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Investigating Recycling Behaviours in Lagos a case study for Developing Countries An Augmented Theory of Planned Behaviour (TPB)

Eremionkhale, George

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Investigating Recycling Behaviours in Lagos a case study for Developing Countries: An Augmented Theory of Planned Behaviour (TPB)



By

George Eremosele Eremionkhale

Your Award (PhD)

May 2022

Investigating Recycling Behaviours in Lagos a case study for Developing Countries: An Augmented Theory of Planned Behaviour (TPB)

By: George Eremosele Eremionkhale



Faculty of Business, Business and Law

Centre for Business in Society University Coventry, United Kingdom May 2022

The work contained within this thesis has been submitted by the student in partial fulfilment of the University's requirements for the degree of Doctor of Philosophy

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Abstract

Recycling is viewed as an essential aspect of sustainability, mainly as proenvironmental consumer behaviour. The theory of planned behaviour is a popular and wellgrounded theory that provides a theoretical framework for systematically identifying, explaining, and predicting recycling behaviours. This thesis evaluated the extension of the theory of planned behaviour based on Lagos characteristics in explaining recycling behaviours in Lagos with the addition of (inconvenience and word-of-mouth). This thesis provided a new perspective to the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents by focusing on the Lagos characteristics, this model; at the same time, adding to the current literature by providing new insight into the underresearched area of recycling behaviour in Lagos.

Overall, this thesis contributes to the literature by providing a new insight toward recycling behaviours in Lagos with intention as a mediating factor for a positive attitude, lack of inconvenience, and word-of-mouth towards participating in recycling in Lagos. Therefore, this finding has implications in terms of the interpretation of extending the theory of planned behaviour based on significant Lagos characteristics on recycling behaviours to provide a new perspective tailed towards enhancing recycling behaviour in Lagos.

The management implications of this thesis include insight into recycling behaviours in Lagos to assist academic researchers and practitioners (government and institution) in producing the best practice model that effectively encourages recycling participation in Lagos.

Publications and Awards Associated with this Thesis

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1 Introduction

Sustainability is a paradigm for thinking about the future where the environmental, social, and economic dimensions are not separated but are rather intertwined and balanced toward achieving a better quality of life (Ralph and Stubbs 2014). The sustainability concept has taken a central focus within global discussions since its introduction in 1987 during the issuing of the Brundtland report, where an economic aspect was added to the former social and ecological part of sustainable development by the United Nations (Khandelwal and Saxena 2010; Minton et al., 2012; Tsalis et al., 2020).

Environmental sustainability can be defined as balancing and interconnecting society while satisfying basic human needs without affecting the ecosystems (Morelli 2011). This concept has been incorporated as a constituent part of environmental policies addressing the current global environmental crisis, which has become a significant and urgent challenge in recent history (Ralph and Stubbs 2014; Holden et al. 2014; Bohner and Schlüter 2014; De Matteis et al. 2021). The nature of the environmental crises is wide-ranging, as observed by the mounting environmental pressures affecting parts of the ecosystems from the accumulation of human activities and consumption patterns associated with interconnected factors that contribute to climate change. For example, biodiversity loss and diminishing resources increase pollution and habitat loss (Ralph and Stubbs 2014; Bibri 2021; Kasperson et al. 2022).

The mounting environmental pressures caused by the inadequate distribution of waste, pollution, and rapid population growth lead to increased manufacturing and greenhouse gas emissions (Arora 2018). It is essential to focus on sustainability, as we live in

a finite world with limited natural resources that we depend on (Reilly 2012; Cumming and von Cramon-Taubadel 2018; Scheel et al., 2020; Maja and Ayano 2021). Therefore, when sustainability was coined in the United Nations' Brundtland Commission of 1987, there was an underlying goal of ensuring the maintenance of the earth's resources without compromising the ability of the needs of future generations (Hajian and Kashani 2021). This led to the United Nations (UN) defining 11 targets and 13 indicators for 17 sustainable development goals to target specific goals and indicators that could track each target's achievement (Villa et al., 2021).

Sustainability goals cannot be met without prioritising the environment's well-being (Kurniawan et al. 2021). Thus, the Sustainable Development Goal 12 (SDG12), titled "responsible consumption and production," was established in 2005 by the UN to ensure sustainable consumption and production patterns (Ghomi et al. 2021). By improving energy efficiency, ensuring effective use of resources, providing access to essential services, and providing sustainable infrastructure while providing green and respectable jobs to ensure a better quality of life for all (Kurniawan et al. 2021). According to the United Nations Environment Programme, Sustainable Consumption and Production (SCP) refers to "the use of services and related products by achieving environmentally sound management of waste and reducing waste generation through prevention, reduction, recycling, and reuse (Hatipoglu and Inelmen 2021).

Currently, most policies, frameworks, and research-based on environmental sustainability tend to focus mainly on developed countries (Jia et al., 2018; Menton et al., 2020). Examples include the 2008 EU waste framework, Germany's 2002 national strategy for sustainable development (OECD 2020), and Sweden's 2018 Swedish climate act (IEA 2020).

However, a few studies and policies are incorporated in developing countries (Jeffrey and Euphemia 2019). For example, Troschinetz and Mihelcic (2009) focused on sustainable municipal solid waste recycling in developing countries, while Awere et al. (2020) focused on E-waste recycling and public exposure to organic compounds in developing countries. Nevertheless, most of these studies tend to duplicate the approaches/models used in developed and developing countries without identifying the differences in characteristics between the developed and developing countries, such as attitudes towards recycling or convenience.

1.1 Research Problem

Environmental sustainability has been executed in various ways, such as focusing on the moral and cognitive aspects or a more hands-on approach, e.g., implementing activities such as recycling (Chan and Bishop 2013; Greaves et al., 2013; Bohner and Schlüter 2014). The main focus of environmental sustainability strategy has been through recycling, as seen by the considerable attention from various environmental stakeholders such as international organisations, government agencies, businesses, communities, and researchers in an attempt to encourage, promote, and facilitate recycling behaviour (Kabirifar et al., 2020; Baah et al., 2021 Fang et al., 2021).

Hence, the term recycling is used interchangeably with other popular sustainable expressions such as eco-friendly, environmentally friendly, and going green (Minton et al. 2012; Ahmad et. 2016; Shahidul et al. 2018;). Recycling can be defined as a sustainable way of reusing and processing previously used materials to effectively reduce the amount of waste sent to landfills (Khalil et al. 2017). Recycling has been perceived as a prevalent and effective

way of preventing, saving, and conserving natural resources due to its increasingly progressive and desirable pathway towards a sustainable society (Troschinetz and Mihelcic 2009; Bohner and Schlüter 2014; Varotto and Spagnolli 2017; Ma et al. 2019).

Governments and environmental organisations in developed countries such as the UK have spent significant resources promoting and advertising recycling behaviours while encouraging their residents to participate in recycling activities, resulting in a booming increase in recycling participation (Priestley 2020). For example, Scotland plans to introduce a 33% waste reduction by 2025; Wales provides 99% of their household with separate food waste collection; Sweden introduced the 2017 climate policy framework to help educate their citizens about waste sorting (Tin-yau 2020). Lastly, the introduction of Germany's green dot system has been one of the most successful recycling initiatives, resulting in less paper and materials being used with less waste to recycle (Emerson 2020).

In contrast, recycling has proven to be a challenge for developing countries and local authorities such as Lagos, with their government attempting and failing to tackle this problem (Otitoju 2014). Recycling in Lagos is still in its infancy compared to the rest of the world, with most of the recycling done in informal sectors (Benson 2020). Although recycling is recognised as an effective strategy toward environmental sustainability within the Lagos government, as seen by the implantation of the Lagos Waste Management Authority (LAWMA), these practices barely exist in Lagos (Dawodu et al. 2021). This is mainly due to factors such as lack of the right individual attitude and need, lack of knowledge and the right attitude towards recycling, and lack of technical resources and training at a local level to tackle the problem (Otitoju 2014; Khalil et al. 2017).

It is essential to point out that Lagos, particularly Nigeria, is not the only developing country with recycling issues, as most developing countries view recycling as a relatedly complex problem. Most of the recycling carried out in developing countries is through informal sectors, e.g., waste-picking and scavenging (Wilson et al. 2006; Dukhan et al. 2012; Velis et al. 2012; Hall et al. 2013), as observed by many studies that focus on recycling in developing countries, such as (Alexis Laurent et al. 2014; Chen et al. 2016; Huang et al. 2020; Ferronato 2020; Wang et al. 2020). However, most of these studies tend to focus on providing information by duplicating ideas and frameworks used in developed countries and applying them to developing countries without concentrating on or adapting them to the characteristics of those countries (Sthiannopkao and Wong 2013). For example, Strydom (2018) applied the theory of planned behaviour to understand the recycling behaviours among residents to help guide the decision-making related to household recycling in South Africa, which concluded that only 3.3% of South Africans in large urban areas showed dedicated recycling behaviour. Compared to studies such as Arli et al. (2019), which found the theory of planned behaviour to predict Australian residents' intention to recycle significantly. This could be based on the defined differences in the characteristics between developed and developing countries, especially towards recycling¹. Nevertheless, a few developing countries, such as Senegalese, Egypt, and South Africa, are starting to implement recycling efforts, particularly within the urban area where the waste generation rate has increased substantially (Marshall and Farahbakhsh 2013; Gandy 2014; Jambeck et al. 2015).

There has been less emphasis on recycling research in developing countries towards understanding the direct and indirect motives influencing an individual's behaviour. However,

¹ Refer to Chapter Two section 2.7 for Recycling in Developed countries versus Developing countries

some studies, for instance, the study by Aboelmaged (2021), examined the determinants of ewaste recycling among young individuals in an emerging economy by integrating habits into a prominent model that predicts their recycling behaviour. Individuals were more willing to partake when they understood recycling approaches and methods. Another study conducted by Wang et al. (2020) on household solid waste recycling behaviour in China found that public awareness, knowledge, age, income, and gender were influential factors in recycling.

While it is noteworthy that there are studies targeted toward developing countries, it is essential to identify that most of these studies focus on countries that are experiencing social and economic development. For example, China's coastal cities have positively been influenced by their more developed cities through the economic transition within the country transitioning into a developed country (Glaser and Funaiole 2020). Hence the importance of identifying and differentiating the characteristics of developing countries that apply to lower-income cities such as Lagos².

This thesis argues the need for developing countries to contribute to environmental sustainability through recycling, focusing on Lagos as a case study. Environmental sustainability is a global issue that requires both developing and developed countries (Purvis et al. 2019). Hence, there needs to be an urgent recognition that the lack of environmental sustainability tends to be more server in developing countries, with fundamental issues, including increased health risks and potential impact on climate change. Developed countries have the technologies and resources to combat these issues (Nkwo et al. 2018; Astill et al. 2019; Rana et al. 2020). Moreover, most developing countries, especially those in sub-Saharan

² Section 1.2 Expands on justifying Lagos for the case study of this thesis

Africa, rely heavily on natural resources for their economies and revenue (Gwaindepi 2021; Maja and Ayano 2021; Ngouhouo and Nchofoung 2022).

According to the United Nations, developed countries such as Nigeria can be defined as low and middle-income countries classified based on their development as measured by their per capita gross national income (GNI) (Gbadamosi 2020). Although frameworks have been developed and implemented to create environmental sustainability through recycling, most of these frameworks do not consider the differences in characteristics between developed and developing countries, for example, lack of knowledge, trust in government, adequate infrastructure, and effective policies and attitudes towards recycling (Galal and Abdul Moneim 2016). Developing countries often lack structural and efficient approaches to addressing generated waste which is essential for developing countries to become sustainably developed (Ahmed et al. 2022).

While it is impossible to assume that all developing countries are the same, they share enough characteristics to enable studies to generalise while considering certain constraints (Ferronato and Torretta 2019). For example, according to the UN, China and Nigeria are classified as developing countries. The UNDP's country classification system has captured the multifaceted development nature through the Human Development Index (HDI), with three compositing indices used to categorise countries: education, longevity, achievements, and income (Gbadamosi 2020). In addition, according to Nielsen (2011), other indices, such as personal security or political freedom, are associated with developmental aspects. However, the HDI is a basic structure that has remained constant over the years, considering its multifaceted nature (Gbadamosi 2020).

Within the HDI classification, the geometrically and developed countries such as the UK, Germany, and the USA are classed in the top quartile of the HDI distribution while developing countries are broken down into three subgroups: high developing HDI percentile of 51-75 (Malaysia, Brazil, and Turkey); medium developing percentile of 26-50 (Thailand, China); and lastly low developing consisting of the bottom quartile HDI (Senegal, Nigeria, and Zimbabwe) (Gbadamosi 2020). Nevertheless, all three subgroups share common attributes like high population growth, mass poverty, unemployment and underemployment, sociopolitical variability, uncertainty and vulnerability, and low access to finance (Wadho et al. 2018; Nadimi et al. 2021). Lagos was chosen as a case study for the purpose of the thesis. Lagos is the most populous city in Africa and a significant city globally, with the most considerable economic capital in Nigeria (Mogaji 2020).

1.2 Brief Overview of Lagos

Demographic and Socio-Economic Background

This study was carried out in Lagos State. Lagos is located on the west coast of Africa in the southwestern part of Nigeria and is the largest and most populated city in Nigeria, occupying over 923,770 square kilometers (Adewunmi et al. 2012). The location and physical characteristics of Lagos State, including topography, water and wetlands, soil features, and geology, makes Lagos vulnerable to climate change (Elias and Omojola 2015). Lagos is the former capital of Nigeria and now the commercial capital of Africa while being the largest state and economic capital in Nigeria, making Lagos one of the fastest-growing megacities globally due to its uniqueness in sub-Sahara Africa in terms of geography, population (densities, structure, and composition), and the concentration of urban slum populations (Elias and Omojola 2015; Ojebode and Onekutu 2021). Lagos state comprises thirty-seven local government areas while witnessing more rapid urbanization post-independence, with most large banks, multinationals, department stores, and critical businesses sitting in Lagos's financial, commercial, and cultural centres (Ajike and Anjolajesu 2017; Mogaji 2020).

1.3 Justification for the choice of Lagos as the focus of this research

Lagos state is one of the thirty-six states in Nigeria. In contrast to other states in Nigeria that depend on revenues generated from the oil sectors: Lagos has a diversified economy from transport, service, manufacturing, retail, and wholesale (Lincoln 2012; Adebisi et al. 2015). According to The Economist (2022), Lagos state is reported to generate ninety billion dollars in goods and services annually. Hence, Lagos is described as the economic hub of Nigeria and Africa.

This thesis considered Lagos state the best choice due to its strategic importance. For Instance:

- 1. Out of the thirty-six states in Nigeria, Lagos has the highest population. It is Nigeria's largest commercial capital, with modern industrial estates, and fits the criteria of a developing, sprawling, and congested city (Edema 2019). Therefore, Lagos is an appropriate representation of the developing nation, Nigeria.
- 2. Since Abuja replaced Lagos as the capital of Nigeria in 1975, Lagos has remained the capital and commercial hub in Nigeria, with an ongoing influx of people from all over the country (Kasim 2018). This is important as it can capture a representatively diverse aspect of the population.

- 3. Lagos State is Nigeria's industrial, commercial, and business hub, which contributed about 35.6% to the national GDP in 2010, reported about \$80.61 billion, and represents approximately 62.3% of the national non-oil GDP (Mogaji 2020). This shows that Lagos is an economic juggernaut where a relatively significant volume of economic transactions occurs in the developing nation, Nigeria. Making it a good representative of the country's economic standing
- 4. The impacts of climate change in Lagos State are multifaceted and affect all sectors. For example, research on the effects of climate change on water and wastewater management has revealed that flooding and associated pollution will significantly reduce the water quality and potable water quantity in the state (Major et al., 2011). Therefore, these external values justify the choice of Lagos as a case study.

1.4 Theoretical Foundation

This thesis's analytical work on recycling is based on the essential aspect of Lagos characteristics, such as power distance with the different social classes, lack of government trust, value for community life, and lack of knowledge concerning the context of the state's policies as well as institutional factors affecting recycling. This, in turn, draws and elaborates the extension of existing work by scholars in the field of the Theory of Planned Behaviour (TPB) which is the extension of the theory of reasoned action and includes measures of controlled belief and perceived behavioural control (Ajzen, 1991). Several theories have been developed to effectively change behaviours by providing an accumulated framework and knowledge to understand the current behaviour better while identifying targets for change (Davis et al. 2014; Ajzen 2020). Examples include the Norm-Activation Model (NAM), Stages of Change

(Transtheoretical Model), The Theory of Reasoned Action (TRA), Schwartz's socialpsychological model of altruistic behaviour, and Diffusion of Innovation Theory. ³

The theory of planned behaviour was chosen for this thesis based on the need for psychological models to understand the recycling behaviour in developing nations such as Nigeria, represented by Lagos, and the factors that underpin these choices, e.g., Lagos characteristics. The theory of planned behaviour has emerged as the most widely used model within behavioural research, predominantly in pro-environmental studies, and has been widely utilised to investigate pro-environmental behaviours in previous studies (Davis and Morgan 2008; Chen and Tung 2010; Nigbur et al., 2010 Ramayah et al., 2012; Chen and Bishop 2013). However, a few studies, for example, Strydom (2018), applied the theory of planned behaviour to understand the recycling behaviours among residents to help guide the decision-making related to household recycling in South Africa and have used the planned behaviour theory in developing countries.

Therefore, this thesis bridges the knowledge gap through the conceptually coherent augmentation of the theory of planned behaviours by including constructs such as social norms, trust, inconvenience, and word of mouth. These are based on Lagos's characteristics, such as power distance and lack of government trust, value for community life, and lack of knowledge in the context of the country's policies and institutional factors affecting recycling, to investigate pro-environmental decision-making towards recycling. These constructs will then be added to the theory of planned behaviour to create a new perspective on the theoretical development of behavioural change in influencing Lagos residents' recycling

³ Refer to Table 2.2 for examples of other behavioural theories used in promoting and explaining proenvironmental behaviours such as recycling, and the key elements that define their approaches.

behaviours. For example, internal ties within a community and the collective cohesiveness of a group (collectivism) lack adequate policies, attitudes toward recycling, and government trust. According to Stern et al. (1993), individuals will participate in pro-environmental behaviour when their current situation activates their values. Hence, this proposed model provides a suitable process to identify underlying mechanisms that motivate an individual in Lagos to recycle.

1.4.1 Theory of Planned Behaviour (TPB) ⁴

Overall, the conceptual framework of the theory of planned behaviour focuses on factors influencing an individual's behaviours and has been utilised in many research issues such as energy consumption reduction, sustainable food choices, environmental attitude and behaviour, and recycling (Yuriev et al. 2020). These studies have shown and supported the statement that the theory of planned behaviour constructs predicts pro-environmental behavioural intentions. However, most of these studies were carried out in developed and economically stable countries such as Europe, the USA, Japan, and Switzerland (Darby and Obara 2005; Sidique et al. 2010; Andersson and von Borgstede 2010). Thus, it is pertinent to ascertain the validity of these theories in other cultural settings, explicitly developing and low economies such as Lagos. According to Peabody et al. (2020), it is crucial to focus on those countries' characteristics to understand better the complexity of how the framework is anchored on the central issues affecting recycling efficiency (Bakare 2020). As a result, there is no clear framework for implementing effective recycling in Lagos.

⁴ Refer to Chapter Two for the full overview of the theory of planned behaviour

Different efforts have been devoted to investigating individual behaviours, especially by scholars mainly in psychology, resulting in the developing of psychological models and theories to help understand these behaviours' factors. However, there are different theories for understanding behavioural change, for example, social cognitive theory, social practice theory, and diffusion of innovation theory. The theory of planned behaviour has emerged as the most widely used model within behavioural research, predominantly in pro-environmental studies (Kinzig et al. 2013; Clark et al. 2019; Lucarelli et al. 2020; Moon et al. 2021).

Consistent with the theory of planned behaviour, three beliefs are relied on when an individual is asked to decide on a course of action. Firstly, behavioural belief is the likely consequence of available alternatives. Secondly is the normative belief, which is the consideration of normative expectations from influential individuals. Lastly, control beliefs weigh potential obstacles and available resources at their disposal. These beliefs are essential to forming attitudes, subjective norms, and perceived behavioural control (Bamberg et al. 2003).

As reported in previous studies, one of the advantages of the theory of planned behaviour is its ability to include and supplement additional constructs from other theories (Oztekin et al. 2017; Passafaro et al. 2019; Xu et al. 2020; Xu et al. 2021). Ajzen (1991), the creator of the theory of planned behaviour, supported this proposition by positing that the theory is open to additional amendments and predictors once the original constructs have been considered and have shown not to capture a significant portion of intention and behavioural variance. Hence, by incorporating different external constructs into the theory of planned behaviour framework, based on some of the characteristics of Lagos, a representative of the developing nation Nigeria, this augmented framework will understand the sustainable

environmental implementation of recycling in Lagos. Nevertheless, despite the usefulness of the theory of planned behaviour, scholars have pointed out several shortcomings associated with using the theory (Yuriev et al. 2020). For example, the theory of planned behaviour has been suggested to only be suitable for exploring a specific behaviour at a particular time (Yuriev et al. 2020), and criticisms directed toward using subjective norm constructs in the theory of planned behaviour (Rivis and Sheeran 2003; Muralidharan and Sheehan 2016).

Subjective norms in the theory of planned behaviour can be perceived as prescriptive due to the social pressure attached to behavioural performance, based on the positive effect on the behaviour when there is pressure to oppose or support a norm (Ajzen 1991; Fang et al. 2017). As a result, it lacks to show how individuals perceive participation in behaviours based on their interaction with others and might not completely catch the processes of norm sharing within groups. Social norms will replace subjective norms in this thesis to circumvent this shortcoming. Social norms have been proven to better predict behavioural intent in understanding pro-environmental behaviours, especially from a social psychology perspective (Cialdini and Trost 1998; Fang et al., 2017). Therefore, subjective norms will be replaced with social norms in this thesis.

1.5 Research Aim

By focusing on the characteristics of the developing region through the case study on Lagos, this model provides a new perspective to the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents; at the same time, adding to the current literature by providing new insight into the under-researched area of recycling behaviour of Lagos, a case study of developing countries. At the same time, this model adds

to the current literature by providing new insight into the under-researched area of recycling behaviour in Lagos, a case study of developing countries. This thesis reinforces the importance of using additional constructs to expand the theory of planned behaviour's ability to predict recycling behaviours of developing countries based on the characteristics of Lagos case study.

1.5.1 Research Objectives

The following objectives were set for the research work to address the need for research in this area:

- 1. To outline Lagos's characteristics and how they differ from those of developed countries regarding engaging in recycling behaviour change in Lagos. This objective was met and is included in section 1.3.1.
- 2. Conduct a comprehensive review of the literature to uncover what is currently known about recycling and behavioural theories in relation to recycling in Lagos. The literature relating to the problem area was critically evaluated and reviewed in Chapter 2 of this thesis and was the baseline used in developing the model and research hypotheses.
- 3. Develop a definition of environmental sustainability as it relates to Lagos. The metaanalysis and working definition of sustainability for this thesis purpose were included in section 2.4.
- 4. To understand the impact of all characteristics and determine which have the most substantial impact on recycling behaviour in developing countries with the case of Lagos and how they work together to develop a culture that does not recycle. This objective was met and is included in section 2.9.2.

5. To produce an integrated logical model that can implement a positive recycling behaviour towards individuals in Lagos. This objective was met and is included in section 3.5

1.5.2 Research Questions

Four major research questions directed this investigation into recycling behaviours in Lagos by creating new insight into implementing the planned behaviour theory on recycling. The following four research questions have been constructed, each subheading to address the research aim. The research questions were formulated to satisfy the investigation of the research objective.

- 1. How do the original constructs of the theory of planned behaviour influence recycling intentions in Lagos, a case study of developing countries?
- 2. What does recycling practice mean in the case study Lagos, and can the theories used in pro-environmental behaviours, mainly in developed countries, apply to recycling in Lagos?
- 3. What are the roles of the additional constructs such as social norms, trust, inconvenience, and word of mouth in conjunction with the theory of planned behaviour components in predicting recycling behaviours among Lagos residents?
- 4. What is the importance of incorporating a developing nation's characteristics, as depicted in a case study of Lagos, into the theory of planned behaviour in influencing its recycling behaviour?

1.6 Research Approach, Methodology, and Design.

This thesis commenced with an in-depth literature review to better understand the research area. In addition, a post-positive approach was used to investigate the research problem through a realistic research paradigm using a mixed, predominantly quantitative research method and methodology to analyse the collected data using inferential and descriptive statistics. The qualitative phrase used a semi-structured interview to support the additional constructs (social norms, inconvenience, trust, and word-of-mouth) chosen based on the Lagos characteristics⁵. The quantitative phase used descriptive and PLS-SEM⁶ techniques to analyse the collected data and assess the validity of the seven research hypotheses⁷. Data relating to the exemplar insight and contexts into the effective relationships were used to further generalise the study's findings and provide a quantitative path analysis using moderation and mediation techniques.

The scale development methodology followed Churchill's (1979) scale development procedure and was influenced by Rossiter's more recent scale development methods (2002). This PLS-SEM approach included construct reliability, construct validity, and discriminant validity. The methodological phases for developing this thesis's main research instrument are outlined in Figure 1.1.

⁵ Chapter Six explains the details of the scale development procedure and presents the results of the semistructured interviews (section 6.2.4)

⁶ Refer to chapter Five for the Justification for choosing PLS-SEM (5.9.3).

⁷ The results from the multivariate analysis and hypothesis testing are presented in Chapter Eight



Figure 1.1 Scale Development Procedure

Source: Adapted from Churchill (1979) and Rossiter (2002)

The data analysis was conducted in two stages. The first was the descriptive analysis aided by the SPSS PASW 18.0 statistical software package to gain insight into any significant difference between the sample groups and the sample's composition. This was done through various tests such as (ANOVA), Chi-square statistics test, and t-test. The second was the multivariate stage, which used SmartPLS 3 software for the PLS-SEM, obtaining construct reliability and discriminant validity. The reason for this stage was to test the hypothesis of this research⁸.

1.7 Key Findings

The result from the conceptualised model as a result of structural equation modelling showed acceptable construct reliability, construct validity, and discriminant validity between the proposed model and the observed data. The first objective of this thesis was to use Lagos's

⁸ Refer to chapter Three for this thesis Hypothesis

characteristics as a case study of developing countries and how they differ from developed countries regarding engaging in recycling behavioural change. Based on a thorough semistructured interview, this thesis identified the Lagos characteristics, which helped select the additional constructs (social norms, inconvenience, trust, and word-of-mouth).

This thesis contributes to extending knowledge and theory development in the following ways:

Ajzen's (1985) Theory of planned behaviour augments that the nature of recycling behaviour in Lagos contributes to behavioural change with specific and general context to recycling. This was achieved by empirically demonstrating significant relationships between the additional predictors (inconvenience, word-of-mouth) of recycling behaviour added to the theory of planned behaviour model⁹. Lagos residents are more likely to develop an intention to recycle based on their beliefs about recycling when perceived as convenient and when they are aware and willing to receive positive information about recycling. This is more impactful in a developing country, as represented by Lagos, as there is a significant gap between the level of recycling convenience between developing and developed countries. Furthermore, the current findings indicated that the Lagos participant's recycling behaviours were directly predicted by their intention to recycle and perceived behavioural control over recycling.

This thesis differs from prior literature by providing a new insight toward recycling behaviours in Lagos, where intention is a mediating factor for a positive attitude and lack of inconvenience and word-of-mouth. Therefore, this finding has implications in terms of the interpretation of extending the theory of planned behaviour based on significant Lagos

⁹ Refer to Chapter Three for the conceptual model of this thesis
characteristics on recycling behaviours to provide a new perspective tailed towards enhancing recycling behaviour in Lagos.

1.7.1 Theoretical Finding

Considering that research on pro-environmental behaviour is an interdisciplinary and complex field (Heinz and Koessler 2021), this thesis draws from and contributes to knowledge in these areas of literature: sustainability literature, theory of planned behaviour, proenvironmental behaviour literature, and marketing literature. By providing a new perspective and insight into recycling behaviour in developing cities, specifically Lagos. This differs from existing literature, as this thesis focuses on the unique characteristics of developing countries. For example, while recycling is performed through formal sectors in developed countries, recycling in developing countries, as seen in the case study of Lagos, is carried out through informal sectors. Additionally, there is a more severe lack of trust between the government and residents in developing countries versus developed countries.

This thesis significantly contributes to the literature by providing evidence that can be used to enhance recycling behaviour in developing cities using a case study of Lagos. Most studies on recycling behaviours tend to focus on developed regions, particularly the U.S.A. and the U.K., and economically stable Asian countries, such as China, Japan, and Malaysia, where recycling is heavily industrialised through formal sectors, with frameworks tailed to those specific areas (Williams 2005; Adhikari 2018; Kamble and Bahadure 2019; Ferronato 2020; Wang et al. 2020).

This thesis has made a theoretical contribution to the knowledge of the theory of planned behaviour by generating a new perspective and insight into recycling behaviour in developing cities, specifically Lagos. This theoretical contribution was made by extending the

theory of planned behaviour to include new constructs (word-of-mouth and inconvenience) that highlight the uniqueness of developing countries given their difference from developed countries.

1.7.2 Word of Mouth and Intention

This research contributes to the theoretical development of recycling behaviours by demonstrating strong empirical evidence of a significant relationship between word-of-mouth and recycling intentions. This finding is essential as it provides new insight into the mechanisms of recycling intention. Word-of-mouth has been shown to impact an individual's judgment by allowing individuals to categorise and make their intention easier (Gupta and Harris 2010; Lovett et al., 2013; Cantallops and Salvi 2014; Jeong and Koo 2015). However, most of these studies have been in the context of green practices such as greenwashing (Hameed et al., 2021) and green purchase intentions (Al-Gasawneh and Al-Adamat 2020), electronic waste disposal (Rezaei and Ho 2021), pro-environmental responsibility such as corporate and social responsibilities (CSR) (Ogunmokun and Timur 2019) and electronic waste management behaviours (Gilal et al., 2019). Consequently, little to no research on how wordof-mouth directly influences recycling intention. Furthermore, the previous research using word of mouth in those other contexts does not directly apply to recycling behaviour as recycling involves a different process in the field of environmental sustainability, namely the conversion of old products into new products. Hence, the importance of this thesis shows a significant relationship between word-of-mouth and recycling intention to provide a new perspective toward behavioural change in recycling.

1.7.3 Inconvenience and Intention

This subsequent finding contributes to the theory of planned behaviour in a recycling context by confirming the significant relationship between inconvenience and recycling intentions. The finding provides a new insight from a Lagos point of view by validating the addition of the construct inconvenience to the theory of planned behaviour to predict behavioural intentions in recycling in an informal sector. This study confirms inconvenience as a predictive power towards Lagos residents' recycling intention. Recycling inconvenience is perceived differently in developed countries such as the UK, with relatively more established norms within the formal section (Kumar 2019; Amoatey et al. 2020; Akkalatham and Taghipour 2021). Therefore, inconvenience does not carry as much weight or significance in recycling behaviours in developed countries compared to developing countries. To the best of the author's knowledge and through searches in peer-reviewed databases, there has not been extensive research empirically exploring the effects of inconvenience on recycling intention in developing countries, as shown in Lagos, a case study for developing countries.

1.7.4 Practical Contribution

This thesis contributes to practice by providing a new insight into recycling behaviours in Lagos to assist academic researchers and practitioners (government and institution) in producing the best practice model that effectively encourages recycling participation in Lagos. In addition, the findings from this study have several implications that are tailored based on the characteristics of Lagos residents for the development and implementation of recycling schemes and the communication campaigns that advocate these schemes' use.

