0%
	B7.3 Recycling mobile phones, tablets, laptops, and smartwatches is a way to make electronic products available to others at affordable prices	Count	3	19	45	121	64	252
		Row N %	1,2%	7,5%	17,9%	48,0%	25,4%	100,0%
	B7.4 Recycling mobile phones, tablets, laptops and smartwatches guards against toxic substances at landfills	Count	2	4	32	115	99	252
		Row N %	0,8%	1,6%	12,7%	45,6%	39,3%	100,0%
	B7.5 Recycling mobile phones, tablets, laptops, and smartwatches contributes to job creation	Count	1	6	56	121	68	252
		Row N %	0,4%	2,4%	22,2%	48,0%	27,0%	100,0%

Descriptive Statistics - Results for independent and dependent utilising a Likert-tyle scale. Continue								
E-waste Recycling Intention	B8.1 I am keen to participate in electronic waste recycling initiatives	Count	2	4	29	131	86	252
		Row N %	0,8%	1,6%	11,5%	52,0%	34,1%	100,0%
	B8.2 I intend to make plans to recycle electronic waste responsibly	Count	2	9	42	137	62	252
		Row N %	0,8%	3,6%	16,7%	54,4%	24,6%	100,0%
	B8.3 I intend to put extra effort into the responsible recycling of electronic waste	Count	2	10	44	133	63	252
		Row N %	0,8%	4,0%	17,5%	52,8%	25,0%	100,0%
	B8.4 I intend to make responsible recycling of electronic devices a priority, even if it is not convenient	Count	4	16	52	125	55	252
		Row N %	1,6%	6,3%	20,6%	49,6%	21,8%	100,0%

Appendix 5: Scree Plots

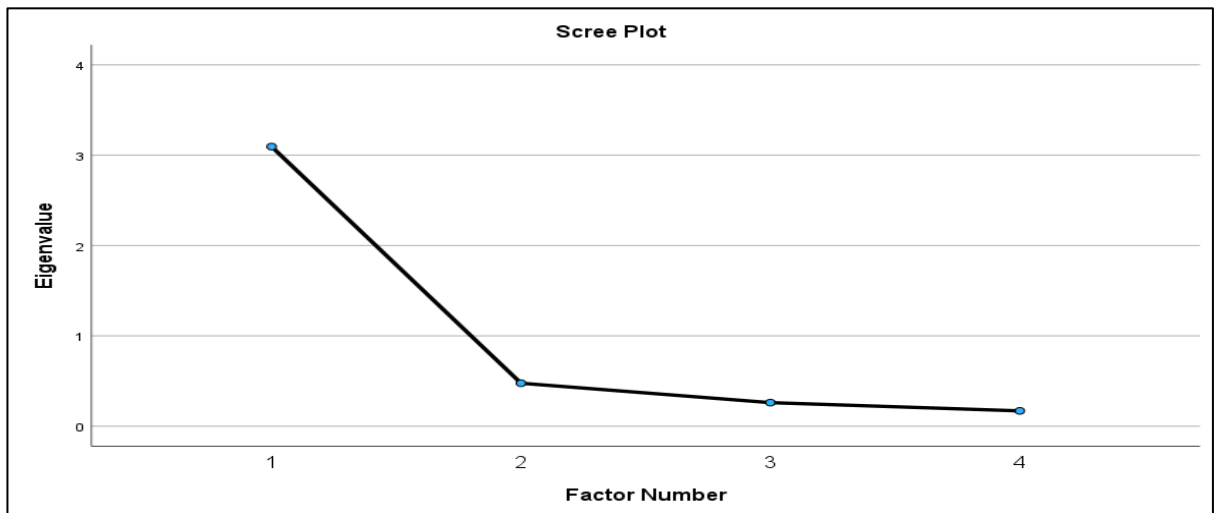


Figure 4: Scree Plot for B8: E-waste recycling intention

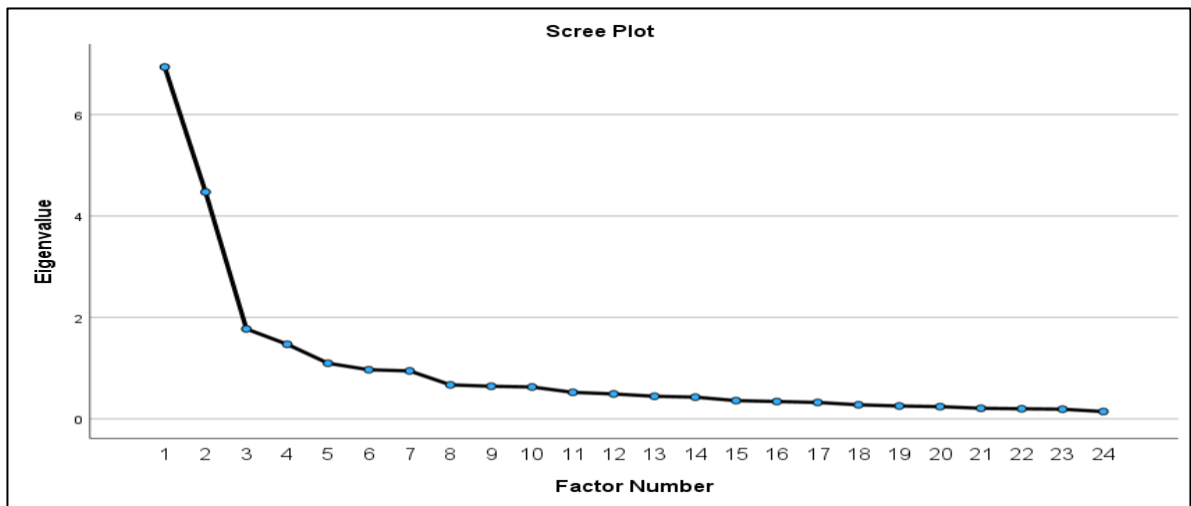


Figure 5: Scree Plot for independent variables

Appendix 6: EFA for section independent variables (B1 – B7)

Correlation Matrix Tables: B1 - B3

	B1.1	B1.2	B1.3	B2.1	B2.2	B2.3	B2.4	B2.5	B3.2	B3.3	B3.4
B1.1	1,000	0,642	0,639	0,487	0,457	0,431	0,268	0,392	0,223	0,329	0,313
B1.2	0,642	1,000	0,712	0,541	0,462	0,479	0,404	0,504	0,112	0,190	0,272
B1.3	0,639	0,712	1,000	0,597	0,512	0,468	0,350	0,480	0,135	0,191	0,300
B2.1	0,487	0,541	0,597	1,000	0,643	0,578	0,377	0,496	0,145	0,220	0,275
B2.2	0,457	0,462	0,512	0,643	1,000	0,651	0,452	0,559	0,081	0,140	0,222
B2.3	0,431	0,479	0,468	0,578	0,651	1,000	0,500	0,638	-0,041	0,052	0,151
B2.4	0,268	0,404	0,350	0,377	0,452	0,500	1,000	0,732	-0,029	0,009	0,110
B2.5	0,392	0,504	0,480	0,496	0,559	0,638	0,732	1,000	-0,049	0,006	0,132
	B1.1	B1.2	B1.3	B2.1	B2.2	B2.3	B2.4	B2.5	B3.2	B3.3	B3.4
B3.2	0,223	0,112	0,135	0,145	0,081	-0,041	-0,029	-0,049	1,000	0,713	0,456
B3.3	0,329	0,190	0,191	0,220	0,140	0,052	0,009	0,006	0,713	1,000	0,590