Therefore, this research's proposed and validated conceptual framework emphasised that the Lagos respondents are optimistic about their recycling intentions, especially when appropriately motivated. With Lagos as a case study, a significantly positive relationship exists between attitude, word of mouth, perceived behavioural control, inconvenience, and intentions regarding positively changing recycling behaviour in developing countries. This thesis presents several 'practical implementations for policymakers which are as follows:

- In this thesis, the construct trust had no statistically significant impact on the Lagos participant's recycling intention. In this respect, comprehensive research has shown a lack of trust between Lagos residents and the government or activities initiated by the government, which is an established Lagos characteristic (Lucrezi and DigunAweto 2020). Based on this result, Lagos residents are not likely to participate in recycling as they perceive recycling to be primarily the responsibility of the local authorities (Abila 2018). Therefore, this thesis provides policymakers and institutions with practical insights into an effective strategy to promote recycling in Lagos by involving community leaders in establishing and executing regulations and policies toward recycling.
- In this thesis, the construct inconvenience was found to be a statistically significant determinant of the intentions of the Lagos residents to recycle, meaning Lagos residents are less willing to participate in recycling when they perceive the behaviour to be inconvenient. Furthermore, given the comparatively severe lack of conveniences in developing countries compared to developed countries, this construct of inconvenience plays a functional role in the theory of planned behaviour in developing countries where even a slight improvement in convenience levels is significantly noticeable. Therefore, this thesis recommends that policymakers in Lagos consider convenience, for example, recycling drop-off centres at convenient locations within the community, adequate

facilities, and handling of recyclable materials for easy separation toward overcoming the associated barriers with recycling inconvenience.

 Word-of-mouth was shown to directly impact the recycling intentions of Lagos residents, making word-of-mouth a comprehensive tool for Lagos residents' judgment towards recycling by making their recycling decision easier. Therefore, this thesis shows that wordof-mouth can play a promising role in influencing recycling participation in Lagos. Thus, the Lagos government agencies and institutions seeking to promote and encourage recycling should consider implementing communication campaigns advocating recycling in Lagos with Lagos residents expressing their experiences about recycling.

1.8 Thesis Structure

This thesis is structured into different chapters to help effectuate the questions and objectives, aligning with the standard format for investigating this type. The chapter and section are designed to meet this thesis's questions and objectives.

Chapter One: Provides the research background while outlining this thesis's questions and objectives and the content, scope, contribution, and significance.

Chapter Two: This chapter comprehensively reviews the literature on sustainability, environmental sustainability in general, and various concepts, measures, and approaches used in developing and developed countries.

Chapter Three: This chapter sets a scene for the researcher's conceptualisation by creating a framework of concept and development of theory to investigate the research problems.

Chapter Four: This chapter focuses on how the research design and methodology were used to achieve the aim and objectives of this thesis. Also, the procedures and the reasons behind applying these methods are presented.

Chapter Five: This chapter focuses on the methods adopted for this thesis. It includes the quantitative and qualitative data collection methods, sampling and time horizon, measurement instrument design, and scale purification through piloting with the measurement instrument.

Chapter six: This chapter focuses on a detailed description of the scale development process by illustrating how the scale was structured. This process engaged different sources to validate the generated items, including qualitative research and quantitative analysis.

Chapter Seven: This chapter focuses on the first part of the findings from descriptive data analysis. This chapter begins with reporting the descriptive frequencies, including the demographical nature of the sample and the data distribution, for comparison purposes. Then, the findings of the descriptive mean comparisons, utilising independent t-tests to assess any significant differences between the variables, were later presented in the chapter.

Chapter Eight: This chapter focuses on Structural Equation Modelling (SEM). This chapter is divided into two major parts: analysing scale reliability and running PLS-SEM. The measurement model was validated using SEM with SmartPLS. The hypothesised conceptual model was tested, where causal relationships gave rise to the displayed observable data and indicated how well the posited model fit the data.

Chapter Nine: This chapter focuses on a detailed discussion of the findings by presenting the contributions of this thesis, both theoretical and practical. The chapter also answers the four research questions.

Chapter Ten: This chapter provides the conclusion for this thesis by summarising the whole thesis and outcome. The thesis is reviewed in terms of content and rationale. The chapter acknowledges the existence of some limitations that lie within this thesis, and these are divided into two types, conceptual and methodological. As the thesis ends, the chapter highlights essential issues that provide opportunities for future research and the limitations.

1.9 conclusion

This chapter sets out the background, necessity, and rationale behind the research problem investigated in this work. The theory of planned behaviour was expanded while implementing recycling management based on Lagos characteristics because it focuses on factors influencing individuals' behaviours. Constructs such as social norms, inconvenience, word of mouth, and trust will be implemented in this framework based on Lagos's internal ties within a community, such as the characteristics that contribute to collective cohesiveness.

The next chapter will include a literature review broken down into three sections: the concept of sustainability with the main focus on environmental sustainability. This then leads to recycling in general and how it is practised in developed and developing countries. Finally, the expansion of behavioural change theory (theory of planned behaviour) in Lagos includes effective and instrumental attitudes and planning a framework to predict recycling in Lagos. Based on the general recycling and prosocial behaviour literature.

2 Literature Review

This chapter details current academic literature to define the theoretical framework for this thesis. It is broken down into three sections to provide a context for this empirical research. The first section focuses on sustainability concepts, a meta-analysis of sustainability, and the dimensions of sustainability (social, economic, and environmental). The second section gives an overview of recycling as a concept under environmental sustainability while distinguishing the differences in recycling between developed and developing countries. It also focuses on the global significance of recycling and classification countries based on the level of development and how recycling is perceived in Lagos. The last section extends the discussion about behavioural change theories, focusing on the theory of planned behaviour and the additional constructs: trust, motivation, and inconvenience word-of-mouth.

2.1 Section One: An overview of the Sustainability Concept

Introduction

Sustainability is not a new topic, as it has been focused on by researchers in different fields to establish a precise meaning while finding solutions to sustainable problems (Kidd 1992; Robinson 2004; Kates 2011; Ahvenniemi and Huovila 2020; Aminpour et al. 2020; Luna-Nemecio et al. 2020; Virtanen et al. 2020). This chapter begins by exploring how various scholars have interpreted the term sustainability. Firstly, an overview and background of sustainability are provided based on the works of multiple scholars, along with this thesis definition of sustainability, followed by examining the debates surrounding the sustainability definitions and models. Lastly, this section concluded by emphasising the difference between strong and weak sustainability and the three dimensions of sustainability. VanZon (2002) defines "sustainability" and "sustainable" as the ability to sustain. However, sustainability has always been associated with the term "eco," an abbreviation from ecology, meaning sensitive or environmentally friendly (Morelli 2011). Odum and Barrett (2009) defined ecology as studying natural environments and the relationship between organisms and their surroundings at any given time. Therefore, sustainability can be defined as ecology's ability to sustain the natural environment. At the same time, Sustain in Latin is "sutinere," with synonyms such as maintaining, preserving, and keeping, which shows that sustainability is the persistence over an indefinite future of specific necessary and desired characteristics of both the ecosystem and the human subsystem within (Vos 2007; Aminpour et al. 2020).

Sustainability is a broad concept that varies across cultures and disciplines, making it fundamentally and profoundly embedded within different concepts and challenging to understand (Robison 2004; Kates 2011). According to Pennington et al. (2014), the critical issue with understanding the subject of sustainability can be linked to how the terms "sustainable development" and "sustainability" are being used interchangeably. Furthermore, the ambiguity of the phrase sustainable development and how the term development has been linked to economic growth, which embraces and emphasises the "quality of life" and the necessities of fulfilling wellbeing, also impacts the ability to understand sustainability (Sénéchal et al., 2017). Nevertheless, sustainability and sustainable development have been considered contestable concepts due to the multiple interpretations of the two concepts (Owens and Legere 2015).

Although these concepts have been used separately, it is clearly expressed that sustainable development and sustainability are linked, and are sometimes used as synonyms,

even within academic and scientific fields (Olawumi and Chan 2018; Sartori et al., 2014; Ruggerio 2021). Therefore, in this thesis, sustainability and sustainable development concepts will be used interchangeably to mean the same concept. However, various scholars view sustainable development as an oxymoron due to its development appearing in environmental degradation. This has prompted discussions and debates about the definition of sustainability and sustainable development (Dresner 2008; Owens and Legere 2015). According to Boron and Murray (2004), the phrase sustainable development is a shrinkage used to cover up the continuity of destroying the environment. Selmes (2005) disagreed with this position, suggesting that there needs to be clarity between the two terms to reduce the risk of confusion and failure to understand and communicate sustainability and its issues effectively. Vos (2007) added that the differences between the two terms must be clearly understood to work correctly within different fields, as sustainability and sustainable development are still perceived differently by researchers and practitioners in their areas (Thiele 2013).

Sustainable development must meet the needs in ways that could continue forever, which results in sustainability (Boron and Murray 2004; Boar et al. 2020). Therefore, sustainability is the general outcome, while sustainable development is how implantation and functions are described at a more specific and local scale (Tsalis et al. 2020). Therefore, sustainable development has been used to support the sustainability phenomena since the introduction and presentation of the Brundtland Report in 1987. Furthermore, according to Adams (2006), sustainability can be traced back to the United Nations (UN) conference on the human environment held more than three decades ago (UNEP 1972).

The sustainability concept was introduced in 1987 during the Brundtland report by the United Nations by adding an economic aspect to the former social and ecological part of

sustainable development (Tsalis et al. 2020). This led to the signing of agenda 21 during the United Nations conference on environment and development in 1992 to push sustainable development as a global objective, with more than 170 nations participating (Boar et al. 2020). Although many considered agenda 21 a milestone towards sustainability, the agenda was not received with excellent cooperation from members of the UN. The agenda ensured that various governments had sustainability as their key priority in their policies (Bohner and Schlüter 2014). The United Nations Brundtland report also led to the first definition of sustainability as "the development that meets the needs of the present without compromising the ability of future generations to meet their needs" (World Commission on Environment and Development 1987; Nousheen et al., 2020). However, this is not the only definition, as studies and research have generated different definitions to fit the research context. The following section focuses on the various definitions of sustainability to create a definition of sustainability that suits this thesis context.

2.2 What is Sustainability?

As mentioned in section 2.1, various definitions have been provided for the term "sustainability" in the existing multidisciplinary literature and subject area, which has added to the challenge of having a standard and precise definition for sustainability, as most of the definitions are interpreted based on the context of the area of discipline or field (Boar et al., 2020; Tsalis et al. 2020). According to Boar et al. (2020), several scholars and researchers have conveyed the definition of sustainability depending on the subject area and discipline, resulting in different interpretations and contexts by academics and practitioners in many ways. Hence, most of these definitions contain echoes of disciplinary viewpoints and language

information (Thomas 2015). For example, most of these definitions imprint on sociology, social psychology, economics, and behavioural and institutional science.

Taylor (2002) claimed that not having a clear definition of sustainability is mainly due to the fear of detractors to precisely define the environmental aspect of sustainability to prevent behavioural change. Vos (2007) added that there needs to be a clear and separate distinction between the three dimensions of sustainability by separately defining each dimension. Given the wide diversity of definitions, a synopsis of generalised definitions is presented in Table 2.1, emphasising key definitions of sustainability found in published literature by specifying inter and intra-generational requirements that are implicit requirements for equitable development while balancing individual needs and well-being with the ecological systems (Alaimo et al. 2020). This paper has pooled the various definitions of sustainability across multiple fields to understand the concept clearly.

2.2.1 Meta-Analysis of Sustainability

Due to the multidisciplinary and latent enquiry into the nature of sustainability, it is reasonable to synthesise the core elements of sustainability from previously published definitions in scholarly research (Tsalis et al. 2020). However, researchers have been presented with difficulties in definition based on the conceptualisation of sustainability, resulting in a lack of a unique definition (Thomas 2015).

As mentioned earlier, sustainability and sustainable development have been considered contestable concepts due to the multiple interpretations of the two concepts (Owens and Legere 2015; Ruggerio 2021). Although these concepts have been used separately, it is clearly expressed that sustainable development and sustainability are linked

and are sometimes used as synonyms, even within academic and scientific fields. Therefore, the formalisation of sustainability and sustainable development definitions are framed based on the reflection of their enquiry into the subject or area. The many definitions of these concepts have been informed by echoes from disciplinary languages while generalising the genesis of the subject of sustainability, as it will be difficult to ignore the theoretical insights, emphasis, nuance, and contribution yielded by this discipline. Table 2.1 contains a generalised definition of sustainability and sustainable development, with all the population taken from journals and books.

Table 2.1 Deminicions of Sustainability and Sustainable Development	able 2.1 Definitions of Sustainabilit	ty and Sustainable Development
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Author	Definitions
WCED, 1987: 213	"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs
IUCN, 1991: 10	"Improving the quality of human life while living within the carrying capacity of supporting ecosystems
Pearce et al., 1990: 6	sustainability is referred to as a problem of managing a nation's needs while maintaining a constant level
Hill and Bowen, 1997: 225	Sustainable development is "a development that improves the quality of human life while living within the carrying capacity of supporting ecosystems".
Meadows, 1998:23	Sustainable development is a social construction derived from the long-term evolution of a highly complex system – human population and economic development integrated into ecosystems and biochemical processes of the Earth.
Vander-Merwe, 1999: 807	is a programme that changes the economic development process to ensure the essential quality of life, protecting valuable ecosystems and other communities at the same time
Altwegg et al., 2004: 13	"Means ensuring dignified living conditions about human rights by creating and maintaining the broadest possible range of options for freely defining life plans. In addition, the principle of fairness among and between present and future generations should be considered in environmental, economic and social resources. Putting these needs into practice entails comprehensive biodiversity protection in terms of ecosystem, species and genetic diversity, all of which are the vital foundations of life.
Beck and Wilms, 2004	It is a consequential global contradiction to the contemporary western culture and lifestyle
HM Government, 2005:2	our strategy for sustainable development aims to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations
The EU Sustainable Development Strategy, 2006:8	The needs of the present generation should be met without compromising the ability of future generations to meet their own needs

Vare and Scott, 2007: 192	It is a process of changes, where resources are raised, the direction of investments is determined, the development of technology is focused, and the work of different institutions is harmonised; thus, the potential for achieving human needs and desires is increased.
Sterling 2010: 513	It is a reconciliation of the economy and the environment on a new path of development that will enable the long-term sustainable development of humankind
Stoddart, 2011: 83	Sustainability is the efficient and equitable distribution of resources intra-generationally and inter-generationally with the operation of socio-economic activities within the confines of a finite ecosystem.
Marin et al., 2012: 94	It is a possibility of time-unlimited interaction between society, ecosystems and other living systems without impoverishing the essential resources.
Ben-Eli, 2015: 136	Sustainability is a dynamic equilibrium in the process of interaction between the population and the carrying capacity of its environment such that the population develops to express its full potential without producing irreversible adverse effects on the carrying capacity of the environment upon which it depends
Duran et al., 2015: 809	The development protects the environment due to a sustainable environment enabling sustainable development.
Sustainable Development ., 2021	"Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
Sustainable Development Commission 2021	"Sustainable development is the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs."

Since the Brundtland Report addressed sustainability as their key priority in their policies (Bohner and Schlüter 2014), there have been numerous definitions of sustainability and sustainable development, as seen in Table 2.1. This is a comprehensive list of definitions accumulated to distil the definitions of sustainability and sustainable development by emphasizing parts of the core idea of sustainability towards the necessary evolution of environmental conditions. In addition to its competing paradigms, archetypes assist in understanding and practically defining the concept.

According to Mensah (2019), the 1987 UN definition of sustainability has become one of the most popular definitions. This is because it was the first to identify the present needs without compromising the ability of future generations to meet their own needs (Johnston et al., 2007). However, the 1987 definition has been criticised by researchers such as Taylor (2002), who posited that the definition lacked a complex task of predicting what the future needs of the next generation would consist of due to the definition lacking to state the difference in values and perception of the present and future needs. Other authors, such as Ruggerio (2021), have posited further that even within the current generation, different factors such as location, level of development, and lifestyle have been identified to affect individuals' needs and how those needs are perceived. However, the 1987 UN definition has been widely accepted as it focuses on two areas associated with sustainability: the efforts to combat poverty in society and the need to raise awareness of environmental impacts based on economic growth (Ruggerio 2021).

Despite the disagreement and debates on the 1987 UN definition of sustainability, there is a sensible agreement that sustainability should be addressed ethically and morally to provide for the wants and needs of individuals without hindering future probabilities

(Bonnedahl and Heikkurinen 2018; Helbing et al. 2021). Nevertheless, defining sustainability has proven complex and vague, as seen by the deviation of opinions debated in different literature (Sénéchal et al., 2017). The explanations, meaning, and definition of sustainability, conveyed in Table 2.1, have incited many questions about the sustainability concept. For instance, how to differentiate between needs and desires? Should the focus just be aimed at developed countries? Unfortunately, there are no clear-cut answers. Regardless of these questions, with the complexity and subjectivity of sustainability, the overwhelming question is how can sustainability be achieved in practice? This question is elaborated upon to satisfy and qualify the definition developed here.

Thiele (2013) suggested that agreeing on one definition is the best way to answer the questions and move forward, as it will help understand the phenomenon under construction. A common understanding of sustainability is hard to attain due to the limited discussions in the literature. Still, it can be more precise if the practice of sustainability were more explicit, measurable, and impactful (Ruggerio 2021). All attention is automatically diverted to environmental issues when the word sustainability is heard or read due to the immense reference to sustainability in the environment (Boar et al., 2020). Therefore, a clear definition of sustainability needs to incorporate the other dimensions of economic and social needs rather than just safeguarding nature and natural resources (Sénéchal et al., 2017).

Even though the research content and citations may indicate an active disagreement based on the author's viewpoint, there are subjective assessments of the theoretical contribution of the definition to understand the term sustainability (Boar et al., 2020). To produce a working definition consistent with the need for this study, a discussion of contextspecific definitions of sustainability was discussed in the previous section to ensure that the

definition produced for this thesis is comprehensive, grounded, conceptually simple and applicable across disciplines. Based on the definitions in Table 2.1, a perfect definition of sustainability will need to appreciate the background and history of the word and context of sustainability by identifying the importance of the previous definitions of sustainability (Pennington et al., 2014).

The following assertions were generated based on the definitions listed in Table 2.1:

- 1. Sustainability encompasses aspects of needs and development
- 2. The expectation is that sustainability will consider all three dimensions of sustainability.
- 3. Sustainability imposes the ability to meet both present and future needs.
- 4. Sustainability identifies a concept and attitude in development.

Based on these assertions, the definition of sustainability for this thesis can be stated as follows:

"Sustainability is the development that meets both present and future needs, involving the devising economic, social and environmental systems to achieve sustainable goals."

This working definition includes the multidisciplinary nature of sustainability, which reflects a definition for developing countries. It captures the range of environmental, social, and economic discourse, combined with a racial change, to preserve the concept of present and future needs. Therefore, this definition is essential as it provides a definition that connects to the abstract values that incorporate the close consensus of developing countries mentioned in chapter one in considering the parameters required in terms of what needs to be sustained for the future generation.

According to Serageldin and Grootaert (2000), sustainability research aims to enhance the understanding and appreciation of societies, individuals, and organisations related to the influence of economic activities on society and the environment as a whole. The sustainability discussion has resulted in the interpretations of different sustainability degrees ranging from strong and weak sustainability (Biely et al. 2016), which will be discussed further in the section below.

2.3 Strong and Weak sustainability

Sections 2.1 and 2.2 discussed the sustainability concept by addressing and conducting a meta-analysis of the concept in abstract terms. However, there are questions such as how to deal with the future and present needs based on a sustainability perspective, what should be sustainable and for how long, and how to achieve sustainability that cannot be answered as an abstraction based on the significant role subjectivity plays in addition to the strong consensus that has emerged from a process of socio-political constructions (Ruggerio 2021).

These questions have added to the difference in disciplinary perspectives in the discussion of sustainability needing to oscillate between two antagonistic viewpoints (Redclift 2005; Cullingworth and Nadin 2006; Ruggerio 2021). According to Steffen et al. (2011), sustainability can be seen in two perspectives weak and strong for the adherent of strong sustainability, also known as "ecological economics," there is a primary focus on nature through the direction and adoption of the physical principles founded on thermodynamic laws and the process of biological growth (Quental et al. 2011). Hence, this approach prioritises the conservation of attributes in a pristine state, with extreme cases neglecting societal needs (Chaminade 2020; Ruggerio 2021). This point of view is dominant as it tends to be associated with the nature conservation movement.

On the other hand, weak sustainability is centred on the economic systems of sustainment through the regulation of nature to a role of ecosystem services, natural resources, and residual pools generated through human activities (Chaminade 2020). Therefore, weak sustainability involves the continuity of supply of substitutable materials for industrial products focused on the body of neoclassical capital theory (Quental et al. 2011). The following section expands on the differences between strong and weak sustainability.

2.3.1 Strong Sustainability

According to Daly and Farley (2011), the conception of strong sustainability is based on ecological-economic physical principles. This approach toward sustainability emphasises and focuses on the primacy of nature while also acknowledging the basic principle of resource management that logically extends to other natural resource domains (Davies 2013; Harris and Roach 2014). Barry (2011) found that a significant aspect of strong sustainability operational criteria is how complicated it is to assess based on the need to preserve the environment and not just the economic value. In other words, there is no substitute for the natural environment.

Strong sustainability proponents range from simple optimal problems, such as harvesting one biological resource, to more complex issues, like managing the ecosystem and multiple populations (Davies 2013; Landrum 2017). Therefore, it is essential to have the intergenerational transfer of capital with strong sustainability while ensuring that natural prosperity is kept intact by preserving natural resources in the same quantity for both current and future generations (Harris and Roach 2014; Landrum 2017; Nikolaou and Tsalis 2020). Furthermore, strong sustainability embodies a more idealistic view of an intimate connection

between social and economic relationships where principles of caring and sharing are highly valued (Landrum 2017).

Even though strong sustainability is embodied in ecological economics by advocating for a preservationist positing that heavily encourages and regulates resource usage to increase the intrinsic value of natural resources (Davies 2013), many environmentalists are adopting weak sustainability as a more practical concept as it allows substituting natural resources for other resources to sustain human welfare (Daly and Farley 2011).

2.3.2 Weak Sustainability

The weak sustainability concept is based on the economic value principle, founded within the neoclassical economic development model, and is dominant in mainstream economics (Barnosky et al., 2012). This approach considers non-renewable natural resources as a factor of production that seeks to substitute between natural and produced capital while establishing rules on how many natural resources can be consumed. In other words, the utility obtained from natural products needs to be substitutable (Dietz and Neumayer 2007). Policies have been developed based on weak sustainability by exploring natural resources and how new capital investment can be retained through sustainable income flow from natural resources (Daly and Farley 2011). For example, increasing resources such as irrigation and mechanisation compensate for the loss of soil fertility during intensive agricultural practices. However, studies such as (Shiva 1992; Landrum 2017) have criticised the weak sustainability approach by suggesting that implementing weak sustainability would undermine nature's capacity to protect the present and future cycles. In today's era, weak sustainability is dominated by concepts that integrate the three sustainable dimensions of interest, even if it entails damaging biodiversity due to sustainable development (Cullingworth and Nadin 2006).

Regarding the complexity of the concept of sustainability, Kastenberg et al. (2005) outlined that individuals are predisposed to react to complex problems with a quick fix, which means tackling the symptoms instead of dealing with the actual situation. Hence, this leads to support of weak sustainability with this ideology pursued by political arenas and supported by many economists (Huang 2018). Although certain countries base their sustainable systems on weak sustainability, they are identified as unsustainable mainly due to the lack of an unsustainable future. Strong sustainability allows societies to move beyond the development path and mass consumption and into the sustainability stage (Kastenberg et al., 2005; Huang 2018).

Table 2.2	Main	differences	between	weak and	strong	sustain	ability
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Key Ideas	Strong sustainability	Weak sustainability
Key idea	The substitutability of natural capital by other types of capital is severely limited	Natural capital and other types of capital (manufactured etc.) are perfectly substitutable
Consequences	Specific human actions can entail irreversible consequences	Technological innovation and monetary compensation for environmental degradation
Sustainability issue	Conserving the irreplaceable « stocks » of critical natural capital for the sake of future generation	The total value of the aggregate stock of capital should be at least maintained or ideally increased for the future generation
Key concept	Critical natural capital	Optimal allocation of scarce resources
Definition of thresholds and environmental norms	Scientific knowledge as input for public deliberation (procedural rationality)	Technic/scientific approach for determining thresholds and norms (instrumental rationality)

Source: Adapted from Mancebo, 2013

Although it is possible to grade the sustainability levels based on the level of realisation towards the sustainable goals through the rigorous approach of grouping into strong sustainability, which focuses mainly on the environmental level (Huang 2018; Wojewódzka-Wiewiórska et al. 2019), it is essential to remember that the fundamental issue for sustainability is to manage the natural environment, as its quality determines the conditions of life, and even survival, of humankind (White 1967; Vehkamäki 2005; Du Pisani 2006; Landrum 2017).

As mentioned earlier, the sustainability concept can be considered from two different points of view: weak and strong sustainability, which were derived based on the two-part division between the social, economic, and biophysical spheres (Fischer et al. 2021). Hence the weak and strong are essential in assessing an individual's behaviour and progress toward sustainability (Chan et al. 2020). Strong and weak sustainability are essential aspects to consider when examining how social innovation research relates to how they are viewed in developed and developing countries (Shi et al. 2019). The author further added that these two concepts could be a beneficial fit for the practical purpose of making an appraisal of the position adopted towards an elaborated process of an ongoing developmental process.

Understanding the characteristics and boundaries associated with various countries is essential in assessing weak and strong sustainability, as it is beneficial towards decision and policy making required towards making society more sustainable (Luukkanen et al. 2019). Therefore, it is necessary to avoid the problem that sustainability indicators are prone to over or underestimate developed countries compared with developing countries (Wang and Lee 2022). For example, the environmental sustainability index favours developed countries because of their pro-environmental control, economic status, and high income (Ahmad et al. 2021). Hence, there is a problem concerning the distinction between weak and strong sustainability among developing and developed countries (Essandoh et al. 2020). Therefore, if

performance in the economic aspect can offset the bad performance in the environmental dimension and vice versa for developing countries (Udemba and Tosun 2022).

Nonetheless, the developmental stage of both weak and strong sustainability essentially differs between developed and developing countries (Tien et al. 2020). In developed countries, the discussion of sustainability focuses on environmental topics, while issues such as poverty and equity are equally important in developing countries (Shi et al. 2019). For example, regarding social equity, it is difficult to determine a standard definition of the poverty rate in developing and developed countries (Musavengane and Leonard 2019). However, in developing countries, there is a standard that the daily income is equal to, or less than 1 USD will be meaningful, but the same standard is meaningless in developed ones. Therefore, according to those cities' and countries' policymaking and environmental priorities, sustainability has been addressed differently in different parts of the world (Igawa and Managi 2022).

Therefore, the sustainability concept emphasises keeping the natural environment in good shape as a condition for the survival of our civilisation (Vehkamäki 2005). By theoretically illustrating the concept into three dimensions: social, economic, and environmental (Mauerhofer 2008; Bardy et al. 2015). Thus, the three-dimensional structure of the sustainability concept provides a better understanding of how the interdependencies occur between different aspects within the dimensions while emphasising the need to find a balance between obtaining various, even contradicting, goals.

2.3.3 Circular Economy

The current mode of consumption and production (produce-use-dispose), often termed linear consumption or economy model, is distinguished based on the extraction of resources for production and consumption without policies for reusing or active regeneration of natural systems (Bucknall 2020). Hence, the increased development and implementation of strategies and plans are based on the creation of resource limitations, population pressure, and environmental damages linked to current consumption patterns, such as a circular economy. The circular economy paradigm shifts from this linear mode by facilitating economic growth while minimizing the resource used to reduce waste (Goyal et al. 2018).

Today, the circular economy is a concept that stimulates the improvement, refurbishment, and redistribution of used materials while being a new developing strategy towards the sustainability paradigm (Bocken et al., 2017; Geissdoerfer et al. 2017; Brinson 2019). The implementation and principles of circular economy entail the transformation of production and consumption patterns towards creating a new industrial system. Azizuddin et al. (2021) define the circular economy as the method used in managing resource efficiency, circularity, and optimisation of used wastes as resources to generate values.

The most realistic circular economy has been linked to the sustainable development concept based on its focus on the three sustainability dimensions (economic, environmental, and social) incorporated within the circular economy (Geissdoerfer et al. 2017; Bucknall 2020). The circular economy concept promotes the principal idea of improving, refurbishing, and redistributing used materials by encouraging linear processes to be converted to circular processes through use, reuse, arrangement, circulation, and recycling. According to

MacArthur (2013), the 3R theory (Reuse, Reduce, and Recycle) is incorporated into the three circular economy principles. The fundamental idea of the circular model is based on three principles: the significance of appropriate design in proposing solutions towards preventing waste discharge, promotion of reclassification of materials, and positioning renewable energy as the main source of circular economy energy (Halog and Anieke 2021).

Circular economy principles have been implemented globally for more than two decades while being widely recognised and advocated by international communities based on the belief in the concept of transforming traditional economic development so more sustainable development (Winans et al. 2017). However, globally, the circular economy concept has been applied differently within diverse social, cultural, and political systems. For example, countries such as the UK have implemented a circular economy as their national development strategy. Other European countries such as Portugal, Denmark, and Switzerland are applying a circular economy towards their waste management (Liu et al. 2018).

2.3.4 Circular Economy in Developed Countries

The circular economy has been recognised as a significant commercial opportunity for promoting the evolution of job creation, minimising greenhouse gas emissions, and new industries towards improving the efficient use of natural resources (Halog and Anieke 2021). In recent times, circular economy has been advantageously adopted within the industrial sector, which could be observed in examples such as the textile, durable goods, and clothing industries. Therefore, the circular economy has been widely accepted and implemented into practice by developed countries such as the UK, Australia, the USA, and the Netherlands, etc., and has led to the discovery of innovations and solutions to the idea of re-use (Durán-Romero et al. 2020).

Developed countries such as those in Europe have adopted the circular economy in their manufacturing and designing towards the emphasises on re-design as a crucial step in restricting from a linear economy to a circular economy (Sauvé et al. 2016).

2.3.5 Circular Economy in Developing Countries

In other for developing countries to adopt sustainability, there needs to be a shift towards circular economy practises in the majority of their sectors especially waste management and collection, hence the importance of cost-effective, sophisticated technologies (Serrano et al. 2021; Winterstetter et al. 2021; Ahmed et al. 2022). Additionally, governments in developing countries face daunting impediments to inefficient management, policy implementation, and policymaking (Ding et al. 2019). Nevertheless, there is a push by industries in developing countries to move towards cleaner production by using circular economy practices to produce environmentally friendly products that are cheaper while being demandable to the communities (Ahmed et al. 2022).

According to serrano et al. (2021), developing countries need to move towards policies that will help in decoupling the countries' growth based on the lack of structured and efficient approaches available in addressing the climate objectives towards their policy development and approaches. Therefore, continuing economic growth with the inclusive development perspective would reduce poverty and protect the environment (Ahmed et al. 2022). Furthermore, the progression of a country's economic performance and its awareness of the

importance of a circular economy can be critical in implementing circular economy practises in developing countries (Ngan et al. 2019).

2.4 Dimensions of Sustainability

It is vital to comprehend the dimensions associated with sustainability to understand the concept better, as they are the foundation and core element of sustainability (Tsalis et al., 2020). The three dimensions hinged on sustainability are the social dimension, which is based on the welfare of individuals; the economic dimension, which is aimed at cost reduction and benefit boosting; and lastly, the environmental (or ecological) dimension, which deals with environmental wellbeing. Therefore, it is essential to consider each of these elements individually and in relation to the other dimensions (Sénéchal et al., 2017).

According to Moir and Carter (2012), there are different ways of representing sustainability that helps encapsulate the complexity of the concept. For example, pictorial visualisation models, quantitative models, physical models, conceptual models, and standardising models. However, according to Marinova and McGrath (2005), the most used form is the pictorial model, which is based on the pictorial model's ability to stress the importance of the intersections between the dimensions to emphasise the need for transdisciplinary and interdisciplinary within sustainability (Marinova and McGrath 2005). Furthermore, as highlighted in Figure 2.1, the three-overlapping circle model of sustainability is essential because it communicates the complexity of sustainability to a broader audience through environmental decision-making and management and the importance of all three dimensions of sustainability (Bohman et al., 2015).