B3.4	0,313	0,272	0,300	0,275	0,222	0,151	0,110	0,132	0,456	0,590	1,000
B4.1	0,258	0,215	0,259	0,305	0,146	0,112	0,079	0,101	0,216	0,309	0,252
B4.2	0,144	0,087	0,138	0,140	0,050	-0,051	-0,059	-0,066	0,337	0,333	0,257
B4.3	0,023	-0,054	-0,048	0,042	-0,046	-0,102	-0,025	-0,076	0,322	0,281	0,211
B5.1	0,140	0,030	0,078	0,036	-0,002	-0,112	-0,106	-0,113	0,459	0,425	0,276
B5.2	0,191	0,086	0,056	0,088	0,029	-0,008	-0,041	-0,071	0,341	0,410	0,235
B5.3	0,115	0,086	0,072	0,066	0,024	-0,030	-0,086	-0,079	0,468	0,439	0,258
B6.1	0,211	0,192	0,193	0,232	0,096	0,080	-0,072	-0,032	0,428	0,472	0,401
B6.2	0,243	0,227	0,191	0,199	0,146	0,118	-0,065	-0,050	0,406	0,453	0,400
B6.3	0,262	0,234	0,181	0,181	0,134	0,086	0,077	0,052	0,383	0,374	0,433
B7.1	0,431	0,389	0,408	0,309	0,305	0,214	0,266	0,239	0,121	0,224	0,267
B7.2	0,388	0,374	0,480	0,310	0,292	0,220	0,318	0,361	0,155	0,192	0,315
B7.4	0,305	0,299	0,399	0,114	0,162	0,108	0,215	0,227	0,057	0,055	0,157
B7.5	0,303	0,341	0,380	0,254	0,202	0,139	0,128	0,195	0,144	0,225	0,315

Correlation Matrix B4 - B7

	B4.1	B4.2	B4.3	B5.1	B5.2	B5.3	B6.1	B6.2	B6.3	B7.1	B7.2	B7.4	B7.5
B1.1	0,258	0,144	0,023	0,140	0,191	0,115	0,211	0,243	0,262	0,431	0,388	0,305	0,303
B1.2	0,215	0,087	-0,054	0,030	0,086	0,086	0,192	0,227	0,234	0,389	0,374	0,299	0,341
B1.3	0,259	0,138	-0,048	0,078	0,056	0,072	0,193	0,191	0,181	0,408	0,480	0,399	0,380
B2.1	0,305	0,140	0,042	0,036	0,088	0,066	0,232	0,199	0,181	0,309	0,310	0,114	0,254
B2.2	0,146	0,050	-0,046	-0,002	0,029	0,024	0,096	0,146	0,134	0,305	0,292	0,162	0,202
B2.3	0,112	-0,051	-0,102	-0,112	-	-	0,080	0,118	0,086	0,214	0,220	0,108	0,139
B2.4	0,079	-0,059	-0,025	-0,106	-	-	-	-	0,077	0,266	0,318	0,215	0,128
B2.5	0,101	-0,066	-0,076	-0,113	-	-	-	-	0,052	0,239	0,361	0,227	0,195

	B4.1	B4.2	B4.3	B5.1	B5.2	B5.3	B6.1	B6.2	B6.3	B7.1	B7.2	B7.4	B7.5
B3.2	0,216	0,337	0,322	0,459	0,341	0,468	0,428	0,406	0,383	0,121	0,155	0,057	0,144
B3.3	0,309	0,333	0,281	0,425	0,410	0,439	0,472	0,453	0,374	0,224	0,192	0,055	0,225
B3.4	0,252	0,257	0,211	0,276	0,235	0,258	0,401	0,400	0,433	0,267	0,315	0,157	0,315
B4.1	1,000	0,640	0,273	0,303	0,342	0,272	0,287	0,269	0,283	0,280	0,305	0,215	0,238
B4.2	0,640	1,000	0,461	0,535	0,481	0,459	0,412	0,364	0,272	0,216	0,200	0,187	0,238
B4.3	0,273	0,461	1,000	0,458	0,395	0,429	0,283	0,277	0,211	0,056	0,109	0,003	0,064
B5.1	0,303	0,535	0,458	1,000	0,673	0,759	0,386	0,325	0,286	0,117	0,107	0,137	0,118
B5.2	0,342	0,481	0,395	0,673	1,000	0,676	0,474	0,397	0,294	0,152	0,108	0,091	0,136
B5.3	0,272	0,459	0,429	0,759	0,676	1,000	0,436	0,398	0,276	0,082	0,064	0,142	0,112
B6.1	0,287	0,412	0,283	0,386	0,474	0,436	1,000	0,798	0,576	0,190	0,201	0,075	0,198
B6.2	0,269	0,364	0,277	0,325	0,397	0,398	0,798	1,000	0,712	0,156	0,146	0,063	0,200
B6.3	0,283	0,272	0,211	0,286	0,294	0,276	0,576	0,712	1,000	0,192	0,230	0,084	0,205
B7.1	0,280	0,216	0,056	0,117	0,152	0,082	0,190	0,156	0,192	1,000	0,664	0,540	0,427
B7.2	0,305	0,200	0,109	0,107	0,108	0,064	0,201	0,146	0,230	0,664	1,000	0,534	0,427
B7.4	0,215	0,187	0,003	0,137	0,091	0,142	0,075	0,063	0,084	0,540	0,534	1,000	0,384
B7.5	0,238	0,238	0,064	0,118	0,136	0,112	0,198	0,200	0,205	0,427	0,427	0,384	1,000