Figure 2.1 Three-overlapping Circle Model of Sustainability

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Source: (Bohman et al., 2015)

As seen in Figure 2.1, the overlapping section suggests that all three dimensions must be satisfied before genuinely being sustainable (Brockhaus et al., 2017). However, this does not mean that all three dimensions must be balanced to ensure sustainability (Mitchell 2000; (Walker et al. 2021). Kates et al. (2005) posited that environmental issues tend to be the most fundamental and can reflect the three-overlapping circle model of sustainability out of the three dimensions. The natural environment supports both societies and economies, meaning they would not survive without the environment's resources. Ergo, this makes the environmental dimension vital within the sustainability theory (Wagner 2015). Brockhaus et al. (2017) added that integrating environmental sustainability into government and organisations'' strategic management functions positively contributes to their economic sustainability. Therefore, this supports the notion of organisational quirks, as economic advantages need to be based on sustainable activities that constrain nature and society, promoting sustainable activities that deliver a sustainable economy (Walker et al., 2021). The three dimensions will be discussed in length in sections 2.4.1 to 2.4.3.

2.4.1 Social Sustainability

Social sustainability can be defined based on institutions, social standards, or democratic rights (Braccini and Margherita 2018). However, the main focus of social sustainability is on individuals, mainly on the relationship between other individuals or as a collective group or community (Vuković et al., 2019). There are two definitions of social sustainability that have captured the essence of this concept, these are

"Social sustainability is the societal and personal assets, processes and rules that empower individuals and community participation to encourage fair and long-termed participation by achieving economic and adequate achievable standards of life based on selfexpressed aspiration and needs within the physical boundaries as a whole" (Colantonio 2007:7).

"Social sustainability is the process of achieving a positive condition within a community through systematic communal participation and a strong civil society (Almahmoud and Doloi 2012:3).

As seen by the selected definitions of the social sustainability concept, its main focus is meeting individuals' present and future needs within the world's limited biosphere. Hence, social sustainability effectively refers to individuals' empowerment and value that practically engages them in activities that will improve their social aspirations and liveability through the collaboration between economic prosperity and individual progress (Colantonio 2007; Braccini and Margherita 2018). This is important as social requirements are essential for developing a vibrant society. It is, therefore, crucial that conditions for the social issues are identified toward achieving intended objectives. Littig and Griebler (2005) argued that individuals within a community must have access to moral capital such as solidarity, humanity, diversity, patience, honesty, and society for a community to meet its social aspiration. Khan et al. (2016) added that social elements are the most ignored among the three sustainable factors and the

most difficult to evaluate and implicate, mainly due to society's dynamic and multifaceted nature and requirements.

The social dimension has been recognised as an essential part of sustainability within a community, even when forming political agendas within institutions and government agencies (Colantonio 2007; Mak and Peacock 2011; Saunila et al., 2018). For example, the UN's charter on human rights and the Earth charter were formed based on social sustainability to universally express ethical principles that foster sustainability (The Earth Charter 2012; Vuković et al. 2019). The social dimension of sustainability echoes social realities through the dynamic individual interaction and society. According to Colantonio (2008), the way and manner individuals and communities live together is a prerequisite to social sustainability based on individual and collective development goals.

Pitt et al. (2009) posited that a more holistic approach needs to be adopted toward tangible and intangible measures to approach social sustainability issues practically. For example, a holistic approach creates opportunities to meet individual needs, constructing industries providing apprenticeship skills and training, social facilities, and affordable housing (Carpenter 2011). Abidin et al. (2013) added that lacking these opportunities could result in deprived and workless communities. A study undertaken by Ahmad and Thaheem (2017) identified major categories of factors that evaluate and prioritise social aspects of sustainability, including participation, safety, security, education, accessibility, job opportunity, and identity.

Therefore, drawing a comprehensive approach that equally targets social-related factors and considers the economy and environment is essential. This is mainly due to the unclear relationships and connection between the three dimensions of sustainability resulting

from one being given priority over the others without being equally essential (Saunila et al., 2018).

2.4.2 Economic Sustainability

Economic sustainability is a process that ensures future generations have equal economic opportunities to achieve welfare as the current generation. This is achieved by indefinitely supporting a defined level of economic production by implementing a production system that satisfies present needs without compromising future needs (Pearce and Barbier 2000; Svensson and Wagner 2015; Saunila et al. 2018). Traditionally, economists assumed the abundant supply of natural resources, which places an undue emphasis on the market's capital to allocate resources efficiently (Sénéchal et al. 2017). However, today, a realisation has emerged that natural resources are limited, leading many commentators to question the feasibility of uncontrolled consumption growth based on the strain of the natural resources by the growing scale of economic systems (Moldan et al. 2012; Guth et al. 2020).

Hence, an economic system designed based on the theory of economic sustainability will need to focus on the requirement that is best suitable for the environment (Ahmad and Thaheem 2017). According to Meadows et al. (1972), when natural resources are used beyond their limits, society will not be sustainable due to the need for economic growth. In the research conducted by Griebler and Littig (2004), they concluded that unless particular action is carried out, there will be a collapse or decline in the environment, economy, and society.

2.4.2.1 Economic Sustainability in Developed Versus Developing Countries

Economic sustainability refers to the ability of an economy to maintain or improve its level of economic activity over time without depleting its natural, social, and financial resources. It is a crucial aspect of economic development, as it enables countries to achieve short-term economic growth, build resilience, and ensure the long-term prosperity of their citizens (Saunila et al. 2018).

Economic sustainability in developed countries refers to the ability of these countries to support their populations and provide for their needs over the long term (Eriksen et al. 2021). Hence, economic sustainability In developed countries is typically more achievable due to their higher levels of economic development and access to resources (Ahmed et al. 2022). Therefore, these countries tend to have more diversified and advanced economies, which allows them to withstand economic shocks better and adapt to changing circumstances while having more vital institutions and regulatory frameworks, which help to prevent economic imbalances and promote stability (Pawlak and Kołodziejczak 2020).

Developed countries' major strengths are their well-educated and trained workforce (Pratley and Roxburgh 2020). In many of these countries, people have access to high-quality education and training, which equips them with the skills they need to succeed in the global economy (Maphosa 2021). This, in turn, helps to drive economic growth and development. Another strength of developed countries is their advanced infrastructure, which includes roads, ports, airports, and other transportation networks (Andrea et al. 2020). This infrastructure allows businesses to operate efficiently and enables people to access essential services, such as healthcare, education, and housing (Ahad et al. 2020). Additionally, developed countries often have access to a large pool of capital, which can be used to invest in new technologies and businesses. This capital can help to drive innovation and support economic growth (Pradhan et al. 2019).

Despite these advantages, developed countries still face challenges when it comes to achieving economic sustainability. For example, many of these countries have an aging population, which can put pressure on social welfare systems and lead to a decline in the workforce (Streimikiene et al. 2021). In addition, the rapid pace of technological change can lead to job displacement and other economic challenges (Litvinenko 2020).

To address these challenges and maintain economic sustainability, developed countries must focus on investing in education, training, and infrastructure. They also need to implement sound economic policies and support the development of new technologies and industries (Sharma et al. 2021). Overall, economic sustainability in developed countries is essential for their populations' well-being and the global economy as a whole. By leveraging their strengths and addressing their challenges, developed countries can continue to grow and prosper in the future (Barbier and Burgess 2019).

Developing countries, on the other hand, often face more challenges in achieving economic sustainability. This is because these countries tend to have less diversified economies, which makes them more vulnerable to economic shocks and fluctuations (Sumner et al. 2020). Developing countries also tend to have weaker institutions and regulatory frameworks, leading to economic instability and exacerbating inequality. One of the critical challenges facing developing countries is the lack of access to education and training (Fagbemi 2021). As a result, many people in these countries do not have the opportunity to learn the skills they need to compete in the global economy, which can limit their ability to find good jobs and support their families (Odera and Mulusa 2020). In addition, inadequate infrastructure, such as poor roads and limited access to electricity, can make it difficult for

businesses to operate and for people to access essential services (Umadia and Kasztelnik 2020).

Despite these challenges, developing countries also have many opportunities for economic sustainability. For example, many of these countries have a growing young population, which can provide a source of labor and innovation. In addition, many developing countries have abundant natural resources, such as oil, minerals, and fertile land, which can be a source of wealth if managed wisely (Li et al. 2020). Therefore, to achieve economic sustainability, developing countries need to build a solid foundation for growth, for example, investing in education, training, and infrastructure, creating the conditions for individuals to thrive and businesses to flourish. It also means implementing sound economic policies and ensuring that natural resources are managed sustainably (Khan et al. 2020).

Overall, economic sustainability is a complex and multifaceted issue influenced by various factors, including income inequality, debt levels, and environmental sustainability (Guth et al. 2020). Although developed countries tend to have a stronger foundation for economic sustainability due to their higher levels of economic development and access to resources, developing countries also have the potential to achieve economic sustainability by adopting policies and practices that promote sustainable development (Li et al. 2020).

2.4.3 Environmental Sustainability

The rise of environmental degradation concerning the drastic economic development, growth, and the lack of environmental awareness in developed and developing countries has made environmental sustainability mundane for sustainability to be defined strictly in terms of environmental sustainability (Whiteman and Cooper 2000; Moldan et al. 2012). Yuvaraj et al. (2021) highlighted a significant environmental risk based on the increased consumption of resources, such as raw materials, and lack of proper waste management, such as recycling. At the same time, Lang et al. (2012) affirmed the need to balance the economy, environment, and humanity, including by government or organisations. Although all three dimensions of sustainability are essential in protecting the environment, it is apparent that without a productive and sustainable environment providing foundational resources, it would be impossible or difficult to have a sustainable society or a sustainable flow of materials, resources, or energy (Jafari 2021).

Environmental sustainability aims to improve human welfare by protecting the environment's raw materials used by individuals to meet their needs while preventing harm to individuals or the environment (Moldan et al. 2012). Therefore, when defining environmental sustainability, there needs to be a focus on the biophysical and ecological aspects, as observed by the various definitions of environmental sustainability. E.g., Morelli (2011) defined environmental sustainability as balancing and interconnecting with society while satisfying the needs without affecting the ecosystems. Virtanen et al. (2020) also defined environmental sustainability as meeting human needs without compromising the ecosystem's health (Virtanen et al. 2020).

For this thesis, environmental sustainability will be defined as:
"As meeting the needs of resources and services for current and future generations without compromising the wellbeing of the ecosystems."

2.4.3.1 Environmental Sustainability in Developed Versus Developing Countries

Environmental sustainability refers to the ability of a society or economy to maintain and improve the natural environment over the long term so that it can support human wellbeing and economic development (Stefanakis et al. 2021). This complex and multifaceted issue affects all countries but developing and developed countries often face different challenges and have different approaches to environmental sustainability (Gunarathne et al. 2020).

In general, developing countries tend to have less advanced infrastructure and technology, making it more challenging to implement environmental protections and regulations (Shahzad et al. 2021). These countries may also have weaker institutions and less capacity to enforce environmental laws, leading to more pollution and degradation of natural resources (Tufail et al. 2021). Developing countries also tend to rely more on natural resources for economic growth, which can lead to environmental damage if not managed sustainably (Nathaniel et al. 2021). Therefore, they tend to have lower levels of economic development, less advanced infrastructure and technology, and weaker institutions and capacity to enforce environmental laws (Shahzad et al. 2021). These factors can make it more difficult for these countries to implement environmental protections and regulations, leading to more pollution and degradation of natural resources. For example, many developing countries have limited access to clean water, sanitation, and electricity, which can negatively impact the environment (Sarkodie and Adams 2020). In addition, poorly planned and managed urbanisation can lead to environmental problems, such as air and water pollution, waste management issues, and loss of natural habitats (Zahoor et al. 2022).

Furthermore, developing countries rely more on natural resources for economic growth, such as agriculture, forestry, mining, and oil and gas extraction. These activities can have significant environmental impacts if not managed sustainably (Usman et al. 2022). For example, deforestation can lead to soil erosion, loss of biodiversity, and climate change. Similarly, mining, oil, and gas extraction can cause air and water pollution and habitat destruction (Bodo et al. 2021). Hence, climate change disproportionately affects developing countries, which often have less capacity to adapt to and mitigate its impacts (Thomas et al. 2019). As a result, these countries are more vulnerable to extreme weather events, such as floods, droughts, and storms, which can damage infrastructure, disrupt agriculture, and cause other environmental and economic impacts (Atanga and Tankpa 2021).

On the other hand, developed countries tend to have more advanced infrastructure and technology, as well as more vital institutions and capacity to enforce environmental laws (such as the USA Clean Air Act) (Azam et al. 2021). These countries also tend to have more diversified economies and less reliance on natural resource extraction (Sisneros-Kidd et al. 2019). However, developed countries face environmental challenges, such as climate change, urbanization, and pollution (Ukaogo et al. 2020). For example, the transportation sector is a significant source of greenhouse gas emissions in many developed countries, contributing to climate change (Zheng et al. 2019). Urbanization can also lead to environmental problems, such as air and water pollution, waste management issues, and loss of natural habitats (Zahoor et al. 2022). In addition, many developed countries have a long history of industrialization, which has led to pollution and degradation of natural resources. For instance, the contamination of water, air, and soil by industrial waste is a common environmental problem in developed countries (Ajibade et al. 2021). Overall, developing and developed countries must address environmental sustainability to ensure a healthy and prosperous future (Leal Filho et al. 2019). This may involve investing in clean technologies and infrastructure, promoting sustainable resource use and management, and taking action to address climate change and other environmental challenges. For developing countries, this may require increased international assistance and cooperation to help build capacity and improve infrastructure, as well as more sustainable development policies and practices (Usman et al. 2022). On the other hand, developed countries need to transition to more sustainable and low-carbon economies and support and assist developing countries in addressing their environmental challenges (Al-Amin and Doberstein 2019).

Ultimately, addressing environmental sustainability requires a global effort, as the natural environment does not respect national borders, and the impacts of environmental problems often transcend them (Doh et al. 2019). Therefore, it is essential to work together and take collective action to achieve a more sustainable and equitable future for all.

2.4.4 Summary

This chapter aimed to address the bridging concept of sustainability by discussing the history of the term sustainability and the idea risen from it. According to the 1987 Brundtland Commission, sustainable development was proposed to reconcile the environmental limit and economic growth by fitting in with the two opposing worldviews: the environmental and social paradigms.

The sustainability observed in this chapter shows the resonance of dominating interdisciplinary concepts, including social, environmental, and economic factors interacting

in complex, often surprising, and unpredictable ways. Therefore, sustainability has been seen as a range of possible meanings that could be subscribed to by actors in the policymaking process, such as environmental prioritising over human development and achieving a synthesis between individual and environmental needs.

According to Morelli (2011), environmental sustainability aims to exist harmoniously and productively for individuals and nature. Environmental sustainability encompasses the productivity of the natural environment with a holistic reality of the biosphere, hence focusing on innovative strategies such as recycling. Recycling, however, is a well-known strategy in waste management and has been an essential part of sustainability development (Khalil et al. 2017).

Recycling has long been known to be an environmentally friendly strategy, as it enhances the productivity and health of natural ecosystems by reducing waste. Furthermore, recycling conserves the encouragement of biological diversity by protecting natural ecosystems and natural resources and enhancing the longevity of the biosphere's environmental sustainability. Recycling is an effective form of environmental sustainability that turns energy waste into energy resources. The following section will thus highlight the indepth concept of recycling while focusing on the factors affecting recycling and how it is perceived in developed and developing countries.

2.5 Section Two: The Concept of Recycling

From Agenda 21 (United Nations 1992) to the 2030 Agenda (United Nations 2015), recycling has been identified as a crucial component of sustainability, as waste plays a vital role in the relatively many changes and deepened concerns associated with achieving global

environmental sustainability through the reduction of the environmental impact (Villalba 2020). Therefore, recycling is undoubtedly an effective strategy for handling the growing volume of waste while minimising the waste through different elements such as treatments and prevention (Kashyap and Visvanathan 2013; Singh et al. 2014). Khalil et al. (2017) defined recycling as a sustainable way of effectively reusing and processing previously used materials to reduce waste sent to landfill. According to Velis and Brunner (2013), recycling involves collecting and processing waste to recover material resources to use the end products as raw materials for manufacturing new products.

However, recycling could be produced by either organic waste resulting in compost, or inorganic waste, resulting in raw materials (Ayilara et al. 2020). According to Oliveira et al. (2021), recycling has increasingly been a progressive and desirable pathway toward a sustainable society. Its main benefit is protecting the environment through reducing raw material usage, energy consumption, and controlled consumption processes.

2.5.1 Types of Recycling Systems

The recycling sector can be divided into formal or informal recycling systems, with the main difference being the various methods of collecting recyclable waste (Villalba 2020; Huang et al. 2020; Ferronato 2020; Wang et al. 2020). Tong et al. (2018) suggested deep value conflicts between the two recycling sectors, such as government level of involvement, individual preferences, and recycling channels. Chen and Gao (2021) added that these values must be addressed to move from informal to formal.

Formal recycling is mainly carried out through local government or any enterprise that has been provided with an official license and registered by the government, which is generally

present in developed countries such as UK or Switzerland (Wang et al., 2020). These methods include kerbside collection systems, door-to-door schemes, street container collection systems, and drop-off centres (Williams 2005; Wang et al. 2020). The attitude towards the formal waste management sector is genuinely positive, regarded as innovative, hygienic, and compatible with a modern waste management system (Ferronato 2020).

While the informal recycling sector has become an essential part of waste management, mainly within low- and middle-income countries, also known as developing countries, as seen by the United Nations Development Programmes Country classification Systems (UNDP) system of classifying countries such as Nigeria, India and South Africa (United Division 2021). Informal recycling is widespread throughout urban areas of developing countries with marginalised and poor social groups (Wilson et al., 2006; Ogwueleka and Naveen 2021). In the context to waste management, the informal sector refers to the recycling activities such as waste-picking and scavenging, which are the terms used to describe the individuals involved with extracting the recyclable materials within this system (Barford and Ahmad 2021). Although the cost of this process is lower in terms of collection and disposal, it generates many problems, such as safety, pollution, public health, and the labour intensity required with this system (Bui et al. 2022). Moreover, the attitude toward informal recycling tends to be often perceived as unfavourable unhygienic, backward, and generally incompatible with modern waste management systems (Ferronato 2020).

2.5.2 Factors Affecting Recycling Rate and Behaviour

Understanding how recycling behaviours are affected is essential in determining the most effective recycling behaviours and practices. According to Knickmeyer (2020), two main factors affecting recycling performance are their attitudes and behaviour towards sorting and

waste generators. Hence, a positive outlook toward the environment effectively influences recycling behaviours and rates (Khalil et al. 2017). However, Wang et al. (2021) posited that these factors that influence recycling behaviours tend to be complex and diverse because they affect individuals differently.

Even though the majority of research carried out on recycling behaviours has predominantly focused on psychological factors, the rate at which these factors facilitate recycling behaviours, as mentioned earlier, is complex and not constant (Joshi and Rahman 2019; Xie et al. 2020; Wang et al. 2021). Nevertheless, psychological factors such as awareness, beliefs, understanding/knowledge, intentions/willingness, and attitude have been shown to effectively promote recycling behaviours (Barr et al., 2010; Klöckner and Oppedal 2011; Thomas and Sharp 2013; Poškus and Žukauskienė 2017; Knickmeyer 2020). Therefore, it is essential to identify and understand these psychological factors.

According to Topal et al. (2021), these psychological factors can be classified into internal and external facilitators. Internal facilitators such as commitment and knowledge have been considered the best predictors of recycling behaviours (Thorley et al. 2021). In other words, individuals with sufficient knowledge of how, where and what to recycle are more likely to participate (Arain et al. 2020). On the contrary, external factors such as the recycling point, distance, time and cost of recycling, and recycling facilities likely deter recycling behaviours (Tiew et al. 2019; Ahirwar and Tripathi 2021; Yang et al. 2022). Staples et al. (2020) posited that pro-environmental behaviours are effectively enhanced by including interventions such as social modelling and prompting, cognitive dissonance, and goal setting. Tian et al. (2022) added in their meta-analytical review on the effectiveness of environmental

concerns that these interventions have been shown to influence individuals towards producing positive recycling behaviour.

However, other studies have also focused on the factors that facilitate and influence recycling behaviours resulting in the sub-classification of these factors. For example, personal and situational factors (Alipour et al. 2020); internal and external facilitators (Bai et al. 2022); environmental, psychological and situational variables (Barr 2007; Su et al. 2019); socio-psychological, individual socio-demographic, technical-organisational and study-specific factors (Yakob et al. 2020). Therefore, the following section will focus on the sub-classification of socio-demographics, psychological situational, and personal factors affecting recycling behaviours. These are structurally similar to Barr's (2007) sub-classification, without the environmental values and addition of the socio-demographics. It is essential to focus on these factors to ensure consistency by understanding underpinned factors associated with recycling behaviours.

2.5.2.1 Socio-Demographic Variables

Socio-demographic variables such as education, age, gender dwelling type, and income have been commonly used facilitators to achieve recycling behaviours (Wang et al. 2021). In addition, various authors (Abbott et al., 2013, Babaei et al., 2015; Arbués and Villanúa 2016; Best and Kneip 2019; Knickmeyer 2020; Ajibade and Boateng 2021) have suggested that sociodemography has a positive influence on participation in recycling. However, not all research has concluded with the same positive point of view towards this variable. For example, Golob and Kronegger (2019) posited that utilising socio-demographics alone is limited when explaining environmentally conscious behaviours. Richardson et al. (2020) further added that when looking at the factors that influence recycling intentions, demographics are usually not statically and non-significant.

Although factors associated with socio-demographics, such as education, age, gender dwelling type, and income, have been shown to predict recycling behaviour, inconsistency and inconclusiveness have also been demonstrated (Yang and Arhonditsis 2022). For example, studies by (Escario et al. 2020; Aboelmaged 2021; Chen et al. 2022) showed age as a good predictor of recycling behaviour. However, researchers such as (Barr et al. 2001a; Berglund 2006, Hage and Soderholm 2008; Casaló, et al. 2019) disagree as there has been no significant relationship between recycling behaviours and age. Nevertheless, demographic variables such as gender, income, age, family composition, and education level have proven effective in profiling individuals based on their recycling habits (Oke and Kruijsen 2016), especially when understanding and identifying what context informs recycling behaviours.

2.5.2.2 Psychological Factors

Similar to the demographic factors that influence recycling behaviours, there has been an increased focus on psychological factors used in predicting and explaining proenvironmental behaviours such as recycling (Ruepert et al., 2015; Yuriev et al. 2020). However, some studies, such as Xie et al. (2020), have determined that psychological factors do not sufficiently influence pro-environmental behaviours. In addition, Díaz et al. (2020) concluded that although psychological factors may show some significant factors in explaining pro-environmental behaviours, their effect is relatively small compared to the idiosyncratic and cognitive factors, for example, knowledge of recycling, trust, and self-efficacy. Conversely, this point has been counted by authors such as (Geiger et al. 2019; Chen 2020; Helmefalk and Rosenlund 2020), who have demonstrated a correlation between recycling behaviours and psychological factors.

Important advances have been made to identify factors influencing pro-environmental behaviours, with most of these studies conducted in developed countries. As highlighted in section 2.7¹⁰ there are vast differences in how recycling is perceived and carried out in developed and developing countries (Díaz et al. 2020). Nevertheless, recently there has been a rise in research on pro-environmental behaviours in developing countries (Amoah and Addoah 2021). Hence a definite contrast exists between the psychological factors and influences on individual behaviours in developed versus developing countries towards recycling (Islam et al. 2021). Furthermore, developed countries possess heavily industrialised recycling activities that are essentially removed from the resident's daily life as recycling in developed countries focuses on technical models, tools, and applications (e.g., sophisticated recycling programs) (Kattoua et al. 2019). In contrast, recycling in developing countries places less emphasis on understanding the indirect motives of individual's behaviours but focuses heavily on practical factors influencing the recycling systems (Ferronato 2020; Wang et al. 2020).

As a result, psychological factors such as desires (Helmefalk and Rosenlund 2020), attitudes (Barr 2004; Harton and Cullum 2014), intentions (Aboelmaged 2021), and habits (Abdullah et al. 2019; Knickmeyer 2020) can influence individuals participating in recycling. Similarly, as seen in Ajzen's (1991 2002) theory of planned behaviour, norms and perceived behavioural controls have either been adopted or modified by conceptualising intention as a proxy to predict recycling behaviours (white et al. 2009; Nigbur et al. 2010; Esfandiar et al.

¹⁰ Refer to section 2.7 for recycling in Developed vs Developing countries

2020; Perri et al. 2020; Esfandiar et al. 2021). Nevertheless, behavioural attitudes have been shown to affect attitudes toward recycling positively, leading researchers to suggest that individual attitudes toward recycling and the environment may directly affect their recycling behaviours (Liu et al. 2020; Zhang et al. 2021).

Even though attitudes may not always lead to recycling behaviour, the intention to engage in recycling is likely underpinned by social norms, attitudes, and perceived behavioural control (Wan et al. 2021; Sonnenberg et al. 2022). Nevertheless, using the tenets of the theory of planned behaviour, studies have shown that social norms and recycling attitudes can strongly influence recycling intentions (willingness). Unlike perceived control, behavioural intentions are antecedents to self-reported recycling behaviours when appropriately formed. On the other hand, regardless of an individual's intention to participate in recycling, other factors, such as situational factors, have activated attitudes towards recycling behaviours (Thogersen 2006; Linder et al. 2021; So et al. 2021). Equally, individuals may decide to recycle based on their positive disposition to recycling or feelings towards their norms (moral obligations) (Vicente and Reis 2008; Zhang et al. 2021; Wang et al. 2021).

Hence, based on psychological factors, recycling shows a combination of predictive powers of intention and constructs on recycling behaviours by understanding the interactive relationship between behavioural intentions and the antecedents that influence recycling behaviours. This is significant as studies have suggested that attitudes and psychological variables are unreliable in explaining individual recycling behaviours due to contextual factors specific to recycling behaviours. Yet, intrinsically motivated individuals are likely to engage in positive recycling behaviours (Van der Werff et al. 2013; Gilli et al. 2018; Arli et al. 2020). Thus, the effects of psychological traits on recycling behaviours are lessened in the face of increased pressure from other factors, i.e., personal factors such as opportunities (materials and facilities) and incentives (prompts and motivations).

2.5.2.3 Personal Factors

In addition to psychological and socio-demographic factors, personal characteristics such as information and knowledge, identity, past recycling habit, environmental concern, and awareness also influence recycling behaviours (White and Hyde 2012; Knickmeyer 2020; Topal et al. 2021). For example, identity can be sub-classified into personal and group identity, with both sub-groups positively influencing behavioural intentions, translating into actual recycling behaviours (Santos 2022). Therefore, individuals are more likely to develop an intention to recycle if recycling behaviours are communally endorsed (Arli et al. 2020) due to their selfefficacy (perceived control) being facilitated by their self-identity (Fielding et al., 2016; Yusliza et al. 2020).

According to Fielding et al. (2016), self-efficacy has been a significant construct in understanding an individual's effort, choice, and perseverance, especially towards recycling, to its direct association with the outcomes of an individual's behaviours. For example, the decision to recycle (choice), the separation of waste or the distance to recycling facilities (personal efforts), and the ability to recycle even without adequate facilities (perseverance) could be associated with efficacy and self-identity. Therefore, self-identification as a recycler enhances an individual's propensity to engage in recycling (White and Hyde 2012; Boz et al. 2020; Grunau et al. 2020).

Currently, researchers are trying to establish a link between recycling knowledge and recycling behaviours, as seen in studies such as those done by (Kumar, A., 2019; Kautish et al.

2019; Meng et al. 2019; Clark et al. 2020), were trying to identify connections between positive knowledge and a positive effect on recycling behaviours. Most have concluded that individuals are more likely to recycle when equipped with adequate awareness and recycling schemes. Hence, personal factors and concerns towards the environment have positively affected an individual perspective towards recycling, with general respect towards the environment predicting their recycling attitudes (Best and Kneip 2011; Geiger et al. 2019; Arli et al. 2020; Escario et al. 2020).

Nevertheless, when situational constraints are strong enough, personal factors such as knowledge do not need to be exerted to influence behaviours (Kornilaki et al. 2019; Cleveland et al. 2020; Yu et al. 2021). Hence, when situational factors such as access to recycling are strong enough and combined with psychological factors (attitudes), personal characteristics may not be needed to influence recycling behaviours.

2.5.2.4 Situational Factors

In addition to the factors mentioned earlier, recycling behaviour has also been shown to be influenced by situational variables. Although several studies on recycling behaviours have focused on psychological factors, researchers have not adequately uncovered situational factors that influence recycling schemes such as (kerbside recycling) to be implemented or introduced (Arli et al. 2020; Shi et al. 2021; Jacobsen et al. 2022). Furthermore, even though psychological factors are a good predictor of recycling behaviours, the chances of influencing an individual's behaviour towards recycling increase when situational constraints are more predominant (Linder et al. 2021; Soomro et al. 2022). In other words, recycling behaviour is a function of external factors such as schemes and access and internal factors such as concern and attitudes. Situational factors have been described by Barr (2007) in terms of individual attributes (for example, socio-demographic) as well as personal situations (behavioural context). These factors have been shown to affect the influence of situational variables on recycling behaviours, as individuals tend to be nudged towards recycling by providing facilities concerning their psychological state (Xu et al. 2018; Knickmeyer 2020; Zhang and Wang 2020). This can be observed in studies showing how well-designed communication strategies, such as recycling promotion and publicities, enhance individuals' engagement in recycling behaviours (Oke and Kruijsen 2016; Cudjoe et al. 2020; Islam et al.2021; Zhang et al. 2022).

Nevertheless, for an individual to effectively engage in recycling, there needs to be adequate recycling communication and information campaigns through policy instruments and other external factors (such as monetary incentives and refund schemes) to simplify the concept of recycling (Fernando 2019; Shevchenko et al. 2019; Islam et al. 2021; Fontecha et al. 2022). Furthermore, although situational factors can influence recycling behaviours, combining all or some of these factors can indirectly enhance recycling behaviours regardless of individual psychological state (Leung et al. 2019; Meng et al. 2019; Wang et al. 2021).

2.6 Global Significance of Recycling

Internationally, recycling has been interpreted differently by different individuals and countries (Kamble and Bahadure 2019) based on scenarios that strengthen their social and environmental strategies or pay attention to their economic or environmental development (Padilla-Rivera et al. 2020; Liu et al. 2021; Obaideen et al. 2022). Hence, the rise in innovative recycling technologies and options to help reduce the strain on the environment is a primary issue (Filipović et al. 2020; Kundariya et al. 2021). According to Yu et al. (2021), recycling has

been considered a necessary responsibility to minimise environmental pollution by utilising waste as a resource. Therefore, recycling policies have been adopted mainly in developed countries. For example, the U.K has successfully increased its recycling ability to 45% of waste being recycled, according to (Priestley 2020), while Scotland plans to introduce a 33% waste reduction by the year 2025, and Wales provides 99% of their household with separate food waste collection. Sweden also incorporated policies such as the 2017 climate policy framework and educating their citizens on waste sorting since the 1980s (Tin-yau 2020).

However, Germany's green dot system has been one of the most successful recycling initiatives, leading to less paper and materials and less recycling waste (Emerson 2020). The Japanese government has also introduced a strict recycling law, mandating their citizens to recycle by minimising their waste generation (World Bank 2017). And lastly, the U.S.A government has been implementing recycling laws since 1993, requiring citizens to recycle a certain percentage of their waste. The US environmental protection agency revealing the successful implementation of the recycling laws has resulted in 37% of waste being recycled (US EPA 2020).

However, developing countries are also starting to understand and see the need for these recycling responsibilities. For example, the Senegalese government signed a Swiss waste disposal firm to treat their rubbish in its capital Dakar (BBC 2020). Nevertheless, Senegal is still part of a small minority, as recycling has proven to be a challenge for most developing countries such as Nigeria (Ezeudu and Ezeudu 2019). This is mainly due to the profound contradictions and differences within the features and characteristics of these developing countries, as mentioned in the previous chap. Hence, it is vital to understand the differences

between developing and developed countries when implementing recycling efforts, as our world is not homogenous (Daioglou et al. 2012; Huang et al. 2022).

Different countries need to implement recycling strategies specific to their characteristics and inhabitants. Therefore, developing and applying methods based on various countries' characteristics is important to implement or improve their recycling rates and behaviours. Furthermore, understanding the difference between developed and developing countries is essential to implementing these strategies successfully. Therefore, the following section will expand on the differences in recycling in countries based on various criteria levels of development.

2.7 Recycling in Developed Versus Developing Countries

As mentioned earlier, many factors affect how a country is perceived as developed or developing. These factors include but are not limited to their highly progressed economy and technological infrastructure, level of industrialisation and human development index (Nielsen 2011). These factors are used to categorise countries into developed and developing countries, as most countries in a particular category tend to share similar characteristics (Jia et al., 2018). Nevertheless, there has been pressure placed on both developed and developing countries to focus on environmental sustainability by implementing recycling by environmental agencies and international organisations that recognise global sustainability as a potential pathway to building resilient cities and safeguarding the natural environments (Galal and Abdul Moneim 2016; Yong et al. 2020).

2.7.1 Recycling in Developed countries

Within the discussion of recycling, there is a definite contrast between developed and developing countries, mainly due to how individuals possess heavily industrialised recycling activities in developed countries that are relatively removed from their daily lives due to the environmentally viable acceptance of recycling (van Beukering and van den Bergh 2006; Tesfaye and Kitaw 2020). However, different countries adopt and implement different recycling strategies due to the ambiguity and flexibility of recycling (Bening et al. 2021).

According to Adhikari (2018), developed countries such as the UK and Switzerland have preserved to pursue social integration, environmental conservation, and economic sustainability through the implementation of formal recycling methods that are mainly executed by the government or any enterprise that has been provided with an official license and registered with the government (Wang et al. 2020). These methods include kerbside collection systems, door-to-door schemes, street container collection systems, and drop-off centres (Wang et al. 2020). Hence, the citizen's attitude towards these methods is genuinely positive as the formal waste management sector is, regarded as innovative, hygienic, and generally compatible with a modern waste management system (Ferronato 2020).

Nevertheless, this does not always apply to all developed countries, as witnessed by the USA, and the U.S.A standards towards sustainability have declined compared to previous years. For example, significant social challenges such as high racial violence and income and gender inequality have taken a back seat to sustainable production and consumption (Kelley 2021). The latter is the case in the USA, mainly during the president's (Donald J Trump) term, as observed through his actions, such as pulling the country from the Paris climate agreement (Kelley 2021). The diverse strategies adopted by developed countries help provide suitable policy tools that supplement their recycling goals (Priestley 2020). For example, community engagement is considered a requisite factor by the UK's government for sustainability resulting in the encouragement of community-based NGOs (Priestley 2020). Hence the importance of adopting some of these policies to be applicable in developing countries while promoting supplements for recycling goals.

2.7.2 Recycling in Developing Countries

In developing countries, waste collection, treatment, and transport have become a relatively complex problem, mainly due to the lack of finance, knowledge/awareness, and human and other critical resources (Dukhan et al., 2012; Hall et al., 2013; Khan et al. 2019; Martin et al. 2021). However, in terms of recycling, the informal recycling sector is adopted in developing countries, becoming an essential part of their waste management, mainly within low- and middle-income countries (Ezeudu and Ezeudu 2019; David et al. 2020). In the context to waste management, the informal sector refers to the recycling activities such as waste-picking and scavenging, which are the terms used to describe the individuals involved in extracting the recyclable materials within this system (Rosa et al. 2018; Barford and Ahmad 2021; Korsunova et al. 2022).

Although many studies focus on recycling in developing countries, such as (Alexis Laurent et al. 2014; Chen et al. 2016; Huang et al., 2020; Ferronato 2020; Wang et al., 2020), the majority of this research focuses on providing information by trying to duplicate ideas and frameworks used in developed countries and applying them to developing countries, without concentrating or adapting them to the characteristics of those countries (Nguyen and Watanabe 2020; Chaudhuri et al. 2022). Nevertheless, a few developing countries, such as

Senegalese, Egypt, and South Africa, are starting to implement recycling efforts, particularly within the urban area where the waste generation rate has increased substantially (Marshall and Farahbakhsh 2013; Gandy 2014; Jambeck et al. 2015; Mutezo and Mulopo 2021; Shi et al. 2021; Deme et al. 2022).

There has been less emphasis on recycling research in developing countries towards understanding the direct and indirect motives influencing an individual's behaviour. However, some studies, such as the study by Abu Hatab et al. (2022) focusing on developing countries, with Ethiopia being the case study, showed that the best predictor for actual behaviours was competencies, while beliefs were more indicative of desired behaviour and perception of behaviours. In addition, individuals were more willing to partake when they understood recycling approaches and methods.

Another study conducted by Hui et al. (2020) conducted a study on recycling behaviour in China, showing that age, gender, and income were the three most influential factors in recycling. Additionally, Liu et al. (2020) research on the relationship between environmental action and knowledge identified the factors influencing environmental behaviours and motivating environmental attitudes in China, concluding that when individuals understand the consequence of environmental issues, they are willing to participate in pro-environmental activities such as recycling.

While it is noteworthy that there are studies targeted toward developing countries, it is essential to identify that most of these studies focus on countries that are experiencing social and economic development, for example, China (Qiao et al. 2019; Ma et al. 2020; Zhang et al. 2020). As a result, some characteristics of developing countries do not apply to them. For example, China's coastal cities have positively been influenced by their more developed cities through the economic transition within the country transitioning into a developed country (Glaser and Funaiole 2020). Hence the importance of identifying and differentiating the characteristics of developing countries that apply to lower-income cities such as Lagos.

2.8 Recycling in Lagos

Lagos is a large and fast-growing economy, with rapid urbanisation and a large and fast-growing population in Nigeria. Unfortunately, Nigeria has no prominent formulated environmental protection policies to address and coordinate the consequences of waste management, such as recycling, as Nigeria is not known for its sustainable effort (Ezeudu et al. 2019; Audu et al. 2020; Alade 2020; Chisholmet al. 2021). However, the Lagos governments have improved their attitudes toward environmental sustainability due to the increased volume of waste generated as an obvious consequence of rapid urbanisation (Nelson and Namtira 2017). This was evident in the sustainable initiatives being emphasised through NGOs and other government bodies, such as the implantation of the Regional Sustainable Energy Centre of Excellence (RSECE), a consortium of the government that can monitor and evaluate the situation that needs to meet the sustainable development goal deliberated by the United Nations, and the Lagos Waste Management Authority (LAWMA) a Lagos State agency responsible for tackling waste generated (Idowu et al. 2021).

The environmental policies and legislations have been poorly enforced in Lagos due to factors such as lack of environmental consideration (Adejumo and Adejumo 2014; Ajibade 2019; Dawodu et al. 2022), lack of community participation, particularly in the metro areas (Aliyu and Amadu 2017), lack of formulated policies (Maiyaki et al. 2019), and lastly poverty and lack of knowledge (Aliyu and Amadu 2017; Dawodu et al. 2022).

As such, recycling in Lagos state is at a very primitive stage (Aliyu and Amadu 2017), despite different governments' efforts to develop their waste management plans (Idowu et al. 2021). The author further posited that this could be attributed to the government's lack of attention, corruption, and will toward practical efforts to execute and regulate these policies. The relationship between Lagos residents and the trust in government and formal sectors is shallow. The study conducted by Afrobarometer shows that only 31% of Nigerians trust the government, with many wary of corruption and inadequate support for ordinary citizens (Yunusa et al. 2021). This was mainly due to the resident's perceived corruption within the government. Uchenna et al. (2020) also posited that corruption perception is one of the main determinants of distrust between citizens and the government. In addition to the corruption plaguing the Lagos government, other factors affect the trust in government and formal sectors, such as the misappropriation of public funds, lack of economic performance, and political participation (Oghuvbu 2021). Lagos state focuses on the top-down model, as the government does not recognise the public's importance in decision-making (Yuan et al. 2003; ODPM 2004; HMG 2005). Hence, the lack of individual attitude and felt need and lack of technical resources and training at a local level to tackle recycling in Nigeria (Otitoju 2014).

Even though Lagos state is its own body, it is still within the country of Nigeria. Therefore, most of the state government's action depends on the federal government for support and some legislation. In 2004 the Nigerian government established the federal environmental protection agency (FEPA), which is responsible for designing, enforcing, and regulating ecological issues such as recycling (NESREA.gov 2020). However, this agency was replaced in 2007 by the National Environmental Standards and Regulations Enforcement Agency (NESREA) due to its lack of articulated responsibilities (Ogwueleka 2009). NESREA was

established to focus on the regulatory work of organisations and individuals whose activities threaten the environment. However, researchers such as (Ogwueleka 2009; Hopewell et al. 2009; Duru et al. 2019) have criticised the agency due to its lack of focus on oil and gas companies and lack of actual compliance monitoring and enforcement in general. This has resulted in a massive gap between management and the output of the NESREA, mainly due to the corrupt governing as the operators tend to be appointed based on political affiliations rather than experience or qualifications (Duru et al. 2019).

Despite the government's long-standing apathy toward waste management through recycling, studies conducted by (Elias and Omojola 2015; Kandissounon et al. 2018) have estimated that Lagos residents annually produce more than four million tonnes of waste. However, only 5% from rural and 50% from urban areas are collected through informal recycling programs. Hence waste is being disposed of in ways that are not sustainable. For example, reckless burning of waste, throwing of waste in inappropriate places such as farmlands and drains, and often forcing within the poor urban areas to partake in scavenging waste dumps to try to earn a livelihood by recovering and recycling the materials for reuse (Otitoju 2014; Benson 2020).

2.9 Conclusion

Many multilateral organisations have advocated for sustainable environmental strategies such as recycling in developing countries to recognise peculiarities within those developing countries (Bass and Dalal-Clayton 2012; Knoblauch et al. 2018; Wu et al. 2021). As mentioned earlier, Lagos is one of the largest and fastest-growing economies, with rapid urbanisation and a large and fast-growing population. However, even with the nation's wealth

and environmental agencies, for example, NESREA and LAWMA, Lagos still lacks an efficient recycling presence based on characteristics such as lack of community participation, particularly in the rural areas, lack of knowledge towards recycling and effective recycling technologies and methods (Aliyu and Amadu 2017; Alabi and Wohlmuth 2019; Abubakar 2021). Although environmental problems have been acknowledged by studies such as (Daramola 2010; Ezeudu and Ezeudu 2019; Ogunmakinde et al. 2019; Alao et al. 2020; Adubor et al. 2022), little attention has been given to the implication of recycling techniques and principles in Lagos.

Studies such as (Jambeck et al., 2015; Charter 2017; Pellow et al. 2020; Ramesh et al. 2021) have suggested that neglecting critical environmental issues result in a negative environmental impact. Therefore, developing states such as Lagos need to achieve green success through a social and economic impact on the environment (Adejumo and Adejumo 2014; Ebekozien et al. 2021; Adubor et al. 2022; Mowaiye et al. 2022). In addition, many states and countries face severe economic, social, and environmental threats from energy and climate change (Charter 2017). Therefore, creating an approach that considers the environment's finite resources (Elgaaied-Gambier et al. 2018) is necessary.

Implementing recycling techniques to influence behaviours related to the environment has lacked consideration by governments and organisations in developing cities such as Lagos (Adejumo and Adejumo 2014; Filimonau and Tochukwu 2020). Dawodu et al. (2022) further posited that profit maximisation is at the forefront, even at the expense of the community's well-being. This is in contrast to the obligation of recycling methods and techniques that meet the socio-economic needs and interests of the consumers while significantly reducing the impact that threatens the natural resources and environment. Therefore, Individuals'

behaviour is complex due to diverse factors, such as needs and desires, values, institutions and infrastructural context, and political and economic factors (Mont and Power 2013; Andersson et al. 2019). Therefore, policymakers need to gain insights from behavioural economics (Ajzen 1991) to understand better factors that help influence behavioural changes to develop effective and efficient recycling policies. Thaler and Sunstein (2008) succeeded in popularising the findings from behavioural science in their application to policymaking by exploring the role of choice architecture and nudging to shape the desired behaviour.

To better understand the determinants of recycling behaviours, it is essential to focus on the behavioural choices associated with recycling engagement (Singh et al., 2014). Since its early beginning, experimental psychology has concentrated on cognitive mechanisms to understand the representation and acquisition of knowledge, which seems to be the logical step needed to explain individual behaviour (Khalil et al., 2017). Once individuals perceive environments and their ability to produce and judge desired effects, predicting and explaining their behaviour will be easy. However, the relationship between behaviour and cognition is not as reliable as expected, as individuals do not perform consistently with their values, beliefs, intentions, or attitudes (Lopes et al. 2019; Chan et al. 2020; Lin et al. 2020).

Therefore, multi-attribute theories from social and psychology are currently used to predict and promote social behaviour (Michie et al., 2015). These theories referenced in the Table 2.3 tend to be heterogeneous in explaining individuals' motivation to change behaviour, the translation of motivation towards actual behavioural changes, and the maintenance of these adapted behaviours (Michie and Johnston 2012). For example, how and why individuals decide to recycle, based on translating their good intention into long-term behaviour (Cane et al., 2014). Behavioural change theories are replicable and observable components of

behaviour change interventions, as they have long dominated attempts to predict social behaviours (McSharryet al. 2020; Gallant et al. 2021). Hence, many studies are carried out based on these theories, such as meta-analyses and critical reviews that change specific behaviours while evaluating their efficiency. However, behavioural change techniques must be well specified to alter individuals' recycling behaviours and cognitive precursors.

2.10 Behavioural Change Theories

Although individuals may think they are entirely in charge of all their decisions, the truth is that most of our choices happen subconsciously (Michie et al., 2014). Hence, most individuals' behaviours are performed daily and are based on their memory, which is unlikely to change unless pushed to (Cane et al. 2014; Pinder et al. 2018; Lavazza 2019). Therefore, behavioural change is often a goal that generally occurs from within to help individual improvement, such as changing an individual's behaviour towards being environmentally conscious. Most of these changes result from communities, organisations, governments, and constituents (de Lange et al. 2019; Ardoin et al. 2020). These changes tend to be referred to as interventionists needed to develop and implement interventions or programs to achieve their desired behaviour due to the importance of understanding the behavioural change theories when trying to get an effective result (Cane et al., 2014; Hagger and Weed 2019; Lopes et al. 2019; Inzlicht et al. 2021).

Psychologists have developed several theories to produce effective ways of changing behaviours by providing an accumulated framework and knowledge for understanding current behaviour while identifying targets for change (Davis et al. 2014; Ajzen 2020). Many of these theories are used in different fields and areas, such as social sciences, to evaluate behavioural change outcomes and facilitate empirical findings (Michie et al., 2015). These behavioural change theories tend to be heterogeneous. They range from explaining how individuals get motivated to how these motivations are translated to actual behavioural changes and to how to maintain these adapted behaviours (Michie and Johnston 2012; Ruan et al. 2020; Kuhlicke et al. 2020; Ntoumanis et al. 2021).

Behavioural change theories are replicable and observable components of behaviour change interventions, as they change specific behaviours while evaluating their efficiency (Jönsson and Abrahamsson 2020; Curran et al. 2021). However, to enable desired change in a particular behaviour, a few elements are needed to change behaviour successfully. Such as readiness to change (adequate resources and knowledge), barriers to change (anything preventing a behaviour from changing), and triggers that may result in returning to former behaviour (Michie et al. 2015).

Presently, different efforts have been devoted to investigating individual behaviours, especially by scholars in the psychology field, resulting in the development of various psychological models and theories to help better understand these behaviours' factors. However, this thesis has selected the Theory of Planned Behaviour (TPB) as the basis for the research into understanding individuals' behaviour toward recycling in Lagos. The theory of planned behaviour has emerged as the most widely used model within behavioural research, predominantly in pro-environmental studies (Kinzig et al., 2013).

Table 2.3 highlights various behavioural change theories that promote and explain proenvironmental behaviours such as recycling (Bamberg and Möser 2007; Gainforth et al., 2016).

Table 2.5 Valious Dellavioural Clidinge Theories		
Name of BC	Key elements that define the approach	Key assumptions
theory		
theory Nudge Theory	Nudge theory is a flexible and modern change-management concept for understanding how people think, make decisions, and behave; helping people improve their thinking and decisions; managing change of all sorts and identifying and modifying existing unhelpful influences on people. Nudge theory is mainly concerned with the design of choices, which influences our decisions. Nudge theory proposes that the designing of options should be based on how people actually think and decide (instinctively and somewhat irrationally), rather than how leaders and authorities traditionally (and typically incorrectly)	Nudge theory is based on understanding and allowing for the reality of situations and human tendencies (unlike traditional forcible instruction, which often ignores or discounts the fact of situations and people). Central to the Nudge concept is that individuals can be helped to think appropriately and make better decisions by being offered choices designed to enable these outcomes.
	believe people think and determine	
Norm-Activation	(logically and rationally). Schwartz's (1975, 1970, 1973) Norm-	It has been suggested that an
Model (NAM)	Activation Model (NAM): conceptualises an explanation of individual behaviours as prosocial due to accepting or denying personal norms. This theory was adopted by Stern et al. (1993) to create a new framework that examines pro- environmental behaviour by integrating values, norms and beliefs.	individual will participate in pro- environmental behaviour when their personal norms are activated by their current situation (Stern 2000),
Social Cognitive Theory	Proposes that people are driven not by inner forces but by external factors. This model suggests that human functioning can be explained by a triadic interaction of behaviour, personal and environmental factors	To increase levels of self-efficacy, it may be essential to provide resources and support to raise individual confidence. Even when individuals have a strong sense of efficacy, they may not perform the behaviour without incentive. This suggests that if we are interested in getting others to enact behaviour change, it may be essential to provide incentives and rewards for the behaviours. Therefore, providing opportunities for behavioural change, assisting with those changes, and offering social

Table 2.3 Various Behavioural Change Theories

support.

Theory of Planned Behaviour Ajzen's (1991) Predicting behaviour and retrospective behaviour analysis have been particularly widely used concerning health and the environment. The TPB is not considered practical or effective for planning and designing the type of intervention that will result in behaviour change (Kinzig et al., 2013)

Stages of ChangeBehaviour change occurs through a 5-step(Transtheoretical
model)process: 1. Pre-contemplation (the
individual has not even thought about
changing their behaviour)
2. Contemplation (begins to think about
changing behaviour)
3. Preparation for action (begins planning to
change behaviour)

 Action (begins practising the behaviour)
Maintenance (the behaviour is performed regularly

The Theory of Reasoned Action (TRA) Provides an insightful ability to explain parsimoniously to perform the behaviour in question while dealing with attitude and subjective norms (White et al., 2009).

Schwartz's socialpsychological model of altruistic behaviour

Diffusion of Innovation Theory

Cognitive dissonance approach Within this theory, Schwartz's socialpsychological model of altruistic behaviour is classed typically as being within the domain of morality in an individual's mind. Attitudes concerning this behaviour are not based on specific conscious or unconscious benefits and calculations but rather on the function of an individual's moral belief (doing the right thing) (Schwartz (1970). The theory emphasises innovation as an agent of behaviour change, with innovation defined as an idea, practice, or object perceived as new. The process begins with the recognition of a problem or need (and is thus problemorientated), and individual adopters progress through five steps: knowledge, » persuasion » decision », implementation » and confirmation. Inconsistency between attitudes or behaviours forces us to either change our

attitudes or change our behaviour to avoid internal conflicts (or dissonance) around these ideas A valuable method for identifying particular influences on behaviour that could be targeted for change. However, the intention is the most critical variable in predicting behaviour change, suggesting that behaviours are often linked with one's motivation. It indicates that it may be essential to present information to help shape positive attitudes towards the behaviour and stress subjective norms or opinions.

Behaviour is influenced only though consciously contemplating change. Behaviour change is a linear and progressive process. People can be 'ready' for behaviour change to differing degrees and are more or less susceptible to particular change strategies.

However, the theory of reasoned action does not account for the situational factors likely to strengthen the relationship between attitude behaviours and enhanced prediction of behaviours and not having nonaltitudinal personal (de Groot and Schuitema 2012).

This theory believes individuals are aware of the importance of their actions on the well-being of others by showing how personal and social concerns are combined to influence an altruistic behaviour (Schwartz and Howard 1980; Thogersen 1996).

The behaviour will change more rapidly if innovations are perceived as being better than previous options It will be consistent with the existing values, experiences and needs of potential adopters (compatibility) if they are easy to understand (complexity), testable via limited trials (trialability), and their results are visible (observability). Our brains prefer when our beliefs, attitudes and behaviour are aligned and consistent. The theory of planned behaviour is central to this thesis, which underlines the intervention used in this research. Informed by relevant literature on the theory of planned behaviour research, this section recognises the potential of extending the theory of planned behaviour to encourage recycling behaviour change in developing cities, with Lagos as a case study.

Before discussing the theory of planned behaviour, it would be beneficial to critically review other behavioural and normative influences theories. There is a vast literature on behavioural change theories, which have been conceptualised in several theories, as seen in Table 2.3. This section discusses these theories to construct a picture of current knowledge on the impact of different approaches toward implementing behavioural change. Although this section looks at all these theories, it is essential to note that this thesis focuses on the theory of planned behaviour. Therefore, this section begins with a discussion of the other behavioural theories identified in Table 2.3.

2.10.1 Nudge theory

Over the past decades, behavioural science has revealed the decision-making process and human behaviour to be rationally bounded, strongly habitual, and systematically biased (Weinmann 2016). As a result, more attention is being paid to effectively dealing with societal challenges, such as influencing people to make better health, happiness, and economic decisions concerning public policy-making without concerning the individuals. This question has motivated legal scholars and economics like Richard Thaler and Cass Sunstein, who popularised Nudge and brought the ideology to a broader audience with their 2008 book titled Nudge: Improving Decisions about Health, Wealth, and Happiness by drawing on behavioural economics and social psychology to "explain people behaviour who deviate from rationality as defined by classical economics" (Marteau et al. 2011).

"Nudge is an aspect of choice architecture that predictably alters people's behaviour, without forbidding any options or significantly changing their economic incentives" (Thaler and Sunstein 2009, p. 6).

Nudge aims to alter the environment where a choice can be made (also known as choice architecture) by influencing people to make a better outcome while having their freedom of choice intact. An intervention must be cheap, easy to avoid, and not alter the incentives for an intervention to count as a nudge. It is important to note that with the nudge strategy, the participants are not forced but influenced by behavioural changes within their choices (Gregor and Lee-Archer 2016). The central premise behind Thaler and Sunstein's theory of nudge is that people are not "Econs," meaning people frequently act differently than what economic theory predicts (Thaler and Sunstein 2009)

In other words, for Nudges to be a valuable tool for environmental policies, they need to have a reliable and predictable impact while effectively changing behaviours (Ceschi et al. 2021). However, implementing Nudge is delicate, especially towards pro-environmental behaviours such as recycling (Ceschi et al. 2021). In some cases, these implementations have failed or, worse, backfired as the impact of nudge policies does not follow predictable linear trends. Therefore, evaluating the effects of recycling policies must focus on the psychological drivers of individual recycling decisions, such as their introjected morality concerning environmental sustainability and their environmental beliefs (Ceschi et al. 2021). Hence the difficulty in determining the precise impact of the nudge policy on recycling behaviour without

considering the faceted psychological nature associated with recycling, including the role of attitudes and behavioural controls.

Nudges are not mandates; for a policy to count as a nudge, the intervention must be cheap and easy to avoid (Thaler and Sunstein 2009). Therefore, recycling policies through nudges would determine individuals' attitudes and perceptions of recycling. The government has successfully accepted nudges, e.g., in the USA and UK (Lakshmi et al. 2022). However, Nudges are sensitive to culture (Davison et al. 2022), while pro-environmental behaviour is demographically dependent (Fisher et al. 2012). Moreover, as mentioned in section 2, how recycling is perceived in Lagos defers from developed countries where the Nudge theory has been successfully implemented. Hence, the theory of planned behaviour was chosen for this thesis.

2.10.2 Social Cognitive Theory (SCT)

The social cognitive theory explains human functioning through a unique way in which individuals maintain and acquire behaviours while considering the social environment in which the behaviour is performed (Lim et al. 2020). Social cognitive theory primarily states that the self does not originate from the abstract of social reality but rather from the reciprocal result of environmental factors' interaction, such as organisational expectations and social normality, and the behaviour itself (such as the experience associated with the behaviour) (Schneider et al. 2021). According to Schunk and DiBenedetto (2020), the social cognitive theory is beneficial in explaining individual functioning based on a model of triadic reciprocality and conceptualising that social interaction can influence an individual about their thoughts, feelings, goals, and behaviours.

Social scientists such as Philip et al. (2013) have argued that behavioural change in an individual is possible when they can be both an agent for change and a responder for change. Studies investigating the effectiveness of a social marketing program within a community to increase the recycling rate have revealed an increase in the number of materials recycled while showing an increase in the positive impact on recycling rates with the implementation of social cognitive theory (Knickmeyer 2020). Therefore, the social cognitive theory states that individual decisions are based on rational thought, meaning there is no space for emotions (Cristofaro 2020). According to this theory, although an individual may be motivated to recycle through a learning process, the learning observation cannot explain the particular behaviour pro-environmental behaviours such as recycling complex interactive processes with motivational, behavioural, social, and emotional components. There to learn a new behaviour, such as how to participate in recycling in Lagos, where recycling is still in its infancy state (Nwankwo 2022), an individual's self-interest, awareness, and knowledge become vital to selfcontrol. What we can learn from this theory is that observation and learning processes are more than the psychological functioning of knowledge and skill (Jiang et al. 2021).

According to Guo et al. (2022), several limitations are associated with using the social cognitive theory to explain recycling behaviour, especially in areas where recycling is still in its fundamental stage, such as Lagos. Limitations of the model include the following: Firstly, the theory assumes that changes in the environment will automatically lead to changes in the person when this may not always be true. The social cognitive theory is loosely organised and based solely on the dynamic interplay between individuals, behaviour, and environment. Additionally, the extent to which each of these factors into actual behaviour is unclear, and if one is more influential than another. The social cognitive theory also heavily focuses on

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learning processes and disregards biological and hormonal predispositions that may influence behaviours, regardless of past experience and expectations (Ackah 2020). Lastly, the social cognitive theory does not focus on emotion or motivation other than through reference to experience. Based on the minimal attention to these factors, the theory can also be broadreaching, so it cannot be easy to operationalise (Schunk and DiBenedetto 2020).

In conclusion, the social cognitive theory's different levels of the social-ecological model are considered in addressing behaviour change of individuals. However, the use of the social cognitive theory in pro-environmental promotion has emphasized the individual and the environment, the latter of which has become a significant point of focus in recent years for promoting recycling activities (Ouariachi et al. 2020). As with other theories, the applicability of all the constructs of the social cognitive theory to one environmental problem may be difficult, especially in developing focused areas such as Lagos.

2.10.3 Schwartz's Social-Psychological Model of Altruistic Behaviour

Schwartz's social-psychological model of altruistic behaviour was developed by Schartz in 1972, with the belief that individuals are aware of the importance of their actions on the well-being of others by showing how personal and social concerns are combined to influence altruistic behaviours (Hui et al. 2020; Daniel et al. 2022). According to Thøgersen et al. (2021), this theory describes how personal and social concerns influence altruistic behaviour. This process begins with the inclusion of social norms regarding moral behaviours generally agreed upon by individuals in an abstract way, with the norms representing the attitudes and values of others.

Within this theory, Schwartz's social-psychological model of altruistic behaviour is classed typically as being within the domain of morality in an individual's mind. Attitudes concerning this behaviour are not based on specific conscious or unconscious benefits and calculations but rather on the function of an individual's moral belief (doing the right thing) (Schwartz 1970). Schwartz's social-psychological model of altruistic behaviour highlights the importance of attitude and social norms, integrating them into individuals' values which are essential in decision-making (Ture and Ganesh 2018). However, these two constructs are also present in the theory of planned behaviour.

2.10.4 The stage of change theory (Transtheoretical model)

The stage of change theory (Transtheoretical model) was initially developed with the psychology discipline while being focused extensively on the health areas (Lee et al. 2021). This theory suggests that an individual moves through stages in an attempt to voluntarily adopt change in their life (Akdaş and Cismaru 2022). Therefore, behaviours are influenced only through consciously contemplating change and are a linear and progressive process (Hayes et al. 2021). As a result, individuals can be 'ready' for behaviour change to differing degrees and are more or less susceptible to particular change strategies (ElHaffar et al. 2020).

The stage of change theory (Transtheoretical model) behaviour change occurs through a 5-step process (Cismaru and Wuth 2019): Firstly, in the Pre-contemplation (the individual has not even thought about changing their behaviour), those in this stage are not yet aware of the problem that may need attention and are not thinking of the required change necessary to the behaviour. The next stage is Contemplation (begins to think about changing behaviour). Those in this stage are already motivated to engage in behaviour such as recycling and are most likely to be open to persuasive attempts towards encouraging change. The third stage is

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the Preparation for action (begins planning to change behaviour). This is where individuals take steps to make the change possible. The next stage is action (begins practicing the behaviour); those in this stage are already performing the desired behaviour. However, they still require continued support and encouragement (Cismaru and Wuth 2019). The final stage is known as maintenance, when the behaviour is performed regularly.

Several limitations are associated with implementing the stage of change theory (Transtheoretical model), which should be considered when using this theory in proenvironmental behaviours such as recycling (Inman et al. 2022). Limitations of the model include the following: The theory ignores the social context in which change occurs, such as convenience and income (Jahromi et al. 2020). Second, the lines between the stages can be arbitrary, with no set criteria for determining an individual's stage of change, which can result in the questionnaires not having assigned an individual to a stage of change that is not always standardised or validated (Sjattar and Arafat 2021). Third, there is no clear sense of how much time is needed for each stage or how long a person can remain in a stage, which results in the model assuming that individuals make coherent and logical plans in their decision-making process when this is not always true (Smith 2020).

The Transtheoretical Model suggests behavioural change interventions to address individuals at various stages of the decision-making process. This can result in adapted interventions (i.e., a message or program component has been specifically created for a target population's level of knowledge and motivation) and is effective (Doran et al. 2022). In addition, the stage of change theory (Transtheoretical model) encourages an assessment of an individual's current stage of change. It accounts for relapse in the individual decisionmaking process (Rio Szupszynski and Ávila 2021).

2.10.5 Diffusion of Innovation theory

The diffusion of innovation theory was introduced by the French sociologist Gabriel Trade in 1903 and was popularised in 1971 by Everett Rogers (Sartipi 2020). this theory argues that innovation is not solely dependent on the competency or collaborative social process that occurs among individuals based on the ability to learn about the innovation (Leite 2022). Instead, the diffusion of innovation theory suggests that for an individual to change, there needs to be a normal distribution of willingness to accept new ideas (Talebian and Mishra 2018). Hence, using this theory helps explain that diffusion is the process where innovation is communicated through specific forums over time among the individuals in the social system (Bharadwaj et al. 2021). Bagiran Ozseker (2019) defines innovation as introducing new systems, processes, products, or systems to distinguish from invention or model towards a new, improved version.