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0,86
Bartlett's Test of Sphericity		3412,705
		680,408
		276
		6
		0
		0

Anti-image Matrices

Anti-image Correlation for B1-B3

Anti-image Correlation

	B1.1	B1.2	B1.3	B2.1	B2.2	B2.3	B2.4	B2.5	B3.2	B3.3	B3.4
B1.1	,908 ^a	-0,286	-0,238	-0,007	-0,067	-0,103	0,136	-0,060	-0,037	-0,156	0,034
B1.2	-0,286	,903 ^a	-0,377	-0,087	0,073	-0,019	-0,098	-0,107	0,022	0,030	-0,018
B1.3	-0,238	-0,377	,892 ^a	-0,234	-0,067	-0,016	0,025	-0,015	-0,016	0,048	-0,052
B2.1	-0,007	-0,087	-0,234	,895 ^a	-0,332	-0,154	0,003	-0,049	-0,037	-0,004	-0,016
B2.2	-0,067	0,073	-0,067	-0,332	,893 ^a	-0,301	-0,055	-0,114	-0,034	0,014	-0,035
B2.3	-0,103	-0,019	-0,016	-0,154	-0,301	,896 ^a	-0,070	-0,276	0,081	0,026	-0,033
B2.4	0,136	-0,098	0,025	0,003	-0,055	-0,070	,814 ^a	-0,545	-0,031	-0,028	0,006
B2.5	-0,060	-0,107	-0,015	-0,049	-0,114	-0,276	-0,545	,834 ^a	0,042	0,007	0,006
B3.2	-0,037	0,022	-0,016	-0,037	-0,034	0,081	-0,031	0,042	,846 ^a	-0,535	-0,013
B3.3	-0,156	0,030	0,048	-0,004	0,014	0,026	-0,028	0,007	-0,535	,828 ^a	-0,367
B3.4	0,034	-0,018	-0,052	-0,016	-0,035	-0,033	0,006	0,006	-0,013	-0,367	,911 ^a
B4.1	-0,015	0,004	-0,015	-0,189	0,090	-0,032	0,022	-0,007	0,104	-0,141	0,031
B4.2	0,041	0,012	-0,021	0,045	-0,063	0,056	0,010	0,028	-0,075	0,084	-0,008
B4.3	-0,020	0,066	0,091	-0,081	0,067	0,052	-0,087	-0,011	-0,065	0,035	-0,057
B5.1	-0,046	0,082	-0,098	0,033	-0,035	0,086	0,045	-0,006	-0,081	-0,013	-0,037
B5.2	-0,142	-1,020E-05	0,108	0,020	0,013	-0,031	-0,090	0,061	0,142	-0,090	0,059
B5.3	0,130	-0,109	0,022	0,005	-0,006	-0,065	0,057	-0,029	-0,140	-0,049	0,038
B6.1	0,081	0,028	-0,036	-0,152	0,128	0,000	0,085	-0,067	-0,051	-0,044	-0,048
B6.2	-0,004	-0,077	-0,022	0,081	-0,114	-0,118	0,061	0,129	0,042	-0,091	0,031
B6.3	-0,083	-0,032	0,085	0,024	0,022	0,083	-0,127	-0,018	-0,126	0,130	-0,183
B7.1	-0,134	-0,088	0,116	-0,065	-0,090	-0,008	-0,106	0,174	0,086	-0,105	0,027
B7.2	0,023	0,072	-0,173	0,039	0,006	0,059	-0,008	-0,161	-0,062	0,050	-0,087
B7.4	-0,054	0,032	-0,175	0,179	0,023	0,051	-0,062	-0,038	-0,014	0,127	-0,017
B7.5	0,044	-0,076	-0,076	-0,037	0,017	0,043	0,082	-0,056	0,040	-0,054	-0,114

Anti-image Correlation for B4-B6

Anti-image Correlation

	B4.1	B4.2	B4.3	B5.1	B5.2	B5.3	B6.1	B6.2	B6.3
B1.1	-0,015	0,041	-0,020	-0,046	-0,142	0,130	0,081	-0,004	-0,083
B1.2	0,004	0,012	0,066	0,082	-1,020E-05	-0,109	0,028	-0,077	-0,032
B1.3	-0,015	-0,021	0,091	-0,098	0,108	0,022	-0,036	-0,022	0,085
B2.1	-0,189	0,045	-0,081	0,033	0,020	0,005	-0,152	0,081	0,024
B2.2	0,090	-0,063	0,067	-0,035	0,013	-0,006	0,128	-0,114	0,022
B2.3	-0,032	0,056	0,052	0,086	-0,031	-0,065	0,000	-0,118	0,083
B2.4	0,022	0,010	-0,087	0,045	-0,090	0,057	0,085	0,061	-0,127
B2.5	-0,007	0,028	-0,011	-0,006	0,061	-0,029	-0,067	0,129	-0,018
B3.2	0,104	-0,075	-0,065	-0,081	0,142	-0,140	-0,051	0,042	-0,126
B3.3	-0,141	0,084	0,035	-0,013	-0,090	-0,049	-0,044	-0,091	0,130
B3.4	0,031	-0,008	-0,057	-0,037	0,059	0,038	-0,048	0,031	-0,183
B4.1	,804 ^a	-0,554	0,014	0,080	-0,082	0,006	0,076	0,039	-0,144
B4.2	-0,554	,829 ^a	-0,222	-0,210	-0,046	0,023	-0,109	-0,056	0,100
B4.3	0,014	-0,222	,895 ^a	-0,106	-0,038	-0,096	0,059	-0,101	0,044
B5.1	0,080	-0,210	-0,106	,853 ^a	-0,283	-0,477	0,011	0,121	-0,118
B5.2	-0,082	-0,046	-0,038	-0,283	,888 ^a	-0,299	-0,182	0,016	0,020
B5.3	0,006	0,023	-0,096	-0,477	-0,299	,851 ^a	-0,013	-0,096	0,076
B6.1	0,076	-0,109	0,059	0,011	-0,182	-0,013	,848 ^a	-0,598	0,006
B6.2	0,039	-0,056	-0,101	0,121	0,016	-0,096	-0,598	,784 ^a	-0,516
B6.3	-0,144	0,100	0,044	-0,118	0,020	0,076	0,006	-0,516	,829 ^a
B7.1	0,008	-0,044	0,030	-0,004	-0,034	0,052	-0,038	0,036	0,002
B7.2	-0,104	0,059	-0,119	0,003	-0,001	0,072	-0,092	0,079	-0,077
B7.4	-0,045	-0,040	0,094	-0,019	0,061	-0,156	0,038	-0,036	0,065
B7.5	0,035	-0,106	0,019	0,042	-0,033	0,014	0,037	-0,031	-0,021