The diffusion of innovation theory includes the different characteristics of innovation that influence an individual's decision to reject or accept innovation (Fry et al. 2018). These characteristics include relative advantages, compatibility, complexity, triability, and observability. Relative advantages can be considered economic value, social prestige, convenience, and satisfaction (Ofori et al. 2021). Compatibility refers to the degree to which an innovation can be perceived to be consistent with current values, needs of potential adopters, and past experience; complexity is the degree to which an innovation is perceived as challenging to understand and use'; triability is 'the degree to which an innovation may be experimented with on a limited basis and observability is 'the degree to which the results of an innovation are visible to others (Min et al. 2021).
There are several limitations of diffusion of innovation theory, which include the following: for example, much of the evidence for this theory, including the adopter categories, did not originate from addressing pro-environmental issues, and it was not developed to explicitly apply to the adoption of new behaviours or recycling innovations (Wolske 2020). Therefore, this theory does not foster a participatory approach to the adoption of recycling programs, as it works better with the adoption of behaviours rather than the cessation or prevention of behaviours. Secondly, the diffusion of innovation theory does not consider the resources available to individuals or the social support towards adopting a new behaviour (or innovation) (Carreiro and Oliveira 2019).

In conclusion, the diffusion of innovation theory has been successfully implemented in different areas, including communication, agriculture, public health, criminal justice, social work, and marketing. However, this theory can be used to accelerate the adoption of crucial pro-environmental sustainability that typically aims to change behaviours based on its ability to assess and identify the literacy-inducing information possessed by individuals concerning the content, sources, quality, and effect; within a social context, social process and social support as upheld by this theory (Kaaronen and Strelkovskii 2020). For example, the most successful adoption of a recycling program results from understanding the target population and the factors influencing their adoption rate. However, using this theory would be difficult as it does not consider a relatively ample number of variables responsible for cause and action (Chuah et al. 2020).

2.10.6 Cognitive Dissonance Approach

According to the cognitive dissonance theory that Festinger developed in 1957, the coexistence of at least two inconsistent cognitions generates a state of dissonance (Odou et

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al. 2018). Based on this theory, the awakening of the dissonance is associated with psychological discomfort leading the individual to be motivated to reduce it (Zhang and Sun 2021). This can be done in three ways: by attitudinal change, which can be done by transforming the individual's exciting cognition; by adding consistent behavioural changes; and lastly, by reducing the importance of inconsistency (Odou et al. 2018).

According to Bamicha and Drigas (2022), about the social world, individuals are represented by their mental cognition through their attitudes, belief, and behaviour or emotions. Therefore, when an individual holds two psychologically inconsistent cognitions, this leads to an unpleasant psychological tension known as cognitive dissonance, resulting in the motivation to reduce those tension (Cooper 2019). primarily attitudinal or behavioural change is required to reduce cognitive dissonance, which will re-establish consistency (Bamdad 2019). Aronson (1969) built on Festinger's theory by linking cognitive dissonance to self-concept, proposing that cognitive dissonance is most accurately felt when an individual feels the cognition involved is threatening their positive self-concept. For example, individuals generally feel they are good and moral; there, they are willing to engage in behaviour that conflicts with this belief resulting in dissonance (Phelan 2020).

The use of dissonance theory has proven effective across different studies aiming to promote pro-environmental behaviours (Verfuerth and Gregory-Smith 2018). However, this theory is more effective when the individuals are already motivated to engage in the behaviour and perceive and understand the importance of engaging in a specific behaviour (Naeem 2020). Hence why it would be challenging to implement cognitive dissonance theory towards recycling behaviours in developing countries or cities such as Lagos as recycling in

Lagos state is at a very primitive stage (Aliyu and Amadu 2017), despite different governments' efforts to develop their waste management plans (Idowu et al. 2021).

2.10.7 Norm-Activation Model (NAM)

Schwartz's (1975, 1970, 1973) Norm-Activation Model (NAM): conceptualises an explanation of individual behaviours as prosocial due to accepting or denying personal norms. This theory was adopted by Stern et al. (1993) to create a new framework that examines proenvironmental behaviour by integrating values, norms, and beliefs. This model introduces a universal value system to analyse behaviour as a function of beliefs about the consequences of actions and norms about personal responsibility to undertake specific actions in response (Kiatkawsin et al. 2020).

According to the norm activation theory, an essential antecedent to proenvironmental behaviour is activating a "personal norm" (Li and Fang 2022). This norm activation occurs when the individual perceives environmental conditions that threaten something the individual values for their well-being, other humans' well-being, and nature; that is, the individual is aware of environmental problems (Denhama and Andringab 2021). Here, personal norms are experienced as a moral obligation to protect whatever threats derive from an individual's general and environmental values (Al-Ghazali and Afsar 2021). Thus, theories explain that the individual's general and environmental value orientations influence the persona norms (Afsar and Umrani 2020). Furthermore, it has been suggested that an individual will participate in pro-environmental behaviour when their personal norms are activated by their current situation (Stern 2000), explaining that personal norms (internalized morals) were an extended determinant in the theory of planned behaviour (Hallaj et al. 2021).

The personal norms in the normative activation model are used to predict an individual's behaviour. They are determined by two factors: the feeling of responsibility for performing the specific behaviour and the awareness of performing or not performing the behaviour having a consequence (Esfandiar et al. 2021). Nevertheless, most studies interpret the normative activation theory as either a moderator or mediator model (Confente and Scarpi 2021). Using this theory as a mediator suggests that a personal norm is influenced by the awareness of the consequence via ascribed responsibility (Ritchie et al. 2022), while using the theory as a moderator suggests that personal norm is influenced by both the awareness of a consequence and the ascribed responsibility (Esfandiar et al. 2021). Therefore, this model was not chosen for this thesis because when using this theory, individuals must be aware of the consequences before they feel responsible for the behaviour (Wu et al. 2022).

2.11 Theory of Planned Behaviour (TPB)

Ajzen's (1991) Theory of Planned Behaviour (TPB) explains a behaviour by allowing researchers to identify the determinants of the behaviour due to an individual's intentions being essential to a particular behaviour's performance (Si et al. 2020). The theory of planned behaviour remains one of the most widely used theories for understanding individual behaviours. This theory argues that the combination of perceived behavioural control, subjective norms, and attitudes are predictors of an intention, as illustrated in Figure 2.2 (Yuriev et al. 2020). Hence an individual intention, defined as a conscious decision of how certain individuals are willing to partake in a behaviour (Ajzen 1991), depends on the combination of the following predictors: behavioural attitude (BA), subjective norms (SN) and perceived behavioural control (PBC) (Gao et al., 2017).

An attitude is a positive or negative evaluation of an individual's behaviour, while the extent of that individual's beliefs towards a behaviour's performance is perceived as behavioural control (Jing et al. 2019; Ajzen 2020). However, the total amount of accessible control determines the individual's belief in behavioural control, i.e., considering how the present factor may facilitate a performance, an individual assumption of a problematic behaviour such as recycling will result in low perceived behaviour control (Yuriev et al. 2020). Conversely, subjective norm refers to the social pressure of how an individual perceives the act of engaging or not engaging during specific conditions (Ajzen and Fishbein 1980; Alsaad 2021). It is usually defined more precisely as an individual's opinion or perception of the beliefs and actions of others (Yuriev et al. 2020).

Although according to the theory of planned behaviour, when an individual perceives to have an adequate level of control over the behaviour, the stronger they can engage in the intended behaviour (Russell et al. 2017). Alternately, when perceived behavioural control comes close to actual behavioural control, the perceived behavioural control can skip the mediator (Intention) and directly influences the proposed behaviour (Sutton 2002; McEachan et al. 2011). Studies such as Hansen 2008; Burns and Roberts 2013; Satsios and Hadjidakis 2018; Ru et al. 2019; Contini et al. 2020; Razali et al. 2020, posited that perceived behavioural control directly predicts the behaviour in question. Therefore, actual control over behaviour is essential. Furthermore, the probability of achieving the required action will be affected by limiting behaviours, obstacles, or resources facilitating the behaviours such as abilities, skills, adequate planning, and Knowledge (Ru et al. 2019).

Various studies have suggested that the theory of planned behaviour framework can be enriched and broadened by adding new constructs or contemplatable variables (e.g.,

Verma and Chandra 2018; Razali et al. 2020; Bae and Chang 2021). This is a common practice for: for example, in a meta-analysis on applying the theory of planned behaviour to examine environmental behaviours such as recycling. Yuriev et al. (2020) identified that 72% of the analysed studies used an extended version of the theory of planned behaviour, including constructs that increase the predicting power of the framework that influences these behaviours.

Similar to these approaches, this thesis is inspired to the extent of the theory of planned behaviour that involves dimensions different from those described above, such as trust, inconvenience, and word-of-mouth. These dimensions were included to explore the explanatory factors to improve the predictive power of the framework to identify sources of variation between the recycling behaviours in Lagos, Nigeria. The following section describes the principal strengths and limitations of the Theory of Planned Behaviour.





Source: Adapted from Ajzen (1991)

2.11.1 An overview of the strengths and limitations of the Theory of Planned Behaviour

Ajzen (1991) posited that the theory of planned behaviour could predict and explain the variance of behaviour based on the relative importance of perceived behavioural control, subjective norms, and attitude, which varies across behaviours or situations. This is the basis for the success of the theory of planned behaviour, allowing it to be considered a fundamental theory supported by evidence from multiple research studies (Ajzen 1991; Beck and Ajzen 1991; La Barbera and Ajzen 2020; Fischer et al. 2022; Hagger et al. 2022).

According to Yuriev et al. (2020), the three strengths of the theory of planned behaviours framework can explain the success of this theory. Firstly, scholars can use the theory of planned behaviour to identify the studied behaviour's beliefs and successively recognise the importance of the specified population. From a methodological perspective, the three direct predictors of the theory (attitude, subjective norm and perceived behavioural control) are expected to be measured in a constant set of validated and predefined statements (La Barbera and Ajzen 2020).

Secondly, the theory of planned behaviour has been considered a relevant and effective model for evolving behavioural interventions used in different areas and fields (Riebl et al. 2015; Timm and Deal, 2016; Yuriev et al. 2020). For example, Gao et al. (2017) explored the determinant of individual's energy-saving behaviour with a workspace by extending the theory of planned behaviour. They concluded that an individual's intention towards energy saving in the workspace is positively affected by their attitude, perceived behavioural control and descriptive norms. In contrast, subjective norms had an insignificant effect on the behaviour. A significant amount of research has been carried out using the theory of planned behaviour on pro-environmental behaviours. Still, this theory has also been successfully applied to other behaviours, such as predicting health-related behaviours (Kothe et al. 2019; Arya and Chaturvedi 2020; Canova and Manganelli 2020). For example, Broers et al. (2020) analysed the efficiency of the theory of planned behaviour in increasing the consumption of fruits and vegetables and concluded that the theory significantly predicts fruit and vegetable consumption.

Lastly, one of the significant strengths of the theory of planned behaviour is its flexible structure (Yuriev et al. 2020). Although Ajzen's (1991) original framework focused on only three direct indicators, the theory has been amended by different scholars by extending the theory through the addition of constructs: self-identity (e.g., Mannetti et al., 2004), past behaviour (e.g., Richetin et al. 2012), moral norm (e.g., Wan et al. 2017), descriptive norms (e.g., Gao et al. 2017), and multiple other constructs. However, the majority of these constructs have originated from theories that are occasionally combined with the original theory of planned behaviour framework: the Theory of Interpersonal Behavior (Triandis, 1977), Value Belief Norm theory (Stern et al. 1999), Norm Activation model (Schwartz 1977), and others.

Nevertheless, despite the usefulness of the theory of planned behaviour, scholars have pointed out several shortcomings associated with using this theory (Yuriev et al. 2020). Firstly, criticisms have been directed toward using subjective norm constructs in the theory of planned behaviour (Rivis and Sheeran 2003; Muralidharan and Sheehan 2016). Statistical analysis research on the theory of planned behaviour conducted by Armitage and Conner (2001) concluded that attitude and perceived behavioural control had a significant variance in behavioural intention. However, subjective norms were proven to be weak predictors of intention due to the impact on individual behaviour.

Ajzen (1991) posited that the theory of planned behaviour has accounted for the difference in predicting the strength of social norms as an impact on the subjective norms and attitudes on individual behaviour. Hence, the subjective norm's role in the theory of planned behaviour in explaining intention variance has led to mixed results. For instance, Ha and Jannda's (2012) study showed subjective norms positively influence predicting pro-environmental behaviours. At the same time, scholars have found subjective norms to be limited in predicting pro-environmental behaviour while contributing to the theory's vague and narrow operationalisation of the subjective norm construct (Harland et al. 1999; Fishbein and Ajzen 2011, Abrahamse and Steg 2013; Newell et al., 2014; Joshi and Rahman 2015; Doran and Larsen 2016; Kim and Seock 2019; Fang et al. 2021).

In addition, scholars such as Armitage and Conner (2001) and Rivis and Sheeran (2003) have argued that the subjective norm component as a predictor of the theory of planned behaviour fails to acknowledge the limitation of social procure a direct predictor of behaviour within the framework. Based on the identified weakness of subjective norms, this thesis suggests augmenting the theory of planned behaviour by substituting subjective norms with social norms.

Secondly, the theory of planned behaviour has been observed only to be suitable for exploring a specific behaviour at a particular time (Yuriev et al., 2020). This is effective when identifying a specific factor affecting an action towards a particular harmful (e.g., smoking, alcohol consumption, use of drugs) or desirable (e.g., recycling, physical activity, energysaving) behaviour. However, the theory of planned behaviour overlooks the complexity of more extensive issues, such as the environmental performance that depends on multiple

behaviours of various individuals, which can hardly produce interventions that would consider each individual (Yuriev et al. 2020).

Considering the limitations and strengths of the theory of planned behaviour and the growing interest surrounding this theory towards environmental behaviours, it seemed relevant for this thesis to extend the theory within the context of recycling in Lagos. Therefore, the following sections expand on the theory of planned behaviour determinants, including the extended constructs.

2.12 Attitudes

As mentioned earlier, there are three intention determinants within the planned behavior theory. The First is the attitude towards a behaviour, which refers to an individual function of salient beliefs favourable or unfavourable towards the behaviour (Hwang et al. 2020). According to Kautish et al. (2019), to understand an individual's attitude towards a behaviour such as recycling, it is essential to understand the measurement and conceptualisation of those attitudes towards that behaviour by identifying the link between attitude and behaviour in general attitude-related theories. In addition, the relationships between behaviours based on attitude-related persuasion and the underlying core antecedents also need to be understood (e.g., knowledge, belief, and attitude) (Geiger et al. 2019).

2.12.1 The Nature of Attitudes

The attitude concept remains dominant in areas such as social psychology, as attitude is a keystone in the edifice of social psychology due to its general understanding as a mediating variable. According to Dempsey et al. (2018), the attitudes that underline a behaviour must be altered to change an individual's behaviour. Hence the use of attitude measurement in understanding individuals' behaviours, such as recycling behaviours (Fang et al. 2021). Itzchakov et al. (2022) posited that attitudes have helped emphasise social psychology's distinctive and indispensable concepts by evaluating aspects of individual responses (cognitions, emotions and overt behaviour).

One of the earliest definitions of attitude was proposed by Thomas and Znaniecki (1918), defining attitude as

"A mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" Thomas and Znaniecki (1918).

The concept of attitude can also be defined as the state of "readiness", meaning what leads an individual to perceive others and objects more readily) due to the inference from different object introspection, making attitudes not directly observable (Srivastava and Rojhe 2021).

When individuals hold a particular attitude, they are ready to act according to their specific category or interpretation (Krischler et al. 2019). Mann et al. (2020) agreed that attitudes are relatively enduring and often developed from experience or as a learned tendency to how things are evaluated in specific ways. Therefore, an attitude involves an objective that predisposes an individual to behave in a particular manner toward a given person, issue, or object (Srivastava and Rojhe 2021). Therefore, it is crucial to discern how an attitude is structured to understand the concept of attitude better.

2.12.2 Structure of Attitudes

According to Solomon et al. (2010), attitudes are developed based on evaluated responses of an individual's encounter with novel attitude objects such as recycling. Therefore, individuals are believed to establish an attitude after encountering factors, such as situations or objects, via media or experiences learned from others (Naji et al. 2020). Hence, attitudes have been described as either unfavourable or favourable towards social objects such as policies, people, or places, usually based on their bias towards an evaluative response (Ledgerwood et al., 2018). For example, an Individual decision to recycle is based on their corresponding mental state or processes, which accounts for the consistency of favourable or unfavourable situational responses towards recycling, such as demographic and personal characteristics, norms, knowledge, and the willingness to recycle. Consequently, an individual's attitude helps express their approval or disapproval towards a behaviour such as recycling (Trudel 2019; Wang et al. 2019; Lui et al. 2021). Hence attitudes are inferred from observable responses that are not directly observable through an individual's internal state (Greenwald and Banaji 1995; Smith et al. 2019; Dalege et al. 2020).

Behaviourists such as Edwards (1983) argued that attitudes are inferred based on individuals' responses to things or social situations. For example, an individual's attitude towards recycling depends on how this behaviour is socially perceived (Ruepert et al. 2015). However, this behaviourist approach has a theoretical implication that considers attitudedependent variables. This has resulted in criticisms from scholars such as McConnell (2018), who argued that there is no specific one-to-one correspondence between attitudes and overt behaviour. Therefore, an attitude may determine or influence behaviour only when combined with other constructs, such as social norms, perceived behavioural control or situational

factors (Iran et al. 2019). Studies such as (Cheema et al. 2020; Khan et al. 2020; Small and Lew 2021) showed no specific correspondence determining only an individual's attitude was responsible for developing behaviours.

According to McGuire (1969), an early Greek philosopher, attitude can be subgrouped into effect, behaviour, and cognitive. The author added that these three components show how attitudes can affect an individual's experience. The tri-component model of attitude, also known as the ABC model, has now been accepted and used in different studies on attitudes and behaviour (Zhang et al. 2021). Scholars such as (Febriyanto and Naufal 2019; Njiku et al. 2019; Shara and Silalahi 2022) have contended that the three essential components of attitudes are necessary to measure and understand attitude accurately. Agyeiwaah et al. (2021) also emphasised that the tri-component attitude model shows an interrelationship between an individual's feeling, thought and knowledge of behaviour such as recycling. For example, when an individual finds recycling agreeable (cognitive) and is pleased with the recycling policy and measure available (affective), this can lead to a positive output towards recycling (behaviour).

affective component	behavioural component cognitive component	
The affective component is also	The behavioural component	In contrast, the cognitive
known as the emotional aspect	refers to how behaviour is	component refers to the
of attitude (Jain 2014;	influenced by an attitude,	individual's thoughts and
Svenningsson et al., 2021). It	resulting in an individual	beliefs towards a behaviour
focuses on an individual's	receiving an intention to act on	such as recycling, which affects
feelings towards an object or	the attitude (Solomon et al.,	their attitude on perception,
situation, such as their likeness	2010)—for example, deciding	opinion, and knowledge
towards recycling and wanting	to recycle because recycling is	towards recycling (Solomon et
to recycle (Akın and Okumuş	the responsible thing to do.	al., 2010). Hence, individuals'
2020). The affective	This component is an active	views towards a behaviour are
component can be perceived	element of attitude, which	based on their objective
as either a positive or negative	concerns the individual's	assessment, which plays a vital
feeling depending on the	tendency to react to a situation	role in perceiving reality,
cognitions (opinions) towards	based on how they are	leading to their attitude
the event or issues, which helps	influenced by their knowledge	towards that behaviour

	Table 2.4	The tri-con	nponent m	nodel of	attitude
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develop an attitude toward it	and feeling toward recycling	(Svenningsson et al., 2021). For
(Solomon et al., 2010). The	(White and Hyde 2012).	example, individuals decide not
stronger the emotions, the		to engage in recycling as they
stronger the attitudes are		perceive it to be a waste of
expected to be.		time and not a practical
		approach to environmental
		sustainability. Although the
		cognitive component of
		attitude is more vulnerable
		than the other logic-based
		persuasive technique, it is likely
		to be more conscious than the
		other attitude elements
		(Solomon et al., 2010).

Even though the three subgroups of attitude antecedents determine most attitudes, they vary in individuals and their attitudes (Akın and Okumuş 2020). Some attitudes can be implicit and explicit based on their behaviour, feelings, and beliefs (Svenningsson et al. 2021). Implicit attitudes are unconscious attitudes that affect an individual's behaviours and beliefs, while explicit attitudes are conscious attitudes that influence an individual's behaviours and beliefs (Fletcher 2008). Individuals need to have attitudes towards a situation as it enables them to quickly and effortlessly determine what behaviour to engage in (Duckworth et al. 2002).

2.12.3 The Relationship between Attitude and Behaviour

Although the common assumption is that individuals' behaviour is tailored based on their attitudes, this is not always the case, as actual behaviours and attitudes are not always perfectly aligned (Chaiklin 2011). For example, many individuals believe in recycling and think it is a good idea yet fail to recycle (Schultz et al. 2004). However, the behavioural aspect of attitude tends to be the prominent focus of social psychologists to understand better how feelings, beliefs, thoughts, goals, and intentions influence individual behaviours (Glasman and Albarracín 2006).

As scholars such as (Foxall 1997 and Ajzen and Fishbein 2005) observe, there is a long association between attitude and behaviour. It has been suggested that the extent to which an attitude guides behaviour relies on its formation as the sequence behaviour-to-attitude-tobehaviour produces. Attitudes with higher consistency are more predictive of behaviour; hence, an attitude has been the key to understanding human behaviour on a general level (Oke and Kruijsen 2016). Therefore, most scholars have conceptualized environmental attitudes as environmental concerns (Mannetti et al. 2004; White et al. 2009; Nigbur et al. 2010) to show a positive correlation between environmental anxiety and conservative behaviours.

Nevertheless, it has been suggested that environmental concerns do not adequately predict individual conservation behaviours, by scholars such as Liu et al. (2020), have identified that individuals' attitudes toward the environment are based on the assumption that a positive attitude towards the environment will translate to pro-environmental behaviours. In 1993, a study conducted by the Department of Environment on public attitude towards the environment showed over 80% of the respondents were concerned about the environment while identifying that public environmental awareness is the third most vital factor to be dealt with by the government, just below health and employment. However, the results showed that concern does not always lead to behavioural change, as only a fraction of the respondents partakes in recycling (Peng et al. 2020).

According to McGee et al. (2022), attitudes are the underlying significance that cannot be justified without explaining. This is attributable to the lack of measurement and correspondence between behavioural interest and attitudes assumed to be related to behaviour affecting the consistent relationship between attitude and behaviour (Fishbein and Ajzen 1975; Guerra and Harrington 2018; Ajzen 2020; Savari et al. 2021). Akter and Abonty (2019) suggested that when more focus is given to pro-environmental attitude and conservational behaviours, this can result in powerful predictors of conservational behaviours. For example, enhanced connectivity within a community and increased feelings of altruism and self-esteem.

However, studies on recycling behaviours have highlighted intrinsic rewards to have a significant role in facilitating pro-environmental behaviours. For example, studies by (Abbott et al., 2013; Silvi and Padilla 2021; Ives et al. 2022) indicated the importance of motivating recycling behaviours even among non-recyclers through the conversion of attitudes towards the environment. This can be done using motives such as frugality, community service, efficacy, and self-sufficiency which are associated with recycling behaviours. Thus, the behavioural aspect of recycling can be influenced by an individual's motive, belief and attitude, combined with societal and social factors such as the reduction of bin cost, and more hygienic, feel-good factors (Abbott et al., 2013, Babaei et al., 2015; Raghu and Rodrigues 2020; Corrado et al. 2022). Therefore, an individual needs to understand the reason behind partaking in behaviours such as recycling to promote these behaviours and beliefs (Ginsburg and Audley 2020; Djafarova and Foots 2020).

2.12.4 Attitude Summary

Over many generations, attitudes towards cultural evolution have developed, producing a heuristic process where an individual's choices are weighted based on the appropriateness of behaviour in a recycling context (Bangsa and Schlegelmilch 2020).

Therefore, an individual's willingness to perform a behaviour is determined by their dynamic or directive influence toward a situation or object. In the case of an individual's attitude towards a recycling behaviour, it is essential for an individual's belief to be linked with the recycling behavioural outcome (Escario et al. 2020), as each attribute is evaluated in advance of the individual's emotional component, therefore perceiving an automatic desirable outcome.

The relationship between an intention and an individual's actual behaviour has been weaker when compared to the relationship between attitude and intention. This is expected and is mainly due to the powerful influence of external factors that affect the relationship between intentions and behaviours (Nystrand and Olsen 2020). The following section highlights the construct of social norms as a determinant in the theory of planned behaviour.

2.13 Social Norms Theory

Researchers have typically used the theory of planned behaviour to explain proenvironmental behaviours, as it can be used to posit the influence of positive attitudes towards such behaviours and the social pressure perceived towards performing the behaviour (Rhodes et al. 2015). Hence, the theory of planned behaviour is considered an adequate theoretical framework in various settings for explaining the variables used to influence proenvironmental behaviours (Han et al. 2012; Howell et al. 2015; Fang et al. 2017). For example, Liu et al. (2019) found that attitudes, normative influence, and behavioural control positively affected an individual intention to be pro-environmentally conscious. In another case, Phulwani et al. (2021) posited that recycling behaviours are independently affected by

attitudes, social influence, and perceived behavioural control by significantly mediating intentions through the behaviour.

According to the theory of planned behaviour, behavioural intention is the most direct antecedent of an individual's behaviour; it is affected by the different constructs, with normative influencing being one of those variables in the subjective norm (Budovska et al. 2020). The subjective norm in the theory of planned behaviour can be perceived as prescriptive due to the social pressure attached to behavioural performance, based on the positive effect on the behaviour when there is pressure to oppose or support a norm (Ajzen 1991; Fang et al. 2017). As a result, there has been a lack of descriptive norms in the theory of planned behaviour, which shows how individuals perceive participation in behaviours based on their interaction with others and might not completely catch the processes of norm sharing within groups. However, moral norms, such as social norms, have been proven to better predict behavioural intent in understanding pro-environmental behaviours, especially from a social psychology perspective (Fang et al. 2017).

Consequently, this thesis will augment the theory of planned behaviour model by incorporating social norms as a predictor of behavioural intention to contribute to the ongoing refinement of the theory. This decision has been supported by scholars such as (White et al. 2009; Kinzig et al. 2013; Budovska et al. 2020) research on recycling. These works have concluded that injunctive norms and descriptive norms alongside attitudes were good predictors of recycling intentions. Therefore, it is worth implementing social norms into the planned behaviour theory to determine its influence on pro-environmental behavioural change.

2.13.1 The Difference between Subjective Norms and Social Norms

In Ajzen's (1991) theory of planned behaviour, an individual intention plays a central role in a particular behaviour. Therefore, Ajzen argues that an individuals intention to engage in different behaviours (e.g., recycling) can be predicted with high accuracy from their attitude towards that behaviour, subjective norm, and perceived behaviour Figure 2.2. The combination of attitude, social norms, and perceived behavioural control predicts intention, which also predicts behaviour (Xiao and Wong 2020). Subjective Norms refer to an individual's belief of what most people approve or disapprove of the behaviour (Redda 2018). It relates to an Individual's perception about whether peers and people of importance think they should engage in the behaviour (Santos and Liguori 2019).

Subjective norms are determined by the perceived social pressure from others for an individual to behave in a particular manner and their motivation to comply with their views (Alsaad 2021). Subjective norms' influence on forming intentions has been proven to generally be weaker in previous studies than the influence of attitude. Moreover, the study by Arli et al. (2020) showed that subjective norms are not correlated with the intention of individuals to establish recycling intentions and predict the behaviour; therefore, the authors call for further research and further improvement on the used measures. According to Tan et al. (2019), a probable cause for the inconsistencies in the significance of the subjective norm construct is that some part of the information contained in the construct is already present in the desirability of undertaking a particular behaviour construct.

The theory of planned behaviour has been considered a fundamental theory across various behavioural domains, with support from additional research evidence (Ajzen 1991; Riebl et al. 2015; Timm and Deal, 2016; Yuriev et al. 2020). For example, La Barbera and Ajzen's

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(2020) research on the theory of planned behaviour on predicting the intention to avoid food waste found subjective norm to be a weak predictor of intentions compared to the other variables with the theory of planned behaviour model. However, it is essential to point out that Ajzen (1991) argued that the impact of the subjective norm on behaviour would vary across individuals. Therefore he accounts for the differences in predictive strengths of subjective norms.

Research suggests that one of the most commonly mentioned weak points of the theory of planned behaviour is precisely the fragile relationship between subjective norms and intentions (Newell et al. 2014; Joshi and Rahman 2015; Doran and Larsen 2016; Kim and Seock 2019; Fang et al. 2021). The author of the theory of planned behaviour, Icek Ajzen (1991), explains this with the fact that intentions are heavily influenced by an individual's personal factors, such as attitudes and perceived behavioural control. Kim et al. (2019) criticised subjective norm narrow conceptualisation, which results in a weak correlation between normative beliefs and intentions. In this context, Li et al. (2019) argue that the confirmed relationship between descriptive norms and intentions implies the possibility of the predictive power of this variable, which gives a strong motivation for predicting pro-environmental behaviour.

Although the theory of planned behaviour includes subjective norms affecting individuals' behavioural intentions, research has found that other normative influences can also impact health behaviours, such as social norms (Fang et al. 2017). The distinctiveness of subjective norms from the other types of norms and the extent to which various norms influence individuals' behavioural intentions pose implications for theory development and testing in recycling. Therefore, this thesis substitutes social norms for subjective norms.

Studies on environmental psychology show that social norms are imperative to explain an individual's pro-environmental decision formation and behaviour (Loureiro et al. 2022). According to Ajzen (1991), social norm, which is interchangeably utilised with the term subjective norm in the extant literature, suggests individuals perceived level of social pressure to engage or not engage towards a particular action within a specific situation. The social norm construct derives from the principle of conformity, as individuals are influenced by the desire to fit within a group or community by conforming to their behaviour (Spears 2021). Social norms are patterns of behaviours that guide an individual's interaction with others (Livingston et al. 2019). They are the beliefs of commonly accepted behaviour toward a particular situation (Budovska et al. 2020). Hence social norms aim to develop socially desirable responses and techniques by keeping society functioning with rules and expectations (Cislaghi and Heise 2020).

Studies have improved their focus on social influences by concentrating on individual attitudes and behaviour through social norms (Smith et al. 2012; Fang et al. 2017; Confente and Vigolo 2018). Research such as (Ramayah et al. 2012; Yu et al. 2019; Bergquist et al. 2020) has applied social norms to pro-environmental behaviours and has shown social norms to explain these actions. Salmivaara et al. (2021) states that when a social norm is made salient, it has been proven to mobilise the decision-making process in that particular situation through persuasive normative messages. A field experiment carried out by Salmivaara et al. (2021) concluded the importance of distinguishing between what an individual thinks others would do in a particular situation (injunctive norm) and what is done by others in that situation (descriptive norm). Therefore, social norms can be distinguished into two constructs which are injunctive and descriptive (Jacobson et al. 2020).

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- Injunctive norms refer to what an individual thinks are the level of approval or disapproval within a society, group, or culture. They are formed as rules or beliefs that constitute the approval or disapproval of moral conduct by specifying what should be done in a situation while influencing behaviours with the promise of a social reward (Le Coent et al. 2021).
- **Descriptive norms** are the standard, and typical patterns of behaviour carried out by an individual based on the expectation that individuals will behave according to adaptive and effective action (Carroll et al. 2016). The author added further, positing that descriptive norms are referred to what most individuals would do in the situation.

According to Pristl et al. (2021), the distinguishing factor between injunctive and descriptive norms is how they derive from various motivational sources and affect an individual's behaviour. For example, individual behaviour may be motivated by an injunctive norm Based on their desire to avoid social blame or obtain social approval (Carroll et al. 2016). additionally, the injunctive norm shares a specific similarity with normative conformity, which is how the behaviour is developed through others' reactions (Le Coent et al. 2021). In contrast, descriptive norms are motivated mainly due to the norms' ability to be made salient, therefore providing information on the correct behaviours, especially when an individual is ambiguous (Carroll et al. 2016).