Anti-image Correlation for B7

Anti-image Correlation

	B7.1	B7.2	B7.4	B7.5
B1.1	-0,134	0,023	-0,054	0,044
B1.2	-0,088	0,072	0,032	-0,076
B1.3	0,116	-0,173	-0,175	-0,076
B2.1	-0,065	0,039	0,179	-0,037
B2.2	-0,090	0,006	0,023	0,017
B2.3	-0,008	0,059	0,051	0,043
B2.4	-0,106	-0,008	-0,062	0,082
B2.5	0,174	-0,161	-0,038	-0,056
B3.2	0,086	-0,062	-0,014	0,040
B3.3	-0,105	0,050	0,127	-0,054
B3.4	0,027	-0,087	-0,017	-0,114
B4.1	0,008	-0,104	-0,045	0,035
B4.2	-0,044	0,059	-0,040	-0,106
B4.3	0,030	-0,119	0,094	0,019
B5.1	-0,004	0,003	-0,019	0,042
B5.2	-0,034	-0,001	0,061	-0,033
B5.3	0,052	0,072	-0,156	0,014
B6.1	-0,038	-0,092	0,038	0,037
B6.2	0,036	0,079	-0,036	-0,031
B6.3	0,002	-0,077	0,065	-0,021
B7.1	,843 ^a	-0,441	-0,274	-0,120
B7.2	-0,441	,861 ^a	-0,198	-0,094
B7.4	-0,274	-0,198	,836 ^a	-0,139
B7.5	-0,120	-0,094	-0,139	,934 ^a

a. Measures of Sampling Adequacy(MSA)

Communalities	
	Extraction
B1.1	0,499
B1.2	0,562
B1.3	0,613
B2.1	0,573
B2.2	0,581
B2.3	0,661
B2.4	0,427
B2.5	0,651
B3.2	0,62
B3.3	0,811
B3.4	0,464
B4.1	0,336
B4.2	0,538
B4.3	0,317
B5.1	0,727
B5.2	0,594
B5.3	0,66
B6.1	0,684
B6.2	0,964
B6.3	0,515
B7.1	0,592
B7.2	0,617
B7.4	0,493
B7.5	0,334

Extraction Method: Principal Axis Factoring.

Appendix 7: Descriptive statistics per cohort

		N	Mean	Std. Deviation
Environmental Attitude	18 – 27 [Gen Z]	34	3,87	0,432
	28 – 43 [Millennial]	50	4,23	0,560
	44 – 59 [Gen X]	53	4,33	0,833
	60 – 78 [Baby Boomer]	32	4,52	0,490
	Total	169	4,25	0,658
Recycling confidence & facility access	18 – 27 [Gen Z]	34	2,75	0,743
	28 – 43 [Millennial]	50	2,58	0,923
	44 – 59 [Gen X]	53	3,12	0,813
	60 – 78 [Baby Boomer]	32	3,20	0,941
	Total	169	2,90	0,891
Awareness of consequences	18 – 27 [Gen Z]	34	3,78	0,590
	28 – 43 [Millennial]	50	4,13	0,594
	44 – 59 [Gen X]	53	4,26	0,537
	60 – 78 [Baby Boomer]	32	4,24	0,464
	Total	169	4,12	0,577
E-waste recycling marketing campaigns	18 – 27 [Gen Z]	34	2,69	0,988
	28 – 43 [Millennial]	50	2,62	1,147
	44 – 59 [Gen X]	53	2,86	1,001
	60 – 78 [Baby Boomer]	32	3,20	0,938
	Total	169	2,82	1,045
Subjective Norms influencing e-waste recycling	18 – 27 [Gen Z]	34	2,74	0,764
	28 – 43 [Millennial]	50	2,71	1,075
	44 – 59 [Gen X]	53	3,33	0,927
	60 – 78 [Baby Boomer]	32	3,70	0,827
	Total	169	3,10	1,001
E-waste recycling intention	18 – 27 [Gen Z]	34	3,65	0,631
	28 – 43 [Millennial]	50	4,08	0,813
	44 – 59 [Gen X]	53	4,09	0,674
	60 – 78 [Baby Boomer]	32	4,20	0,640
	Total	169	4,02	0,723