Scholars such as Yamin et al. (2019) have shown the two norms' different effects on individual behaviours by expressing that the influence on the behaviour depends on how salient the norm is perceived during the situations. The authors further suggested that the clearer the salient of the norm is, the greater the influence it will have on the individual's consciousness and behaviour. Nevertheless, both injunctive and descriptive social norms have been confirmed to encourage pro-environmental behaviours, with scholars such as (De Groot

and Schuitema 2012; Keizer and Schultz 2018; Han et al. 2022) indicating that both forms of social norms were equally valuable in normative messaging on prosocial behaviours.

However, debate on the most effective social norm approach has risen between either descriptive or injunctive norms. For example, some research on social norm approaches (Yip et al. 2022) indicates that descriptive norms are more significant when influencing behavioural change than injunctive norms. While other researchers, such as (Phua 2013; Charalambous 2019), found injunctive norms to impact behaviour more significantly. Even though there may be no resolution to this dispute, the best-perceived solution is combining both norms in a social norm intervention. Hence, Individuals are likely to engage in several pro-environmental behaviours, resulting in a counterproductive combination of the norms (Katz et al. 2022).

2.13.2 Social Norms Approach Research

According to Torres et al. (2019), extensive research has been carried out on social norms approaches to encourage socially desirable behaviours in individuals and societies. The subsequent sections will discuss the effort to implement different social norms interventions such as social norms approach campaigns, the personalised social norms approach and the small groups' norms-challenging model.

2.13.3 Social Norms Approach Campaigns

Research on social norms focuses on others' attitudes and behaviours (Keizer and Schultz 2018). However, when an individual perceives an inaccurate behaviour, this can result in the inaccurate perception of the "perceived norm" rather than an inaccurate understanding of how people behave or think "actual norm" (Van Grootel et al. 2018). Hence, misperception becomes the basis of social norms approach campaigns, occurring when an individual

overestimates or underestimates the prevalence of attitudes and behaviours within a group (McAlaney et al. 2020).

According to Perkins and Perkins (2018), the social norms approach campaign was based on the study by Perkins and Berkowitz (1986). Since its introduction, this approach has been implemented at all levels of prevention, with different methodologies used to provide normative feedback to help correct misperception that influences behaviour (Dempsey et al., 2018). These feedbacks are mainly used to promote healthy behaviours, but they can also be implemented in pro-environmental promotion (McAlaney et al. 2010). Examples of the influence of misperception have been seen in various studies. One such research has shown how college students exaggerate harmful behaviours, such as drug usage and alcohol consumption, resulting in students engaging in these behaviours to match the perceived norm (Stock et al. 2020).

According to Dempsey et al. (2018), the social norm approach campaigns are intended to correct misperceptions by disseminating actual social norms, information and interventions among societies and groups. A social norms approach campaign is achieved by identifying a perception while gathering the credibility of data on the actual social norm, which is then communicated through various positive messages (Pristl et al. 2021). According to Perkins (2019), a crucial aspect of the social norms approach campaign is to provide an adequate social norm message to correct the misperceived norm within a group or society and reduce the occurrence of deleterious behaviour, as demonstrated in Figure 2.3.

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Figure 2.3 the Social Norms Approach

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Source: Perkins (2019)

One of the earlier platforms used in social norms approach campaigns was the print media, which was the primary medium for communicating social norm messages to the targeted audience (Ridout and Campbell 2014). As technology and social media evolved, so did the mediums of implementing social norms approach campaigns (Lotan 2019; Bonnevie et al. 2020). The social media approach campaign has been used successfully to reduce the misperception of illegal drug use, drinking with peers and tobacco smoking, as seen in the studies by (Amialchuk et al. 2019; Pischke et al. 2021; Isaacs et al. 2022). However, some scholars have concluded that unsuccessful intervention of the social norms approach campaign is likely to occur when the social norm message is constructed poorly, decreasing the effectiveness of the intervention (Richter et al. 2018).

Nevertheless, the social norms approach campaign has become a widely applied approach and has been adapted to non-health-related behaviours, such as influencing proenvironmental behaviours such as recycling (Chileshe 2018). Furthermore, this approach has been proven to effectively encourage sustainable behaviours, as seen in research by (Lotan 2019; Bonnevie et al. 2020; Pischke et al. 2021; Isaacs et al. 2022), who used two separate social norms interventions with residents in California to reduce their energy consumption successfully. The following section expands on the next approach used to implement social norms interventions: the small group's norm-challenging model.

2.13.4 The Small Group's Norms-challenging Model

The small group's norms-challenging model focuses on the survey of the perceived behaviour by presenting and discussing the proposed norm information within a small group workshop followed by a survey (Berkowitz et al. 2022). The author posited further that the small norms-challenging model has efficiently been used to encourage and correct misperceptions of pro-environmental behaviour.

The small group's norms-challenging model has been criticised due to the size limit, as using a small sample means there will be difficulty reaching a wider audience (Kerr et al. 2019). Nevertheless, this approach is considered a promising alternative to the social norm behavioural change approach (Chileshe 2018).

2.13.5 The Personalised Social Norms Approach

The personalised social norms approach has been recognized as a practical approach based on personalised feedback that increases the campaign's efficacy (Dempsey et al. 2018). The personal social norm campaign is different from other social norm campaigns based on providing feedback on the respondents and other behaviours (Harries et al. 2013; Evans et al. 2022).

Seidel et al. (2021) indicated that personal individual feedback would significantly impact behavioural change due to its more salient accuracy in revealing the differences

between individual behaviours. Environmental studies conducted by (Harries et al. 2013; Burchell et al. 2013; Chumg et al. 2019; Grilli and Curtis 2021) showed how the personalised social norm approach encouraged pro-environmental behaviours. These studies generally differ and focus on actual behavioural data rather than a misperception of norms.

2.13. Summary of Social Norms

Social norms have proven successful and effective in encouraging socially desirable behaviour (Allcott 2011; Harries et al. 2013; Burchell et al. 2013; White et al. 2019; Esfandiar et al. 2020). However, they have also been counterproductive, especially when undesirable behaviour has become normalised (Bellora-Bienengräber et al. 2022). The research conducted by Bavel et al. (2020) indicated that individuals within social groups who already perceive socially desirable norms could be deleteriously affected by the communication of social norms. For example, news statements such as "recycling alone will not help the environment from the disasters associated with climate change" may discourage individuals from partaking in recycling because they may think it is a waste of time (Cialdini et al. 2006). This effect was termed the "boomerang effect" by Schultz et al. (2007, p.429), referring to increased undesirable behaviour due to social norms approaches.

Studies have shown that individuals tend to underestimate the effect of social norms, especially the effectiveness of individuals' behavioural changes based on how they perceive others towards those behaviours (Nolan et al. 2008). Hence, the extent to which individuals are unaware of social norms' effect on their behaviours is limited. Goldstein et al. (2008) added that individuals deny conforming to social norms due to their lack of awareness of those norms.

2.14 Perceived Behavioural Control (PBC)

The balance between attitude and social norms in tackling how an individual decides to change or adapt to a behaviour such as recycling is a choice mechanism based on boundary settings (Topal et al. 2021). This results in a controlled behaviour variable that describes an individual's belief that there is insufficient information and skills to carry out tasks (Tabernero et al. 2015). Therefore, perceived behavioural control refers to how an individual perceives the difficulty of performing a behaviour, affecting both the behavioural intention and behaviour (Ajzen 1991). Perceived behavioural control shows how individuals perceive the ability to perform behaviours such as recycling based on their societal constraints and attitudes (Zhang et al. 2019). For example, Grazzini et al. (2018) research showed that individuals are prone to engage in behaviours such as recycling if they understand the impact of recycling on the environment. However, the study also posited that if individuals perceive the behaviour as complicated, they are likely not to partake in it.

Conversely, unlike the attitude construct, perceived behavioural control measures an individual's ability to perform the required behaviour based on the lack of a generally preferred way of measuring perceived behavioural control (Ajzen 2020). Therefore, perceived behavioural control can be operationalised in two ways: firstly, perceived self-efficacy (an individual's belief about their ability; Bacikova-Sleskova et al. 2021) and perceived controllability (the belief that an individual's behaviour is intentional; Ajzen 2020).

2.14.1 Perceived Self-efficacy

According to Li et al. (2018), self-efficacy is an impressive predictor of whether an individual participates in an activity, especially when it involves personal effort. Self-efficacy

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is an individual's belief in organising an action to cope with a situation (Barni et al. 2019). It motivates individuals to persist in adversity when trying to achieve an anticipated goal effortlessly (Tabernero et al., 2015). The basis for self-efficiency is a process that requires an individual's willingness to engage in the behaviour by influencing the perception of response and aspiration of goals, emotions, reaction, barriers, and opportunities (Grazzini et al., 2018). Therefore, behavioural intentions and behaviours are both indirectly and directly influenced by perceived self-efficacy (Ru et al. 2019; Contini et al. 2020; Razali et al. 2020).

Self-efficacy has positively affected pro-environmental behaviours such as recycling (Shahzalal and Font 2018). For example, it has influenced behaviours such as considering recycling space and outcome (Timlett and Williams 2011) and perceiving or spending required towards recycling (Chu and Chiu 2003). Therefore, scholars such as (Cheng et al. 2011; Morton et al. 2011; Grazzini et al. 2018; Becheur et al. 2019) have argued that self-efficacy is a relevant mediator to recycling due to its ability to affect this behaviour despite it being a high-risk situation that is based on individual beliefs that operate as active agents towards processes necessary to obtain the specific outcome. Bosone and Martinez (2017) further added that perceived self-efficacy mediates the message's persuasiveness to increase environmental behaviours, such as the intention to engage in recycling. However, the individual's willingness to articulate the perception of the control will dictate how the direct measure of perceived behavioural control captures the underlying control construct (Razali et al. 2020).

2.14.2 Perceived Control

According to Dempsey et al. (2018); Bakici (2020), the combination and weighting of attitude and social norms are appraised based on an individual concerned with attitude and assesses the behavioural consequences while considering the social aspect of how others

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perceive the behaviour. Hence, this method is approached by electing an individual's belief on salient control factors, on their beliefs towards resources, both present or absent, obstacles and opportunities that may impede or facilitate their behavior performance (Cheng et al. 2011). Along these lines, the resources and options based on an individual belief underpin the perceived control over the questioned behaviour (in this case, recycling) (Shahzalal and Font 2018).

According to Oztekin et al. (2017), recycling behaviours are influenced by attitudinal and control beliefs; however, the addition of motivation could be considered with perceived control as a willingness to influence an individual's behaviour and engagement towards the proposed outcome (Weiner 2018). Nevertheless, once an individual believes to have little control over a behaviour such as recycling due to recycling resources, this could decrease their intention to partake in that behaviour even if they have a high recycling stance (Wang et al. 2019; Testa et al. 2020). Hence, the perceived behavioural control over an individual's recycling strength could be influenced by the individual's confidence to engage in the proposed task (Xia et al. 2021).

2.14.3 Behaviour control summary

Perceived behavioural control is considered an essential aspect of an individual as it is based on their attitude towards behaviour and society, which acts as a reference towards their perceived behaviour (Sun et al. 2020). Therefore, perceived behavioural control refers to an individual's ability to control a given behaviour, such as recycling, based on the potential constrain of intended actions, such as opportunities and available resources (Sun et al. 2020). Hence, the accuracy of perceived behavioural control directly affects the relationship between future behaviour and current behavioural controls (Zhang et al. 2019). As a result, perceived

behavioural control is used to measure the ability of an individual to perform a particular behaviour (Testa et al. 2020).

Most studies have treated perceived behavioural control as a unidimensional construct, often measured by items such as Perceived difficulty, individual confidence, and behavioural performance (Sun et al. 2020). However, unlike attitudes, perceived behavioural control can be measured and operationalised by understanding how an individual controls the measured behaviour or eliciting the respondent's beliefs on the salient control factors (Acheampong and Cugurullo 2019). Nevertheless, it is essential to understand both belief-based and direct measures associated with perceived behavioural control, as they help assess control perceptions better (Zhang et al. 2019).

2.15 Augmented Constructs to the Extensions and Modification of the Theory of Planned Behaviour

Recently, the majority of studies have been focused on extending the theory of planned behaviour by augmenting and adding different constructs to the original theory to understand better recycling behaviour (Rhodes et al. 2015; Oztekin et al. 2017; Passafaro et al. 2019; Xu et al. 2020; Xu et al. 2021). Ajzen (1991) supported this proposition by positing that the theory of planned behaviour is open to additional amendments and predictors once the original constructs have been considered and have shown not to capture a significant portion of intention and behavioural variance.

Therefore, based on the formative research on the theory of planned behaviour, this thesis proposes that the theory of planned behaviour should be expanded and modified to account for the Lagos characteristics that promote effective behaviour towards recycling in Lagos. Hence, this thesis has introduced constructs (trust, communalism, inconvenience and word-of-mouth) to help explain Lagos's recycling behaviour, which are further detailed in the following section below.

Social Capital Theory (SCT)

Social capital theory (SCT) is a complex multidimensional concept that encompasses the selection of social and cultural value systems (Krishen et al. 2018) by incorporating sociocultural factors that explain developmental outcomes (Krishen et al. 2019). Hidalgo et al. (2021) defined social capital theory as a multidimensional phenomenon that encompasses stocks of values, social norms, trust, beliefs, relationship, engagement, and obligation that fosters a collective, cooperative action for mutual contribution and benefits social and economic development.

The use of social capital theory has increased drastically based on the growing research interest since its emergence in the late 1980s (Konno and Schillaci 2021). However, the social capital theory has no universal definition based on the theory being measured and defined in an unsystematic and pragmatic fashion (Spash 2020). Nevertheless, the social capital theory has been viewed as an abstract idea mainly rooted in trust, norms, and informal networks such as motivation that believes social relationships are valuable resources (MacGillivray 2018). Therefore, the following section highlights construct trust as an extended variable in the theory of planned behaviour.

2.16 Trust

The notion of trust is a unique concept used in various disciplines such as psychology, economics, sociology and information technology (Thomas and Marco 2013). Trust has also

been examined in multiple contexts over time, with examples relating to distribution channels (Dwyer et al. 1997), the use of market research (Rupprecht et al. 2020), bargaining (Eberhartinger et al. 2021), partner cooperation in strategic alliances (Robson et al. 2019) and industrial buyer-seller relationships (Zhang et al. 2020).

Although the social-psychological perspective appears to be most relevant for understanding individuals' trust, studies such as (Sønderskov and Mannemar 2009; Mansbridge 2014: Fairbrother 2016; Smith and Mayer 2018; Rodriguez-Giron and Vanneste 2019; Yang and Ren 2020) have shown trust as a high model essential in influencing collective action. Furthermore, individuals are more likely to develop cooperative solutions to problems when they perceive trust (Ostrom and Walker 2003). However, individuals perceive trust uniquely, making it challenging to define trust (Larson et al. 2018).

Different definitions of trust have been proposed, including that by Mayer et al. (1995), who outlined trust as a mechanism for relationships to continue and progress by bringing risk into equilibrium to contribute to the failure or success of the relationship. In comparison, Rousseau et al. (1998:395) defined trust as an intention to accept vulnerability based on the positive expectation of other individuals' behaviours or intentions in a psychological state. These definitions highlight the generated risk element based on the potential loss brought by the control given to the trustee (Putterman 2009). However, despite the risk associated with trust, it is our nature to trust, as it is based on social interaction (Ye et al. 2019).

Therefore, trust has been widely analysed in literature and used to predict environmental behaviour such as recycling (Cologna and Siegrist 2020). However, trust must be present when adapting to a complex cognitive task such as recycling, especially when there is a lack or low level of knowledge and high uncertainties about this behaviour (Siegrist 2019). Consequently, the presence of trust serves as heuristic decision-making to alleviate the behavioural decision to recycle (Brewer and Ley 2013; Siegrist 2019). Hence, trust becomes an essential factor in individuals selecting options for behaviours such as recycling, as individuals rely on responsible actors when forming opinions, especially when delegated to entrusted actors (Siegrist et al. 2010).

Thus, it is essential to determine what experts can be trusted to act on and provide information on recycling participation based on their potential to influence the adoption of that behaviour (Cologna and Siegrist 2020). Hence, the importance of trust in recycling behaviour, as the level of trust can determine individuals' support towards recycling organisations or policies towards adopting the recycling lifestyle (Siegrist 2019).

The theoretical perspective of trust used in various studies can be accumulated into three categories (Lee and Turban 2001):

- Personality theory conceptualises trust as an expectancy, feeling, or belief rooted deeply in an individual's origin and personality.
- Economic and social conceptualise trust as a phenomenon between and within institutions, such as individuals' trust towards those institutions.
- Social psychology conceptualises trust as the willingness and expectation associated with acting upon expectations that enhance or inhibit trust's development and maintenance.

The following section highlights the various trust models by adapting Duit's (2010) study on developing economies, which indicated that individuals positively perceived trust towards environmentally sustainable behaviour at different levels: interpersonal, institutional, and organisational trust.

2.16.1 Trust Model

Mayer et al. (1995) proposed an integrative trust model by conceptualising trust into three distinct but interrelated dimensions: organisational, institutional, and interpersonal trust. In their model, trust is based on the inner workings of a trust relationship and the factors affecting trust, and the model also outlines trust between two parties (the trustee and trustor) (Mayer et al., 1995). Bundy et al. (2018) added that for trust to be achieved, the trustee and trustor must be present while working in cooperation. Within this model, the trustor is inclined to trust or has a propensity to trust, which must be carried out naturally and not based on the reaction of the trustees' previous experience.

In Mayer et al.'s (1995) model, trust is defined as an individual's willingness to be vulnerable toward the actions of others based on the expectations of a particular action being performed, irrespective of their ability to control or monitor the action. This definition has been widely accepted in literature in different areas, as it shows that combining an individual's culture, background, and experience will impact their propensity to trust (Gill et al. 2005).

According to Mayer et al. (1995), the level of an individual's trustworthiness of others is based on the trustee's level of willingness to deceive or lie to the trustor. Trustworthiness arguably constitutes three main elements: Ability (a group of natural skills, competencies, and characteristics that enable an individual to influence some specific domain), Benevolence (the perceived faith that the trustee believes in doing good to the trustor, aside from an egocentric profit motive), and Integrity (the perception that the trustee adheres to principles that the trustor finds acceptable). Therefore, the introduction and essence of risk within a trust relationship provide a natural outcome, with various trust associations having set in Mayer et al. (1995) model, as both trustees and trustors suffer from negative repercussions when trust is low (Bundy et al., 2018).

2.16.2 Institutional Trust

According to Spadaro et al. (2020), institutional trust is a sub-type of trust between individuals and institutions with interpersonal ties. Over the years, there have been empirical findings and compelling arguments for supporting Institutional trust as a primary mode where trust is created in an impersonal environment with the sense of community being the standard value (Wu and Shen 2018). Institutional trust, however, is essential to various matters ranging from trust among and between individuals and institutions (Bornstein and Tomkins 2015). For example, institutional trust has been necessary for improving cooperative behaviours in environmental cooperation, such as trust in public institutions (Harring 2013; Fairbrother 2016) and trust in political institutions (Yang and Tang 2010; Hakhverdian and Mayne 2012). Furthermore, individuals are willing to make sacrifices when they believe that each actor's external authorities will be competent for their part. For example, they provide necessary infrastructure or effectively and evenly monitor individual behaviours (Mansbridge 2014).

Studies such by (Ross et al. 2014; Scafuto et al. 2018; Harring et al. 2019; Cao and Liu 2019; Pivetti et al. 2020) have shown a positive correlation between recycling and trust, mainly in the instructional quality based on the significant role of collective action on recycling through responsible recycling situations for collecting and processing waste. Furthermore, in a study based on 14 developing countries by Irwin (2009), institutional trust was argued to promote pro-social social behaviours within a collectivist society, as assurance is looked for by the societies and communities from institutions that regulate intergroup interaction. Hence
the importance of trust and institutional quality on individual tendencies to recycle and trust between individuals and institutions (Milinski et al. 2002).

2.16.3 Interpersonal trust

Interpersonal trust is the trust between individuals and groups, which can be crucial in developing cooperation and behaviour, such as recycling within a community, by increasing cooperation with others through generalised trust (Harring et al. 2019; Magoola et al. 2021; Cao et al. 2022). Mayer et al. (1995) outlined that cooperation tends to be the by-product of trust without putting the relationship holder at risk, as once the element of trust is removed, this can result in distrust, with the breaking of shared values being the main reason (Connelly et al. 2012).

The relationship between individuals and the formal recycling sectors can be defined as a "vertical trust, "which refers to individuals' trust in the formal sectors. These trusts are essential in developing trust relationships. This trust focuses on seniority and power difference between individuals and the formal recycling sectors, resulting in an uneven balance relationship (Cruz-Castro and Sanz-Menéndez 2018; Graycar 2019; Liao and Liao 2021). These powers grant the formal sector permission to make decisions regarding recycling procedures, rules, and even policies, making it difficult to achieve a balanced and equal relationship. However, there is a high vertical trust between the Lagos residents and the appointed officials regarding the Logas formal recycling sector. Nevertheless, most recycling decisions and policies are not from the formal sector, as most of the recycling carried out in Lagos is through the informal sector.

2.16.4 Organisational Trust

Organisational trust is how individuals perceive the trustworthiness of an organisation based on the confidence the actions performed by the organisation are beneficial to the community and not just the organisation (Tan and Tan 2000). Hence, organisational justice plays a crucial role in the level of trust within individuals and an organisation (Wan 2011). According to Tziner et al. (2017), there are four categories composed within organisational justice to express how an individual views organisational fairness: distributive, information, procedural and interactional. These four categories affect the trust relationship, with distributive and procedural having a more prominent role.

In the recycling context, if an individual feels that organisations are dedicated to recycling while promoting pro-environmental behaviours, this tends to result in a positive view of distributive and procedural justice and an overall increase in organisational support (Tan and Tan 2000). Therefore, trust in individual engagement relationships through effective communication, fairness, and organisational ethics is needed to prevent a negative relationship between the individuals and recycling participation (Wilmot and Galford 2007; Bachmann et al. 2015).

2.16.5 The Difference Between Trust in Government in Developing versus Developed Countries

Trust in government agencies can be a crucial indicator of underlying public sentiment toward the community (Esaiasson et al. 2021). However, most research on political trust and its determinants has been conducted in developed countries with industrialised democracies (Ugur-Cinar et al. 2020). As a result, little is known about the factors influencing the trust between government and their citizens in developing countries with substantially different societal characteristics. The evidence is inconclusive, but good governance, ethnic and linguistic homogeneity and prosperity, Protestant religious traditions, and economic, political, and social equality have all been found to simulate trust – although the evidence is not unambiguous (Flores 2022).

However, in developing countries, due to the inefficient processes and systems of democratic governance, the high levels of state failure and corruption, and higher levels of (perceived) social, economic, and political inequalities, in addition to inadequate access to economic opportunities and services, trust in government is in a decline when compared to developed countries (Adams et al. 2019). In other words, these countries often face cultural and institutional context that inhibits rather than stimulates the creation of a trust. Consequently, in developing countries, contemporaneous trust (generalized, interpersonal, and political) tend to be lower than in developed countries (Bargsted et al. 2022). Scholars such as (Michael Auerbach and Thachil 2020; Morais-da-Silva et al. 2020; Tsa et al. 2020; Chen and Sivakumar 2021) have also argued that raising trust among individuals in developing countries would help increase the credibility and stability among the residents and the government, therefore, facilitating peace within the fractured societies while establishing legitimate and long-lasting relations with institutions, while fostering a climate that abides distrust.

On the other hand, in developed countries, trust between the government and citizens is seen as a deeply embedded disposition through which individuals are disposed to be trusting (Vaidelyte et al. 2021). Other research argues that this trust is less about the individual and more about the community you inhabit, resulting in social capital promoting trust in government (Borgonovi and Andrieu 2020). Moreover, developed countries offer an

environment often associated with trusts, such as democratic history and supranational commitment, while hosting variation on confidence level within the public sector, for example, voting principles and authority structures (Escobar 2021).

Furthermore, in developed countries, more residents trust their government, as the public's trust and belief in the legitimacy of government are based on the feelings that government is responsive to them while being able to affect government outcomes due to the citizen's demand for transparency, accountability, and participation, and factors such as greater access to information and higher levels of education (Khemani 2020). However, public trust in government and political institutions has declined in developing and developed countries in the new millennium despite its importance. For example, in the United States, there is considerable evidence of an uneven and pervasive decline in the confidence of their citizens toward political institutions (Díaz et al. 2019).

2.16.6 Summary of Trust

Trust has a vital role in environmental behaviours, as individuals need to be confident and believe in producing an outcome that will be consistent with their expectations (Harring and Jagers 2013; Zannakis et al. 2015). Therefore, trust is crucial in influencing an individual's support for environmental policies such as recycling. Furthermore, trustworthiness towards a trust model can engender an individual's willingness to comply with recycling initiatives, laws, or policies, as insufficient trust tends to cause reluctance toward supporting recycling practices and procedures (Kollmann and Reichl 2015). Hence, Individuals who trust formal recycling organisations are willing to help recycling actions that address global issues due to a decisive factor in recycling intentions (Knickmeyer 2020; Lo et al. 2022). Nevertheless, it is essential to note that trust in these institutions can be challenged due to a history of misguided governing or a lack of structured governing in managing the public (Pfotenhauer et al., 2019; Gaskell et al., 2020).

The relationship between Nigerians and the trust in government and formal sectors is shallow. The study conducted by Afrobarometer shows that only 31% of Nigerians trust the government, with many wary of corruption and inadequate support for ordinary citizens (Yunusa et al. 2021). Due to how Nigerian perceive corruption within the government (Uchenna et al. 2020). The author further posited that corruption perception is one of the main determinants of distrust between citizens and the government. In addition to the corruption plaguing the Nigerian government, other factors affect Nigeria's trust in government and formal sectors, such as the misappropriation of public funds, lack of economic performance, and political participation (Oghuvbu 2021).

Trust is central to understanding the perception of implementing recycling behaviour due to the transparency necessary to impact an individual's perception of this behaviour (Negash et al. 2021). Furthermore, the importance of system trust is essential, as it prevents the public from feeling misled, which may affect their willingness to recycle (Sullivan 2020). Therefore, trust is critical for addressing social institutions' characteristics by focusing on the institutions' legitimacy, goals, and controls (Lewis and Weigert 1985; Dellmuth and Tallberg 2020).

2.17 Situational factors

Even though an individual may have a positive attitude towards recycling, this does not necessarily translate into performing the behaviour (Adrita and Mohiuddin 2020; Witek and Kuźniar 2020). It has been recognised that the theory of planned behaviour allows for

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incorporating additional variables to contribute to significantly explaining behaviours such as recycling (Arya and Chaturvedi 2020; Yuriev et al. 2020; Aboelmaged 2021). Therefore, considering previous studies such as (Chan and Bishop 2013; Botetzagias et al. 2015; Yuriev et al. 2020; Aboelmaged 2021; So et al. 2021), the addition of situational factors is necessary as it contributes to the conditions to which individuals react or act as they explore the impact of non-personal characteristics on recycling behaviour. In addition, it contributes to addressing specific beliefs relating to the perception of an individual's ability to perform the required behaviour.

However, based on the Lagos characteristics highlighted in the chapter above, this thesis will incorporate situational factors such as culture (individualism and collectivism), Inconvenience towards recycling, and Word of mouth to the theory of planned behaviour towards implementing recycling behaviour in Lagos, which will be expanded in the sections below.

2.17.1 Culture (Individualism and Collectivism)

Individualism and collectivism are variables based on an individual's relationship with others (Kim 2019). According to Sánchez-Rodríguez (2019), individualism can be characterised as an individual's tendency to prioritise their personal goals and value over the goal of a group. Therefore, stressing their initiative to focus on self and emotional independence (Jamali et al., 2019). Furthermore, self–reliance and freedom of choice are also emphasised with individualism while emphasising cost-benefit analyses when determining behaviour (Pagiaslis and Krontalis 2014; Kuanr et al. 2021; Cui et al. 2022).

Conversely, collectivism leans towards a group's goal over personal goals by stressing in-group harmony and conformity while defining self-concerning the group (Wong et al. 2018). Hence, a few determinants such as sharing, obligation, and duties are associated with collectivism, as within a collectivist society, all individuals are integrated into strong, cohesive groups from birth onwards (Pagiaslis and Krontalis 2014; Germani et al. 2020). Even though individual and group goals are necessary, collectivism prioritises group values and goals over individual ones (Wong et al. 2018).

When studying individualism and collectivism at a cultural level, they are considered opposite continuums based on the description of individualistic or collectivistic within the cultural orientation (Salehan et al. 2018). However, even with individualism and collectivism being represented in different dimensions, both tend to exist within the same culture, with some Individuals possessing both tendencies associated with individualism and collectivism (Moon et al. 2018).

The implication for an individual's behaviour for others tends to be promoted with collectivism, driven by the willingness to share resources (Pagiaslis and Krontalis 2014). Thus, it is reasonable that recycling behaviours may be a function of collectivism when the focus is on the benefit of the group or society, even if these benefits are not immediate (Cui et al. 2022). In addition, researchers such as (Sorkun 2018; Lede et al. 2019; Wang and Hao 2020; Cialdini and Jacobson 2021; Li et al. 2021) have provided evidence of the community's participation in recycling programs influenced by social norms.

The Lagos culture is a highly collectivistic society due to their long-term commitment towards members of the groups and community such as family, extended family, or extended relationships, with loyalty being a collectivistic factor paramount within this region, which

often overrides societal regulations and rules (Akinpelu et al. 2020). Lagos residents foster strong relationships as responsibilities are taken by the fellow community or group members, while promotional decisions are handled within the society (Chukwuma-Nwuba 2018). Therefore, the collectivism present in Lagos should relate to the impact of actions toward future recycling participation.

2.17.2 Inconvenience toward Recycling

Studies such as (Thi Thu Nguyen et al. 2018; Zhang et al. 2019; Li et al. 2021; Altikolatsi et al. 2021) have shown how Inconvenience influences recycling behaviours. Inconvenience is based on how an individual perceives the difficulty level associated with how the behaviour is accomplished concerning the difficulties or costs related to performing the behaviour. For example, an individual determines recycling as essential but does not recycle based on the difficulties attached to recycling, such as requiring too much time or extra space (Li et al. 2021).

As noted by Khan et al. (2019), convenience is a predictor of recycling behaviours, as individuals who generally have positive attitudes toward recycling tend to partake in recycling when convenient. Interestingly the same result was seen with individuals who showed little to no care towards recycling, as a convenience and ease towards recycling produced a higher recycling rate (Gilli et al. 2018; Zhang et al. 2019). Sulaimanet al. (2019) conducted a study among college students. They found that inconvenience towards recycling played an essential role in influencing recycling behaviour, while the importance of recycling had no significance in influencing it. Arain et al. (2020) supported this by concluding that individuals' recycling occurrences were impacted by the convenience of recycling, e.g., available recycling facilities. Similarly, Altikolats et al. (2021) showed that university students and staff were more likely to participate in recycling schemes when it was more convenient for them. Hence, the desire for

convenience and comfort seems to be an essential driving force for recycling behaviours (Altikolatsi et al. 2021).

Recycling is considered an inconvenience due to the time and effort required and the needed technology and methods (Li et al. 2021). In Lagos, recycling is deemed inconvenient due to the lack of formal structures surrounding recycling and the current policies not focusing on changing the current waste behaviour, such as available recycling facilities (Khalil et al. 2017). Therefore, this thesis defines inconvenience as Lagos residents' belief in how inconvenient it is to participate in recycling. This is vital, as previous studies have indicated that when hassle or unnecessary stress/work is associated with recycling, participating in recycling behaviour becomes laborious (Zhang et al. 2011; Li et al. 2021; Altikolatsi et al. 2021). Hence the importance of inconvenience as a determinant of recycling behaviours.

2.18 Word of Mouth (WOM)

Being one of the oldest and most effective modes of information exchange between individuals, word-of-mouth communication received extensive attention from practitioners and has attracted various studies (Ismagilova et al. 2017). It has been well-researched in academic literature, mainly in marketing, as it is considered an essential tool based on its ability to influence an individual's decision-making process (Rosario et al. 2020). Compared with other marketer-initiated communications, word-of-mouth has shown to be more effective in influencing individuals' attitudes towards behaviours. As a result, it has made the word-of-mouth concept undeniably complex, with various proposed definitions (Hennig-Babić Rosario et al. 2020; Han et al. 2012; Torres et al. 2022). During the formative years, word-of-mouth was defined as in-person (face-to-face)

communication on services, companies, or products to individuals who were not commercial

entities (Aichner et al. 2021).

Arndt's (1967) definition of WOM communication is often used: "Oral person-to-person communication between a receiver and a communicator whom the person perceives as non-commercial, regarding brand, product or service".

Scholars such as Westbrook (1987p. 261) defined word of mouth as "all informal communications directed at other consumers about the ownership, usage, or characteristics of particular goods and services or their sellers".

However, the development of communication and information technology, such as the internet, has enriched the communication environment by introducing many alternative forms, such as emails and social media (Kane 2017). Therefore, the concept and definition of word-of-mouth are evolving to include electronic forms of communication (Rosario et al. 2020). For example, Hennig-Thurau et al. (2004) definition of word of mouth as

"any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet [and which] can take place in many ways (e.g., Web-based opinion platforms, discussion forums, boycott Web sites, newsgroups)" (Hennig-Thurau et al.2004, p. 39).

Word-of-mouth is based on the communication between receivers and senders, with the ability to influence a proposed outcome, which significantly increases when there is a stronger relationship between the receivers and senders (Babić Rosario et al. 2020; Bastos and Moore 2021; Moore and Lafreniere 2020). Hence, the sender's knowledge level is essential for effectively sharing information via word of mouth (Zhang et al. 2021). Anastasiei et al. (2021) added that the ease of receiving information via word-of-mouth could increase if the receiver believes to be acquiring competent information. The source shapes word-of-mouth's ability to affect the individual's intention, and the reliability of word-of-mouth is influenced by the credibility of the sender and the receiver's level of knowledge, resulting in word-of-mouth affecting the individual's intention (Ismagilova et al. 2020).

Moore and Lafreniere (2020) posited that the sender's intention is critical to a successful word of mouth, as the receiver tends to base the proposed message on the sender's intention. For example, if the individuals feel the intention behind word of mouth is not genuine, this could result in the message being void (Ismagilova et al. 2017). Additionally, an individual's behaviour is critical to how word of mouth will be perceived, as seen by Anastasiei et al. (2021), who posited that word of mouth is more effective when individuals believe that the information or message is directly adequate to reduce their risk. Therefore, word-of-mouth messages that directly target an individual's behaviour are more effective than random word-of-mouth messages (Ismagilova et al. 2017). According to Ali et al. (2021), word-of-mouth via individuals' is a more credible means of communication towards targeting behaviours, as personal interaction is a critical part of mass communication. Hence, word of mouth must be perceived as natural, as individuals prefer to learn about real experiences and opinions rather than biased suggestions (Rosario et al. 2020).

Lastly, personal experience is a powerful tool for making word of mouth more persuasive, as Individuals can pinpoint specific messages that meet their needs by learning from other individuals' experiences (Aleti et al. 2019). For this reason, word of mouth influences behaviours, as individuals can empathise with the messages shared by the senders (Cheng et al. 2021). However, like other marketing concepts, word-of-mouth has advantages and disadvantages. Therefore, the following subsection provides an overview of the opportunities and threats of words and mouth by evaluating the advantages and disadvantages.

2.18.1 Advantages and Disadvantages of Word of Mouth (WOM)

Word and mouth can be classified as valuable marketing instruments for behavioural change consisting of accurate information and actual reviews on a product or service to manage a cornucopia of messages from different sources (Hajili et al. 2014). They are valuable resources to use during decision-making, especially when other individuals generate them, and the messages are viewed as credible rather than commercialised (Amani 2021). Studies have shown that individuals prefer to receive messages via word of mouth from personal sources—for example, friends, acquaintances, and family members (Choi 2020).

Studies have shown that negative messages via word of mouth can be particularly insidious to individuals, as sharing negative experiences could result in individuals avoiding certain product services or behaviour (Bi et al. 2019; Chen and Yuan 2020). However, the impact of negative word of mouth may be severely underestimated as most of these messages are primarily invisible but have long-lasting effects (Alzate Barricarte 2021). Additionally, word of mouth has an inherent structure of using an individual's conversations or experiences, resulting in a wrong or misunderstood portrait of the product, services, or behaviours and a lack of control (Cheung and To 2020). Nevertheless, word of mouth is still a popular tool among researchers and marketers due to its established influence on individuals' intentions (Jalilvand and Heidari 2017; Babić Rosario et al. 2019).

2.18.2 Models and Theories of Word-of-Mouth

Although word of mouth is an old phenomenon, it has been modernised with further research and digitalisation due to its importance in influencing individuals, leading to

extensive models and theories associated with word of mouth (Talwar et al. 2021). Therefore, the following sections provide an overview of some commonly used theories and models.

- The Two-Step Flow Communication was established by Lazarsfeld and Katz in 1955 and is one of the most common and oldest models. This theory has been credited for beginning the influencer marketing theory. It focuses on using mass media in connection with opinion leaders to spread information to potential audiences, as the opinion leaders act as the intermediary for communicating messages between the individuals (Keller and Fay 2009; Silverman 2011).
- Social Network Theory is linked to word of mouth, allowing individuals to exchange information. It is also the basis of several sociological and psychological pieces of research (LI et al. 2020).
- Triple-Down Effect/Theory is commonly used in the context of word of mouth to describe the process of social influence. This theory assumes innovation is begun by individuals in the "higher class" and is diffused to those in the lower class, as individuals in the "lower class" imitate those in the "upper class (Sethna and Blythe 2016). The trickle-down theory is still commonly used as a marketing strategy, such as advertising through celebrities (Schaefer 2015; Maltz 2017).

The review of word-of-mouth theories and models showed even though word-ofmouth is an old concept, it has been researched and modernised to adapt to current contexts. Hence, this indicates that word of mouth is still a natural phenomenon that effectively influences an individual's intention.

2.18.3 Word-Of-Mouth Links to Environmental or Sustainable Behaviour

Word-of-mouth refers to the exchange of ideas, comments, and thoughts between two or more consumers and is one of the favourable individual behaviours in communication (Siddiqui et al. 2021). The use of word-of-mouth informs others of their pleasure or displeasure towards a service or service provider (Munap and Yahaya 2019). Research has shown that informal or personal conversations of information among individuals or groups not only an individual's choice or decision but also help shape their attitude, expectation, and perception of the service or behaviour (Travers et al. 2020). Word-of-mouth can be used to convey an individual experience (positive word-of-mouth) and also unpleasant experiences through rumours or complaints (negative word-of-mouth) (García-de los Salmones et al. 2021).

Initially, Word-of-mouth has been viewed as an action for informally sharing information and experiences among individuals based on their satisfaction or dissatisfaction with the specific behaviour (Liu et al. 2021). Extending word-of-mouth to the environmental field proposes that pro-environmental word-of-mouth is the extent to which individuals inform their friends, colleagues, and relatives about the positive messages and environmentally friendly nature of performing pro-environmental behaviour (Huy et al. 2022). In pro-environmental and sustainable behaviour, strong individuals tend to be strongly influenced by the opinions of their peers and group (Liu et al. 2021); hence, why word-of-mouth is believed to be able to complement and extend the effect of pro-environmental and sustainable engagement (Wong et al. 2021).

Literature such as Kim and Yun (2019) have indicated that word-of-mouth positively affects both pro-environmental intentions and behaviour. Hence, positive or negative wordChapter Two: Literature Review

of-mouth can directly be associated with the specified behaviour (Hameed et al. 2021). Proenvironmental and environmental sustainability policies and programs have taken advantage of the environmental trends; as a result, individual behaviour toward environmental consideration would positively affect word-of-mouth concerning environmental concerns (Kim and Stepchenkova 2020). The recommendation of others is likely to encourage individuals to change their behaviour and decision-making preference (Bunn et al. 2018). Therefore, word-of-mouth is essential for individual decision-making and should be adopted as an effective behavioural change strategy (Berné Manero et al. 2020). Based on the direct effect on individual decision-making, they are referring to information that can reduce the uncertainty of them partaking in the behaviour (Sok et al. 2021). Liao et al. (2020) proposed that positive word-of-mouth can bring a high degree of credibility to specific behaviours, resulting in high engagement towards that behaviour based on the positive information and evaluation of that behaviour.

2.18.4 Word-Of-Mouth for Lagos Case

Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products while helping conserve natural resources, such as timber, water, and minerals, and reducing the amount of waste sent to landfills (Winterich et al. 2019). In addition, recycling can help reduce the greenhouse gas emissions associated with the extraction and processing of raw materials (Ciacci et al. 2020). For example, in Lagos, Nigeria, recycling can play a significant role in helping to reduce the city's waste management challenges (Ike et al. 2019). Lagos is the largest city in Nigeria and one of the fastest-growing cities in the world, with a population of over 21 million people. As a result, the city generates a large amount of waste, which can cause environmental problems

such as pollution and the spread of disease (Edema 2019). By promoting recycling and other forms of waste reduction, Lagos state can help to address these challenges and improve the quality of life for its resident (Dipeolu and Ibem 2020).

Word-of-mouth can effectively spread information about the benefits of recycling and encourage more individuals to participate in recycling programs, for example, sharing information about recycling with friends, family, and neighbours, which can help raise awareness and promote the importance of this issue (Knickmeyer 2020). The author further added that this could be done through conversations, social media posts, and other forms of informal communication. Overall, recycling is a critical way to protect the environment and improve the quality of life in Lagos, Nigeria (Adubor et al. 2022). Therefore, by promoting recycling and spreading the word about its benefits, individuals and communities can help to make a positive impact on this vital issue.

Word-of-mouth marketing is a powerful tool, and it can be particularly effective in Lagos, Nigeria, where personal connections and trust are highly valued (Oraedu et al. 2020). In Lagos, word-of-mouth on recycling can take many forms, such as recommendations from friends and family, reviews on social media, and online communities where people share their experiences with different products and services (Ghanem and Quds 2019). One example of the effectiveness of word-of-mouth marketing in Lagos is the success of Jumia, an e-commerce platform that allows people to shop online for a wide range of products (Miloud and Youcef 2022). Jumia has increased in Lagos and other major cities in Nigeria, largely thanks to its focus on building trust and creating a positive customer experience (Ukonu and Agu 2022). Additionally, Jumia encourages customers to share their experiences with the platform on

social media and other online platforms, which has helped to generate buzz and attract new customers (Gupta and Jeyaraj 2021).

Overall, word-of-mouth in Lagos can be highly effective for individuals to connect towards engaging, building trust, and participating in recycling behaviour (Knickmeyer 2020), by providing a positive experience and encouraging individuals to share their experiences physically or online to drive growth and success toward recycling.

2.19 Intention

The development of recycling belief is an antecedent to how individuals are willing to perform a specific pro-environmental behaviour based on their intentions (Van der Werff et al. 2013; Yuriev et al. 2020). Therefore, delegating tasks will result in a confident expectation of positive outcomes for a behaviour such as recycling; however, this could also result in negative consequences, such as a lack of effective control, deliberation, and consequences (Yang and Weber 2019). Hence, a recycling intention indicates the readiness of an individual to participate in the preferred evaluation, as it reflects the conjunction of behavioural plans with appropriate resources and opportunities to attain a behavioural goal (Rosenthal and Leung 2020). In essence, intentions result from conscious processes that require deliberation, time and the focus on consequences (Pinder et al. 2018).

2.19.1 Reasoned Intention

Recycling intention is to communicate an individual's objectives to participate in the behavioural outcome of recycling (Sujata et al. 2019). Intentionality, this behaviour is derived through external significance by providing a relevant mental state of belief towards recycling,

such as social types and mental conditions affiliated with individuals, including fear or desire, belief can be captured as the intentionality to perform (Huang et al. 2019).

Therefore, the intention to act toward a goal in a mind-toward fit is based on the external signs of the internal mental state (Dias da Silva et al. 2022). When a goal of a desire, belief, or fear towards an intention is met, the behavioural outcome is achieved (Velasco et al. 2020). Hence, successful behaviour is determined by the world-to-mind fit of the proposed intention, as fulfilling a desire or belief through intentional action will satisfy intentions (Sergeeva et al. 2021). The desire to perform a behaviour in the future is reflected in the intention, as intentions are good predictors of behaviour (Rosenthal and Leung 2020).

2.19.2 Goals

How an individual perceives the communication of behaviour such as recycling is essential for establishing a common goal used in realising the aims of the behaviour by achieving the proximal milestones based on the planned realisation of the outcomes, aims, and objectives (Leung and Rosenthal 2019). Hence, goal setting plays an essential role in producing an outcome by directing behaviours concordant with the planned behaviours (Marien et al. 2018).

According to Ajzen (2005), intentions are perceived behavioural dispositions later translated into actions at appropriate opportunities and times. Hence, the researcher concludes with a strong correlation between intention and behaviour in evaluating the theory of planned behaviour (Rosenthal and Leung 2020). However, these correlations are perceived as lower where the behaviours are non-volitional, as the priority to act determines the critical time pressure (Skimina et al. 2018). Therefore, when there is less pressure on timing,

individuals can consider the implications, expectations and consequences of proposed behaviour before committing to proceed (Guo et al. 2020). As a result, goal-directed reliance is significant toward recycling intentions that lead to recycling actions (Linder et al. 2021).

2.19.3 Intention Summary

Behavioural actions are directed towards objectives by intentions, as cooperative behaviours are used to end an endeavour, such as partaking in recycling (Sujata et al. 2019). An individual intention is the function of their attitude towards performing a behaviour, which has resulted in a high correlation between intention and behaviour (Jena 2020).

2.20 Behaviour

Behaviour can be interpreted as an individual's reaction or action towards a situation or stimulus, as behaviour is determined by the intention to perform a behaviour in question (Santos 2008). Behavioural criteria consist of an individual performing more than one observable action, which will result in a behavioural act such as recycling. The transition from an intention to recycle to a behavioural manifestation involves the formation of an active recycling relation that enacts the benefits of the relationship (Jaiswal 2020). Different contextual and personal conductions can influence an attitudinal intention toward a negative or positive activity or service (Yadav et al. 2019). An individual's willingness tends to be reflected in the implementation of behaviour and the promotions and constraints of the situation (Peng et al. 2019). For example, an individual's willingness to become environmentally friendly can only be realised when recycling is possible.

Conversely, a behaviour may be impossible to be implemented due to a situational constraint surrounding this behaviour regardless of the strength of the individual's feelings

towards taking such action, which could result in the behavioural intention loss of predictive power on behaviour (Zhang et al. 2016). Nevertheless, attempts to predict behaviours are consistent (Heidari et al. 2018). It is logical for an individual with a favourable perception of attitude towards a situation to perform a favourable behaviour. Hence, the basic assumption is that a favourable or unfavourable implication is associated with the situation under consideration and behaviour. Pro-environmental behaviour, such as recycling, has been argued to increase with well-prepared situational support (Zhang et al. 2016).

According to Ajzen and Fishbein (1975), behaviour can consist of four elements. Which are: The action is taken, the target at which the action is directed, the context in which the step is performed, and the time at which the action is performed.

2.21 Literature Review Conclusion

This chapter conducted a critical analysis of academic literature in a narrative and logical structure while focusing on recycling, which included a meta-analysis of previous work to understand environmental sustainability, which resulted in the definition of environmental sustainability concerning recycling as a positive expectation of recycling behaviour. In addition, research on recycling was conducted to qualify the global characteristics, with evidence pointing to developed countries having a higher recycling rate than developing countries.

On average, depending on the effectiveness and presence of recycling activities, developed countries have generated a higher rate of recycling engagement through policies and imitative than developing countries. A review of research exemplifies the distinction between recycling initiatives in developed countries versus low-developing countries.

Chapter Two: Literature Review

Research on recycling has been used in developing countries as a practical approach to defining environmental, economic and societal issues associated with recycling effectiveness and efficiency. Conversely, recycling programs and debates have been implicated in developed countries, diverging to socio-economic, psychological, and behaviour prediction modelling.

This led to identifying incentives and barriers to recycling in developing countries, lacking regulations, schemes, laws, and government recycling policies. Many case studies indicated that understanding recycling features such as recovery rate and waste generation is essential for proper recycling management solutions. Having experience and knowledge of recycling linked to individual behaviour is necessary for practical recycling activities. Hence, finding the relationship among recycling factors in developing countries made an apparent collaboration to the required nature of environmentally sustainable management.

This research intends to build upon the recycling knowledge in Lagos, Nigeria, by understanding factors influencing recycling. Using behavioural change theory (theory of planned behaviour) is extended with various constructs to understand recycling factors.

3 Conceptualisation and Hypotheses Development

This chapter primarily describes the research model's development by expanding the existing literature's conceptual approaches. Importantly, it outlines the rationale for incorporating different external constructs into the theory of planned behaviour framework, based on some of the characteristics of Lagos, a representative of the developing nation Nigeria, to understand the sustainable environmental implementation of recycling in Lagos. The conceptual model synthesises and anchors previous work from established scholars on recycling behaviours concerning behavioural change theories, such as the theory of planned behaviour.

3.1 Introduction

Previously studies have shown both empirical and anecdotally correlation between behavioural change theories such as the theory of planned behaviour and recycling behaviour (Mannetti et al. 2004; White et al. 2009; Nigbur et al. 2010; Han et al. 2012; Howell et al. 2015; Rhodes et al. 2015; Fang et al. 2017). However, most of these studies are mainly conducted within developed countries or countries with adequate and formal recycling practices. Therefore, this research creates a new perspective by investigating the issue of implementing and proposing logical and conceptual research models that explain why and how to effectively practise recycling behaviour in developing countries with a focus on Lagos. Therefore, this research model is logically translated into hypotheses alongside the rationale for the explored relationship choices. Section 3.2 details the modelling scope and the requirements taken into consideration.

3.2 Research / Conceptual Model Development

The first foundation influencing recycling behaviour in Lagos is based on the interpretation and taxonomy of information between recycling behaviour formation. Many scholars have identified individual behaviour change as complex, making the decision-making process ambiguous, with different theories unconventionally utilised to understand this complexity, mainly in behavioural and social sciences research (Beatson et al. 2020; Al-Ghazali 2021; Gati and Kulcsár 2021; Yamini and Gajanand 2021).

Therefore, by delineating the positive contribution of individual participation at each level, the recycling behaviour concept is based on the process flow of psychological state outlined with the extension of the theory of planned behaviour (Han et al. 2016). Therefore, this theory has been adapted, contextualised, and modified to understand better the influence of behaviours on the natural environment. Although studies such as (Mak et al. 2018; Strydom 2018; Kumar 2019; Jain et al. 2020) have expanded and used the theory of planned behaviour to explain the human recycling relationship, it is difficult to be sure that this theory would change/ explain recycling behaviour in Lagos. Most of those studies do not account for the specific characteristics displayed among Lagos residents, especially towards recycling.

Therefore, constructs have been adapted to fit into the narrative of this research based on those characteristics to explain/implement recycling behaviours in developing countries, with Lagos being a case study. The conceptual model posits that variable simultaneously is essential to understanding individuals' recycling behaviour, as the theory of planned behaviour determinant is a significant antecedent of behavioural intention to participate in

recycling. In accordance, the modification of the theory of planned behaviour model embraces the antecedent of influencing recycling behaviours in Lagos.

3.3 Conceptual Model

In Lagos, the conceptualisation of recycling behaviour is synthesised on Ajzen's (1985) influential work with the theoretical contribution of the theory of planned behaviour. By examining social-psychological aspects of attitudes and behaviour towards environmental sustainability and, more explicitly, recycling. Therefore, providing an argument that behavioural intention determines behaviours such as recycling, with the addition of constructs such as trust, inconvenience and word-of-mouth to express individuals' willingness and desire to undertake the recycling behaviour.

Several theories have been developed to effectively change behaviours by providing an accumulated framework and knowledge to understand the current behaviour better while identifying targets for change (Davis et al. 2014; Ajzen 2020). Examples include the Norm-Activation Model (NAM), Stages of Change (Transtheoretical Model), The Theory of Reasoned Action (TRA), Schwartz's social-psychological model of altruistic behaviour and Diffusion of Innovation Theory. ¹¹ The theory of planned behaviour was chosen for this thesis based on the need for psychological models to understand the recycling behaviour in developing nations such as Nigeria, represented by Lagos and the factors that underpin these choices, e.g., Lagos characteristics. The theory of planned behaviour has emerged as the most widely used model within behavioural research, predominantly in pro-environmental studies and has been widely utilised to investigate pro-environmental behaviours in previous studies (Chen and Bishop

¹¹ Refer to Table 2.2 for examples of other behavioural theories used in promoting and explaining proenvironmental behaviours such as recycling, and the key elements that define their approaches.

2013; Clark et al. 2019; Esfandiar et al. 2020; Lucarelli et al. 2020; Aziz et al. 2021; Zhang and Quoquab 2022). However, few studies have used the planned behaviour theory in developing countries, especially in cities such as Lagos (Khalil et al., 2017). Therefore, the conceptual model is related to the reasoning process of variables linked to the theory of planned behaviour belief formation variables from which the behavioural steps are taken.

Furthermore, the literature in chapter two ¹²summarised the main issues associated with the existing recycling frameworks, methods, and models in developing countries, especially Lagos, compared to developed countries. Majorities of this shortcoming are based on the lack of Lagos characteristics fixation on the theory of planned behaviour. The literature review helped formulate the constructs required to augment the theory of planned behaviour, with the semi-structured interviews confirming¹³ the construct choice.

Therefore, it is conceptually coherent to augment the theory of planned behaviours by including constructs such as social norms, trust, inconvenience, and word of mouth. These are based on Lagos's characteristics, such as power distance and lack of government trust, value for community life, and lack of knowledge in the context of the country's policies and institutional factors affecting recycling, to investigate pro-environmental decision-making recycling. This, in turn, draws and elaborates the creation of new insight into the theory of planned behaviour to understand the implementation of recycling in developing countries with Lagos as a case study Lagos.

¹² Refer to Chapter Two, for the in-depth critical descriptive review of recycling behaviours and the theory of planned behaviour.

¹³ Refer to Chapter Six for the semi-structured interview analysis.

This decision supported studies (such as Chan and Bishop 2013; Botetzagiaset al. 2015; Mak et al. 2018; Strydom 2018) that extended the theory of planned behaviour to understand recycling behaviours. For example, Chan and Bishop (2013) extended the theory of planned behaviour with moral norms, which reflect an individual's feelings about whether a behaviour is inherently right or wrong as an additional predictor of recycling behaviour. In addition, Mak et al. (2018) posited that the basis of the theory of planned behaviour is set apart from conventional studies on behavioural theories. The author further asserted that recycling behaviour is determined by three latent variables: corporate support, administration and incentives, demonstrating significant effects on recycling behaviour while encouraging behavioural change towards recycling. Figure 3.1, therefore, highlights the conceptual model for this thesis.



Figure 3.1 Conceptual Research Model

3.4. Research Model Development Summary

This section expands on the rationale for the proposed logical research model conceptually by critically analysing and evaluating existing conceptualisations to underpin and explore the requirements of social norms, trust, inconvenience, and word of mouth. Based on the literature review and confirmed with the semi-structured interviews, these are necessary through the existing contribution of the theory of planned behaviour on recycling behaviours.

Therefore, it was essential to produce evidence that verified the necessity of contributing to the development of theory in recycling behaviour in Lagos by expanding the theory of planned behaviour. Hence, the following section formulates these hypotheses in the subsection below to evidence this thesis's contribution to theory development in this area. But, first, it was necessary to deduce the logical research model in Figure 3:1 that resulted in the research hypotheses.

3.5 Research Hypotheses

This thesis model is grounded on Ajzen's (1985; 1991) Theory of Planned Behaviour (TPB) framework to examine the augmenting of the theory on Lagos residents' behaviour towards recycling. The theory of planned behaviour is an established tool used to predict and examine individuals' intentions based on three critical constructs: Attitude, perceived control, and subjective norms and how they interact towards impacting behavioural intentions (Ajzen 1985; Kumar 2019). However, studies such as (Wang et al. 2011; Nigbur et al. 2010; Ramayah et al. 2012; Yin et al. 2014; Kumar 2017) have expanded the theory of the planned behaviour model by adding different constructs such as social norms, trust, inconvenience, and word of mouth to the diverse behaviours in the context of recycling.

Although these constructs have been added to the theory of planned behaviour, this thesis differs from those studies as it provides a brand-new perspective and insight into recycling behaviour in developing cities, specifically Lagos. Significantly, this thesis contributes to the literature by providing evidence on enhancing recycling behaviour in developing cities focusing on Lagos. Most studies on recycling behaviours tend to focus on developed cities and, particularly in the U.S.A., the U.K., and economically stable Asian countries, such as China, Japan, and Malaysia, where recycling is heavily industrialised through formal sectors, with frameworks tailed to those specific areas (Adhikari 2018; Kamble and Bahadure 2019; Ferronato 2020; Wang et al. 2020). For this reason, recycling behaviour in developing cities is under-researched compared to developed cities.

Thus, in this thesis, several hypotheses were investigated with the experimental survey work relating to the formation of recycling behaviour concerning the willingness to

recycle in Lagos. The following subsection details the formation and rationale for forming the hypotheses.

3.5.1 Attitude and Intention

Attitude refers to an individual's negative or positive feelings towards a particular behaviour (Bae and Chang 2021) and has been a relatively stable and persistent construct within psychological studies. Researchers such as (White and Hyde 2012; Sulaiman et al. 2019; Zhang et al. 2020; Arli et al. 2022) have shown a correlation between an individual's attitude and intention to recycle. According to Fishbein and Ajzen (2011), attitude consists of instrumental attitude, which focuses on the cognitive assessment of behaviour, and experiential attitude, which measures the effective evaluation of behaviours. In the context of this study, attitude is conceptualised as an individual's belief and evaluation of recycling.

Although environmental attitudes have been researched and conceptualised differently (Escario et al. 2020), it has been established as the best predictor of intention behaviour in several sustainable behaviour studies (Cheung and Fok 2014; Wang et al. 2018; Pan et al. 2018; Liu et al. 2020; Patwary et al. 2020). Conversely, there have been some debates in environmental psychology on the direct relationship between attitude and behaviour, as some studies have offered support for positive relationships. For example, Dixit and Badgaiyan (2016) posited that individuals are encouraged by positive attitudes to support sustainable behaviours such as recycling. Hu et al. (2018) added that individuals with positive environmental attitudes prefer to engage in sustainable behaviours such as recycling. These are aligned with the empirical findings of Line and Hanks (2016), Melbye et al. (2017), and Patwary et al. (2020), who argued that environmental attitude is positively related to

intention, as a positive attitude of an individual can predict an individual's intention to engaging in pro-environmental.

Nevertheless, most of these studies have shown that when an individual has a positive attitude toward their intention, it increases participation in that behaviour (Nigbur et al., 2010). Furthermore, recent studies by Khan et al. (2019) and Wang et al. (2020) also concluded that when individuals positively perceive a behaviour such as recycling, it leads to a positive intention toward that behaviour. Therefore, based on the above explanation, the following hypothesis is proposed.

H1: Attitudes are positively related to recycling intentions for developing countries

3.5.2 Perceived Behavioural Control (PBC) and Behaviour

Perceived behavioural control refers to the difficult perception of an individual towards a particular behaviour (Ajzen 1991). Bandura (1977) posited that perceived behavioural control consists of various resources such as facilitating conditions and self-efficacy, the self-confidence to perform the behaviour (Patel et al. 2020). However, earlier research, such as Magnusson et al. (2001), conceptualised perceived behavioural control to be influenced by external factors such as availability and price while ignoring the role of individual internal factors such as regret vs. excitement and disappointment vs. pleasure in influencing the perceived behaviour (Sultan et al. 2020).

According to Ajzen (1985 and 2002), there are two aspects associated with perceived behavioural control: control belief and perceived intensity, with factors restraining or promoting behaviours toward the individuals' self-efficacy. However, some factors inhibit or encourage participation in recycling, ease of recycling, or time spent recycling, as the more confident the individual is towards recycling, the stronger their willingness to participate in recycling (Matthie et al. 2012).

Numerous studies on pro-environmental behaviours that used the theory of planned behaviour have argued that individuals may want to execute an action and most likely withdraw based on situational constraints. However, it was argued by Ajzen (1968) that the theory of planned behaviour framework could uniquely lead an individual to voluntary act, hence, why it is not satisfying to have an individual under such control (Ogiemwonyi et al. 2020). When an individual possesses adequate resources and opportunities, there tend to be fewer obstacles or impediments to arise, which increases their perceived control over the behaviour while enhancing their likelihood of performing that behaviour (Zheng and Chi 2015).

Therefore, studies such as (Magnusson et al. 2001; Matthie et al. 2012; Ogiemwonyi et al. 2020; Sultan et al. 2020) have shown a positive relationship between perceived behavioural control of individual behaviours toward environmentally friendly actions such as recycling. Hence, when an individual considers the cost of partaking in a sustainable behaviour as too high or stressful, this can lead to the individual exhibiting lower perceived behavioural control and hesitating to perform the behaviour (Kang and Kim 2013). Nam et al. (2017) and Chi et al. (2021) also emphasised that time, facilities, capabilities, and money are perceived behavioural control that affects individuals' performance towards pro-environmentally and social behaviours. Based on the above explanation, the following hypothesis is proposed

H2: Perceived behavioural control is positively related to recycling behaviour in Lagos, a representative of developing countries

3.5.3 Social norms and Intention

From a social psychological perspective, social influence is based on the external social factors that influence individual behaviour and can be characterised as normative social influence and formational social influence (Deutsch and Gerard 1955; Fang et al., 2017). According to Rivis and Sheeran (2003), normative social influence and informational social influence can be categorised into injunctive and descriptive norms. According to the theory of planned behaviour, behavioural intention is the most direct antecedent of an individual's behaviour. It is affected by the different constructs, with the normative influence being one of those variables in the form of the subjective norm (Budovska et al. 2020).

Within the theory of planned behaviour, the subjective norm can be perceived as prescriptive due to the social pressure on a behavioural performance based on the positive effect on behaviour when there is pressure to oppose or support a norm (Ajzen 1991; Fang et al. 2017). Hence, the subjective norm's role within the theory of planned behaviour in explaining variance in intention has led to mixed results, adding to the vague and narrow operationalisation of the subjective norm construct in the theory of planned behaviour. For example, Ha and Jannda's (2012) study showed a positive influence of subjective norms in predicting pro-environmental behaviours, while Harland et al. (1999) established subjective norms to be limited in predicting pro-environmental behaviour. Researchers such as Armitage and Conner (2001) and Rivis and Sheeran (2003) have also argued that the subjective norm component within the theory of planned behaviour fails to acknowledge the limitation of social procure as a direct predictor of behaviour.

Therefore, Previous studies, for example (Manstead 2000; White et al. 2009; Cialdini and Goldstein 2004; Smith et al. 2012, Kinzig et al. 2013) have shown that external social

pressures significantly increase an individual's willingness to participate in behaviour such as recycling which in turn encourages collectivism. In this thesis, collectivism is an encouraging trait within Lagos cultures, hence the significance of community in influencing an individual's behaviour (Adejumo and Adejumo 2014). Based on the more significant social pressure perceived from the community, social norms have been adapted to replace subjective norms in this thesis model due to the communal pressure on willingness to engage in recycling. Based on this, the following hypothesis has been purposed

H3: Social norms are positively related to the recycling intentions of Lagos residents

3.5.4 Inconvenience and Intention

Convenience in the recycling context is considered the space, time, and perceived ease of an individual managing their waste through recycling (Barr et al. 2001; Tonglet et al. 2004; Wan et al. 2012). Authors such as Saphores et al. (2012) have highlighted convenience as an essential internal construct for interpreting an individual's willingness to recycle. Hence convenience is mentioned in multiple studies as a critical aspect of influencing an individual's recycling intention and behaviour (Derksen and Gartrell 1993; McCarty and Shrum 1994; Domina and Koch 2002; Kelly et al. 2006). On the other hand, Perceived inconvenience has been shown to reduce an individual's willingness to partake in recycling activities (DeYoung 1990; Boldero 1995; Ewing 2001; Domina and Koch 2002; Do Valle et al. 2004).

According to Saphores et al. (2012), inconvenience can be categorised into two forms: firstly, the association with perceived risk towards recycling, e.g., excessive time requirement and lack of adequate storage space: secondly, the physical aspect of recycling, such as separating waste or separating waste or bring the recyclables to the drop-off location. Several studies have emphasised that when an individual perceives recycling as inconvenient, this will negatively impact their likelihood of participating in recycling activities (De Young 1990; Ewing et al. 2001; Pinto et al. 2004; Thi Thu Nguyen et al. 2018). Wang et al. (2011) and Thi Thu Nguyen et al. (2018) posited that an individual perceived convenience towards recycling impacted their willingness to recycle.

Derksen & Gartrell (1993) identified that when an individual holds a generally positive attitude towards recycling, there is a greater chance of perceiving recycling as convenient. Kelly et al. (2006) added that individuals are more likely to participate in recycling schemes when convenient, as convenience was the primary factor influencing recycling behaviour in their study.

H4: Individuals who perceive recycling as "inconvenient" will have a less favourable intention to recycle

3.5.5 Trust and Intention

In pro-environmental management, trust does not focus on individual relationships. Instead, it focuses on how individuals perceive a government and management agencies concerning their overall ability to manage the resources (Mishler and Rose 2005; Wynveen and Sutton 2015). Therefore, this trust is grounded on how agencies' past and current management practices are perceived by the general public (Mishler and Rose 2005). Therefore, it is essential to emphasise establishing and maintaining a good relationship between individuals and managing agencies toward pro-environmental trustworthiness (Nannestad 2008; Wynveen and Sutton 2015; Harring et al. 2019).

If the general public has a reason to expect the managing agency to betray the trust invested within the relationship, this would be a rational basis for not trusting the governing agencies (Arli et al. 2019). Thus, individuals do not buy into policies, no matter how genuine they may be. Drawing on previous research conclusions, it is reasonable to posit a positive relationship between trust and recycling (Wynveen and Sutton 2015; Arli et al. 2019; Harring et al. 2019). From the relational point of view, theoretical underpinnings suggest that the higher the level of trust between the governing agency and the citizens, the more engaged they would be toward recycling (Bell et al. 2000; Arli et al. 2019). Hence, they are likelier to perceive trust toward pro-environmental activities such as recycling (Thogersen 2000; Daugbjerg et al. 2014). When relationally examining trust, it should be plausible that cooperating behaviours such as recycling will increase when trust is perceived between both actors (Arli et al. 2019). This implies a strong rationale and faith in the public ability to participate in complex issues such as recycling, making personal contributions seem less daunting (Harring et al. 2019).

H5: Trust in government is positively related to recycling intention as more trusting individuals show a more positive attitude towards the behaviour

3.5.6 Word of Mouth (WOM) and Intention

According to Gupta and Harris (2010) and Lovett et al. (2013), applying personal communication, such as word of mouth, significantly affects an individual's intentions. Bone (1995) posited that word of mouth extensively impacts an individual's judgment because word-of-mouth information allows individuals to categorise and make their intention easier. Likewise, Cantallops and Salvi (2014) and Jeong and Koo (2015) showed that the valence of word-of-mouth could promisingly influence an individual's intention. There are several ways

an individual's attitudes and behaviour can be changed due to recycling communications, such as word-of-mouth, as observed by Sun et al. (2006). The latter showed that word-of-mouth is considered an essential source of information for an individual when deciding, for example, to choose to recycle.

Furthermore, researchers such as (Hung and Li 2007; Lee and Youn, 2009; Gilal et al. 2018) have shown that sharing personal experiences can effectively boost an individual's attitude towards a specific behaviour or action. Hence, word-of-mouth effectively supports an individual's perception of fulfilling an effort, such as the intention to recycle. Zhang et al. (2018) added that word-of-mouth is essential in encouraging individuals toward pro-environmental decision-making. Individuals tend to make decisions based on information references to reduce the uncertainty of making that decision.

Keller and Fay (2012) also suggested that positive word-of-mouth can increase credibility, leading individuals to partake in the decision and reduce the decision-making process. Furthermore, when individuals are surrounded by confusing information about proenvironmental behaviours such as recycling, having some positive word-of-mouth is more likely to enhance their intention toward the behaviour (Zhang et al. 2018). Therefore, the following hypothesis is proposed.

H6: Word of Mouth has a more significant and direct effect on an individual's recycling intention in developing countries, using Lagos as a case study.

3.5.7 Intention and Behaviour

According to Ajzen (1991), there is a robust theoretical basis for the direct influence of intention toward behaviour. Furthermore, Ajzen (2005) posited the existence of a strong
correlation between the strength of an individual's intention toward behaviour and the likelihood of participating in that behaviour. Therefore, intention reflects an individual's willingness to participate in a behaviour (Ajzen 1991), which is impacted based on a range of indirect and direct factors such as (control issues, the nature of the individual and behaviour, and social influences) which creates intent to encourage the individual to perform the behaviour (Arli et al. 2019).

Undeniably, the intent concept has been at the centre of the theory of planned behaviour (Ajzen 1991; Oztekin et al. 2017) and is an adequate predictor of actual behaviour (Arli et al., 2019; Sujata et al., 2019)). Hence, when an individual possesses a strong intent towards participating in a behaviour such as recycling, their chances of participating in those behaviour increase compared to those with vague or weak intent (Arli et al. 2019). Various studies and models have confirmed this relationship between intention and behaviour, especially pro-environmental behaviour. For example, Chan and Bishop (2013) concluded in their research on the moral basis for recycling that intention was an effective predictor of recycling behaviour. Sujata et al. (2019) showed a positive relationship between intention and recycling behaviour among the general public in Penang. In Linder et al.'s (2021) research on the relative influence and interaction of psychological and environmental on proenvironmental behaviours, they posited that an individual intention towards a particular behaviour is an essential factor in the performing that specific behaviour

On the other hand, Aboelmaged (2021) found that, at least concerning e-waste recycling, the gap between the intention and behaviour can be weakened by factors such as an individual's inactive information-seeking behaviour (Rosenthal 2017) or lack of resource availability (Strydom 2018). These factors are more profoundly present in developing

countries, as shown by the case study of Lagos, than in developed cities. Nevertheless, the predominant view appears to correlate with individuals in developed countries who have strong intentions toward behaviour and are likelier to engage in that behaviour. Therefore, the following hypothesis is formally formulated.

H7: Intention to recycle positively affects Lagos residents' recycling behaviour.

3.6 Research Hypotheses Conclusion

This chapter aimed to develop a conceptual model for this thesis by Identifying potential constructs for pro-recycling behaviour and began with a comprehensive review of existing quality scales. Therefore, the constructs of social norms, trust inconvenience and word-of-mouth were chosen based on Lagos characteristics from the literature with a semi-structured interview confirmation¹⁴. This thesis's end outcome is forming a conceptual model and hypothesis of this thesis.

The hypotheses were derived from the research model constructed, with each of the stated hypotheses, H_1 to H_7 consisting of independent and dependent variables. Thus, this section highlights the rationales for selecting each hypothesis¹⁵. The below table is a summary of the research hypotheses.

Table 3.1 Research Hypotheses Summary

Hypothesis	Research Hypothesis Statement
H1	Attitudes are positively related to recycling intentions in developing countries

¹⁴ Refer to chapter five methods chapter for semi-interview confirmation

¹⁵ Refer to chapter eight for this thesis finding of the outcome of the testing of the relationship

H2	Perceived behavioural control is positively related to recycling behaviour in
	Lagos, a representative of developing countries
H3	Social norms are positively related to the recycling intentions of Lagos residents.
H4	Individuals who perceive recycling as "inconvenient" will have a less favourable recycling intention.
H5	Trust in government is positively related to recycling intention as more trusting individuals show a more positive attitude towards the behaviour
H6	Word of Mouth has a more significant and direct effect on an individual's recycling intention in developing countries, using Lagos as a case study.
H7	Intention to recycle positively affects Lagos residents' recycling behaviour.

4 Research Methodology and Methods

4.1 Introduction

This chapter explains the strategies for this thesis's data collection and analysis tactics. According to Guba (1990) and Grix (2004), a methodology is a system or process used by researchers in the area of study or activity. It is essential to the success or failure of a research project. Therefore, this chapter evaluated various philosophical paradigms and strategies related to data collection and analysis to choose the research methods to tackle the research aim and objectives while addressing the research questions.

This chapter also discusses the dominant philosophical paradigms within the marketing discipline to help justify the researcher's philosophical paradigm for this thesis by examining the triangulation strategies and research design adopted while explaining the various research and data types used within this thesis. Finally, the techniques used for data collection and analyses were discussed while justifying those strategies' choices. Figure 4. represents an overview of the methodology strategies and structure.

Research/ Philosophical Paradigm Interplay (Positivism and Interpretivism)		
V		
Research Design Strategy		
V		
Exploratory/ Confirmatory Research Strategy		
V		
Triangulation Strategy		
Research and Data Types		
V		
Data Collection and Analysis Strategies		

Guba and Lincoln (1994: 105) defined paradigm as the "basic belief system or worldview that guides an investigator". Suppe (1977) posited that a paradigm is the worldview of a shared community of scientists on a set of assumptions by investigating particular research within a paradigm to help define boundaries, outcomes, and research approaches to determine the development and perception of knowledge. Although many paradigms exist, such as common perceptions, attitudes, beliefs, and value paradigms (Guba 1990), it is essential to define the boundaries, approaches, and outcomes of research to determine how the knowledge is perceived and developed while ensuring a robust research design (Grix 2004).

Given the proceeding discussion, this thesis focuses on the paradigm that directs a disciplined and academic inquiry, which can be classified as ontology (nature of knowledge/reality); epistemology (nature of the relationship between the inquirer and the knowledge); and methodology (how the inquirer goes about finding knowledge) (Guba 1990; Grix 2004).

Figure 4.1: Blocks of Research

Ontology ____ Epistemology ____ Methodolog ____ Method ____ Source

(Source: Grix 2004:66)

Researchers in specific disciplines use paradigms as guides to make sense of a phenomenon by determining the methodologies and tools needed to provide the epistemological view's perspective as an organising principle of carrying out the "normal work" within a discipline (Filstead 1979: 34). Therefore, it is vital to identify the philosophical paradigm, showing where the research is grounded within the research process (Moon et al.,

2016). Such as generating research questions and hypotheses, developing methods for data collection, analysing, and interpreting data, and reporting critical findings, which may vary on the stances adopted by the researcher (Al-Ababneh 2020).

4.2 Research Philosophy

Baker (2002) explained that a researcher's philosophical paradigm is interrelated with the research process and method. Therefore, researchers need a straightforward philosophical research approach to help provide a more informed decision on the research strategy, design, data collection, and analysis strategy to answer the research questions better (Moon et al. 2016). When a researcher considers the various research approaches available, it is essential to use the best research designs by identifying the different boundaries of the philosophical paradigm to cater to any constraint while identifying the optimum approach to be chosen (Leavy 2017).

Generally, philosophical paradigms include critical theory, constructivism, positivism, relativistic, realism, interpretivism, pragmatism, and post-positivism. However, interpretivism, positivism, and post-positivism have historically dominated marketing research (Rahi 2017). These paradigms depend on the nature of the research problem and the researcher's preferred method of addressing these problems (Grix 2004).

Author	Setting	Paradigm
Tom and Valli (1990)	Education	Positivism and interpretivism
Denzin and Lincoln (2000)	Social science	Positivism, post-positivism
Guba and Lincoln (2005)	Social science	Positivism, post-positivism
Lather (2006)	Education	Positivism, post-positivism
Creswell (2007)	Social science	Positivism, post-positivism, social
		constructivism

Table 4.1: Philosophical Paradigms within Social Science

Grix (2004) further posited that the triangulation of paradigm or interplay strategy had been called for by scholars such as (Hunt 1991; Schultz and Hatch 1996), resulting in current marketing research being characterised as lying in a continuum of interpretivism and positivist paradigm as seen in Table 4.1, which highlights the different types of philosophical paradigm in social science, followed by Table 4.2 and 4.3 which highlights the critical differences between positivist and interpretivism. In addition, the required research paradigm that lies in a continuum of positivist and interpretivism paradigms is represented in figure 4.3, with these critical paradigms in marketing discussed next.

Table 4.2: Marketing Research: Main Scientific Paradigms and their Elements

Paradigm	Positivism	Interpretivism
Ontology	Reality is tangible, measurable, and unique.	Reality is subjective, multifaceted, and interpreted by individuals
Epistemology	Reality is objective and independent of the researcher	The researcher is a participant in reality
Common Methods	Experiments and surveys to verify hypotheses and deductively "explain."	In-depth interviews, focus groups, and case studies aim to inductively "understand."

(Source: Grix 2004)

Criterion	Positivism	Interpretivism
Reality	·Objective, out there to be	· Subjective, in people's minds
	found.	 Interpreted differently by people
Science	·Based on strict rules and	· Based on common sense
	procedures	· Inductive
	· Deductive	· Not value free
	· Value-free	
Purpose of	·To explain social life · To	· To interpret social life
Research	discover the laws of social life	 To understand social life
		 To find people's meanings
Common	·Experiments/ surveys:	Hermeneutical/dialectical; the researcher is
Methodologies	verification of hypotheses,	a "passionate participant" within the world
	chiefly quantitative methods	being investigated

Table 4.3: Characteristics of Social Research Paradigms

Source: Healy and Perry (2005:119)

Figure 4.3: The Key Research Paradigms Explanation Understanding Image: Positivist Post-positivist Interpretivist

(Source: Grix 2004)

4.2.1 Positivist Paradigm

Auguste Comte, a French philosopher, first defined positivism in the 19th century as the theory of societal development in identifying genuine knowledge based on experimental, observation, and social intellectual while upholding the belief that social issues could be empirically analysed, just like scientific inquiry and theories in biology and psychology (Beck 1979). A positivist approach is frequently associated with scientific research that utilises quantitative data that follows the science norms (Babones 2016). Lastrucci (1963) defined the positivist approach as "an objective, logical and systematic method of analysing a phenomenon, devised to permit the accumulation of realistic knowledge". Guba (1990) added by positing the core tenets of positivism as ontological (dealing with the belief that there exists a reality out there, which is driven by immutable natural laws); epistemology (data is objective and emphasises the importance of inquirer keeping distance from data derived); and Methodology (empirical experimentation).

Therefore, positivism aims to construe hypotheses, test variables, use controls, and test hypotheses with a highly structured methodology to make predictions (Babones 2016). Bryman (1988) explained that positivists use questionnaires in the operationalising construct that tests the relationship between two variables using path analysis and other techniques. This is harmonious with Conen et al. (2000) identifying empiricism, determinism, generality, and parsimony. In addition, it was concluded that social scientists could obtain a clear and justifiable interpretation of social phenomena through positivism based on the ability to test and verify data (Beck 1979). Consequently, positivists believe that the truth about a phenomenon is objective, single, and acquired through standardised empiricism. The advantages and disadvantages of the positivism paradigm are highlighted in table 4.4.

Table 4.4: Advantages and Disadvantages of Positivish	Table 4.4: A	Advantages	and Disadvar	ntages of F	Positivism
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Advantages	Disadvantages
· Clear theoretical focus	· Weak at understanding social phenomenon
· Easily comparable data	• This uncompromising approach cannot be changed once data collection has started.
· Greater control of the research process	• Often does not discover the meaning people attach to social phenomena.
• Economically cheap to collect large amounts of data.	

Adapted from (Easterby-Smith et al., 1991)

4.2.1 Interpretivist Paradigm

In contrast to the positivist, the interpretivist believe that reality consists of people's subjective experiences of the external world; thus, they believe that a single objective reality does not exist (Willis 1995; Carcary 2009). Willis (1995) further posited that interpretivist do not believe there is a single correct route or method to knowledge; instead, they view that the world and "reality" as socially constructed (Carcary 2009). Therefore, an Interpretivist aims to grasp the diversity of subjects' experiences due to the social world concerned as an emergent social process created by individual concerns (Burrell and Morgan 1979). Walsham (1993) suggested that theories should be judged according to the researcher's interest in the area, as in terms of the Interpretivist tradition, there are no "correct" or "incorrect" theories. Consequently, Interpretivism can be described as the participants being directly observed in

their natural setting to systematically analyse their social behaviour while interpreting and understanding their social world (Neuman 1994).

Walsham (2006) suggested there is no objective reality as an individual's background, prejudices, and knowledge makes forms biased when viewing certain things in our own and not others. Unlike positivism, the physical-law-like rules are not understood in the social world, resulting in multiple facts and an external reality relating to the physical and internal realities that are unique and subjective to each individual (Bannister 2005). Therefore, an interpretive paradigm understands how individuals perceive and attach to social phenomena (Rahi 2017). Qualitative research, such as ethnography, interviews, and content analysis, is the fundamental methodology used with the interpretive paradigm for data collection and analysis methods. Table 4.5 highlights the advantages and disadvantages of interpretivism.

Table 4.5: Advantages and Disadvantages of Interpretivism

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Sources: (Arksey and Knight 1999; Blaxter et al., 2001; Descombe 2002; Kim 2003; Carcary 2009)

4.2.3 Post-Positivist Paradigm

Post-Positivism emerged as an approach positioned closer to positivism, based on the advantages and disadvantages of interpretivism and positivism to integrate their core tenets (Trochim 2006). The social sciences criticise positivism for its over-reliance on scientific and objective reasoning while neglecting subjective experience and common sense of humans being treated like objects (Letourneau and Allen 1999; Nodoushani 2000; Trochim 2006; Tuval-Mashiach 2021). Positivism has existed for several years and has generally been accepted by researchers in the science discipline until the dominant challenges witnessed in the 20th century relating to its inability to understand social phenomena (Nodoushani 2000). This led to the rise of the interpretivism paradigm that focuses on understanding the social phenomenon by using the subjective experiences of social actors (Tuval-Mashiach 2021). Nonetheless, the interpretivism paradigm has witnessed an ongoing challenge to its lack of reliability, validity and generalisation (Kim 2003).

Post-positivism is not centred on the sole reliance on objectivity but the social construction of reality but recognising the importance of people being assigned to human and social experiences (Easterby-Smith et al. 1991). Both quantitative and qualitative research are accepted by most post-positivism as valid approaches for discovering the truth about social life concerning the search for "warranted assertability" as opposed to "truth" (Phillips 1990; Guba and Lincoln 1994). However, qualitative research tends to be rejected by positivists, while Interpretivist rejects quantitative research. In contrast, post-positivism relies on quantitative research for its objectiveness and objectivity. The core tenets of post-positivism were highlighted by Guba (1990) as critical realist ontological (the recognition of deception among intellectual mechanisms and human senses); epistemology (the acknowledging of subjectivity by regarding the objectivity as a non-attainable "regulatory ideal" in any absolute sense); and methodology (the recognition of triangulation of methods, data theories and investigators).

4.3 Justification for Researcher's Choice of Philosophical Paradigm

There are contradicting views on how research is conducted and evaluated with positivism and interpretivism. As with positivism, the stronghold for assessing research outcomes relies on validity, reliability, and generalisation. In contrast, in interpretivism research, the outcome depends on the dependability, transferability, and dependability of determining the trustworthiness of the qualitative study (Carcary 2009). The post-positivism paradigm emerged with a compromise to blend positivism and interpretivism paradigms. However, as seen in figure 4.3, post-positivism takes a central position with certain core tenets and dogmas between positivist and interpretivism, thereby limiting the flexibility of the researcher's search for truth relating to a specific research occurrence. In addition, it is almost impossible to eliminate a researcher's bias from a study with post-positivism (Hutton 2009), as attention is diverted from the researcher's interesting overall phenomena to a specific phenomenon due to its qualitative perspective (Clark et al. 1998).





Source: The Author

Based on the researcher's choice to mix the different paradigms to archive the current objective and aims of the study¹⁶, a compromised position of post-positivism paradigms can

¹⁶ Refer to chapter one for the aims and objectives of this thesis

be suggested as a result of the weakness and strength of positivism and interpretivism (Sarantakos 1998; Blumberg et al. 2005) as seen in Figure 4.4. This relates to multiple paradigm perspectives or paradigm interplay, as the approach aims to acknowledge their connections while maintaining the distinctiveness between paradigms (Schultz and Hatch 1996). Paradigm interplay objectives are used to find a compromise between paradigms (Harris 2000) by acknowledging the seminaries and distinctiveness between the paradigms and providing both perspectives (Ybema 1997).

Therefore, this thesis utilised a paradigm interplay perspective to search and understand the truth relating to this research phenomenon based on the preceding discussions by incorporating both positivism and interpretivism paradigms. Extant research has been applied and recommended for the feasibility of using paradigm interplay with both positivism and interpretivism (Schultz and Hatch 1996; Romani et al. 2011). According to Kim (2003), positivist research needs to be used as the central methodological framework when investigating organisational performance issues by valuing other research paradigms. This thesis adopted positivism as the dominant paradigm based on this understanding.

In light of this and the aim and objective of this research¹⁷, the paradigm underpinning this thesis leaned towards a positivist paradigm while seeking some form of compromise between the positivist and interpretive approaches to understanding the subjective experience of its key actors, as seen in Figure 4.4. Therefore, a visual representation of the researcher's choice of paradigm interplay is based on (Grix 2004) continuum of research paradigms.

¹⁷ Refer to chapter one for the aims and objectives of this thesis

The rationale taken to formulate this decision is as follows.

- Firstly, the thesis is in line with the core tenets of the positivist paradigm. The aims and objectives of this thesis rely heavily on theory testing rather than theory building. Extant literature on recycling and related constructs of behavioural change theories were applied to propose the theoretical background, model, and hypotheses. In addition, the researchers used a deductive research approach to favour positivism rather than an inductive research approach.
- Secondly, the recommended scale development strategy for marketing researchers, particularly Churchill's (1979) approach, was utilised in this thesis and is underpinned by positivism, while quantitative research and analysis rely on positivism.
- Thirdly, the data analysis strategy used in this thesis was based on hypothesis testing, quantitative analysis, and reliability and validity evaluations due to the operationalisation of the proposed constructs to obtain quantitative facts. When evaluating marketing research and social science, it is vital to identify the validity, reliability, and generalisability of research outcomes consistent with positivism's core tenets (Carcary 2009). Therefore, a positive paradigm was utilised in this thesis to justify the reliability, generalisability, and validity, and validity of the research outcome.

In addition to the dominant use of positivism, the interpretivism paradigm was utilised to better understand the sustainability issues in behaviour as a social phenomenon, as recycling and behavioural change theories are social systems that involve human behaviours during their delivery process (Knickmeyer 2020). Furthermore, consistent with Nodoushani (2000) and Trochim (2006), the personal experience of individuals, groups, and subcultures is based on recognising the subjective experience of individual needs rather than being treated like an object and understanding a new phenomenon. Consequently, recycling can be best measured, managed, and understood when studied as a social phenomenon rather than an object. Moreover, the use of interviews is used to the inadequacy of existing scales in the domain of the study as part of the item's generation and scale development process (Carcary 2009).

As a result, the research utilised a triangulated approach due to the justifications mentioned in the section highlighting the rationale taken to formulate this decision and paradigm interplay involving confirmatory and exploratory research strategies and the quantitative and qualitative data and methods. Furthermore, using the interplay paradigm enabled the researcher to capture the subjective experience of critical organisational factors while using accurate scales to ensure the research's validity, reliability, and generalisability, as highlighted by positivism (Trochim 2006).

This thesis also used the interpretivism paradigm based on the proceeding discussed by defining the domains constructs in a semi-structured interview, identifying items for the scale development, and using content and thematic analyses to analyse the data. Nevertheless, this thesis relied predominantly on positivism by collecting data from a large sample size through a pilot study and main study survey questionnaires while using the exploratory factor analysis, structural equation modeling method, and confirmatory analysis to analyse the data.

4.4 Research Design Strategy

According to Burns and Bush (2002), a research design is an advanced decision to specify the method and procedure used for collecting and analysing data. In addition, Burns

and Grove (2005) described research design as maximising control over a study by aiding ten decisions and selecting sample procedures, population, measurement methods, and data collection and analyses plans. The outcome and conclusion drawn from the study were impacted by the research design's choice (Scandura and Williams 2000). Therefore, this thesis's proposed research design strategy parallel with the chosen philosophical paradigm, based on the strategy, planning, decision, and strategy for investigating the research questions, acquirinn and analysing that information (Prosser 1998).

The philosophical paradigm adopted in this thesis was used based on the designed research strategy regarding the different types of research and data, research strategy, triangulation strategy, data collection and analytical strategy of this thesis. Therefore, the following section discusses the various research design strategies.

4.5 Triangulation Strategy

The phrase triangulation was adopted from the navigation and military strategy, locating an object's exact position through multiple reference points (Jick 1979). Therefore, triangulation in a research context uses numerous data gathering and is also a good research design indicator (Litosseliti 2010). Denzin (1989) identified four main triangulation research strategies discussed in the section below.

• Data Triangulation: refers to the sampling of different strategies and data sources within research to cross-check and compare the consistency of the information. This type of triangulation can also be categorised into space triangulation, time triangulation, and person triangulation. Space triangulation is when two or more data are collected from multiple settings on the same phenomenon. In contrast, time triangulation is when data

is collected at different time intervals. Lastly, person triangulation is when the same phenomenon is collected from different individuals.

- Researcher Triangulation is when single research is avoided by using two or more researchers to analyse the same data.
- **Theoretical Triangulation** is when two or more theoretical perspectives understand how different principles and assumptions affect a finding.
- Methodological Triangulation is when two or more methods are used in one study. This triangulation method can also be categorised into within-methods triangulation, which involves two or more processes within a research paradigm. Finally, cross-method triangulation is used in a single study, both quantitative and qualitative approaches (Denzin 1989).

Since the chosen paradigm for this thesis lies within a continuum of positivism and interpretivism, as portrayed in figure 4.4. The triangulation research approach was adopted in this thesis based on the consistent use of the triangulation research strategy in this thesis's philosophical paradigm. This enabled using different data and research types and data collection and analysis strategies through the triangulation strategy. Therefore, ensuring convergence in the minimising, eliminating, or finding plausible explanations used in concluding while elucidating that the divergent aspect of the research and complement were limitations of each method (Johnson and Turner 2003; Collis and Hussey 2003).

Finally, the researcher's ability to generate a confident conclusion and communicate clear and confident recommendations was improved by incorporating the triangulation research strategy (Scandura and Williams 2000).

4.7 Research and Data Types

When undertaking any study, explicit declarations must be made on the type of information required and the strategies used to collect and analyse data, which acts as the researcher's roadmap, helping guide the researcher in the research methods chosen to collect analytics data (Romani et al. 2011). For example, selecting quantitative versus qualitative research and data, primary versus secondary research /data, and subjective versus objective data. Therefore, the following section highlights the difference between qualitative and quantitative research.

4.7.1 Qualitative vs. Quantitative Research

According to Bryman (1988), qualitative and quantitative research are significantly more than data-gathering methods; instead, they denote divergent assumptions on the purpose and nature of social sciences research. Researchers are constantly confronted with the optimal difficulties of choosing what data type and study to conduct, resulting in the researcher deciding between quantitative and qualitative data and research (Romani et al. 2011). However, the research aims and objectives tend to determine the choice between these two streams of research approach and the adopted philosophical paradigm. The selected research approach determines the type of data collection and strategic analyses that will answer the research questions and problems (Mitchell 2018). The predispositions of qualitative and quantitative research methods adapted from Glesne and Peshkin (1992) are highlighted in table 4.6.

Table 4.6: Qualitative and Quantitative modes of inquiry predispositions

Qualitative Mode	Quantitative Mode
Assumptions	Assumptions

 The variables in this approach are interwoven, complex and challenging to measure. Their reality is socially constructed. This model has priority on the subjective matter. This mode focuses on the insider's point of view (Emic perspective). 	 The variables with this approach can be identified, and their relationships can be measured. There is an objective reality associated with their social factors. This mode is the importance of the method. This mode focuses on an outsider's point of view (Etic perspective).
Purpose	Purpose
• This mode aims to contextualise, interpret, and understand the insider's perspective.	• This mode aims to predict, generalise, and causally explain the outsider's perspective.
Approach	Approach
 This mode is Naturalistic Researchers are instrument This mode ends with grounded theory and hypotheses. This mode relays on emergence and portrayal This mode is inductive and searches for patterns. This mode makes minor use of numerical indices and seeks pluralism and complexity. This model has a descriptive write-up 	 This mode is experimentation Uses formal instruments This mode begins with hypotheses and theories. This mode relies on control and manipulation This mode is deductive and components the analysis. This mode reduces data to numerical indices while seeking consensus as to the norm. This mode uses abstract language in writ-up.
Researcher Role	Researcher Role
Empathic understanding	Objective portrayal
 This mode involves personal partiality and involvement. 	 This role involves detachment and impartiality.

Adapted from Glesne and Peshkin (1992)

4.7.1.1 Qualitative Research

Qualitative research involves collecting data through the respondent's attitude, experiences, and behaviours by conducting observation, focus groups, or interviews to resolve a research problem and developing an initial understanding of the phenomenon being studied through an iterative process (Kaplan and Duchon 1988). Qualitative research assumes multiple realities within a social phenomenon, requiring the researcher to be immersed within the setting to understand the situation clearly (Firestone 1987). Although qualitative research is holistically flexible and focused, it produces richer data and information in meaning and theory while capturing the participant's point of view (Marcus and Robey 1988; Daymon and Holloway 2002). Nonetheless, qualitative research also lacks transparency on followed procedures replicating the research complex. The data obtained through these methods tend to be biased with generalisation problems of reliability and validity (Bryman 2001; Romani et al. 2011).

4.7.1.2 Quantitative Research

In contrast, quantitative research aims to investigate phenomena by devising procedures that measure the phenomenon quantitatively based on positivism and science (Michell 1997; 1999). Numerical data analysis and hypothesis development are essential in quantitative research by implementing mathematical models relating to the phenomenon by presenting statistics, graphs, charts, or tables showing an empirical understanding of the social phenomenon (Hesse-Biber and Leavy 2004). The advantages and disadvantages of quantitative are highlighted in Table 4.7.

Advantages	Disadvantages
 The use of quantitative research helps ease the comparing of data across categories over time. Quantitative research is flexible in the treatment of statistical and comparative data analyses. It is easy to replicate data collection methods in quantitative research when proving validity and reliability. Quantitative research helps with the reduction of extensive data set quantities. 	 People are reduced to a set of variables and numbers in quantitative research. Rather than capturing the whole situation, quantitative research captures only a snapshot of a specific point in time. There is a lack of deep meaning, explanation, and understanding of a phenomenon in quantitative research.

Adapted from (Kruger 2003)

This thesis utilised quantitative and qualitative research and data to be consistent with

the paradigm interplay philosophical position and consider the intellectual standing. The

following paragraph highlights the justification for using quantitative and qualitative research and data.

Firstly, the overreliance on quantitative data and analyses has been criticised in several studies in social science disciplines, which have advocated using both quantitative and qualitative research. For example, inductive quantitative research was argued to build opposition to continual hypothesis tests by Strauss' (1967), with Meehl (1978) adding that researchers cannot solely concentrate on the statistical significance of hypothesis testing to advance science. Churchill (1979) also recommended implementing quantitative and qualitative in-scale development processes. Implementing a mixed method was essential for this thesis. The qualitative data confirmed that the proposed additional constructs aligned with the Lagos characteristics needed to implement recycling behaviours¹⁸. In contrast, the quantitative data measured the relationships between the hypotheses¹⁹; additionally, qualitative and quantitative data favoured the aim and objectives of this research by seeking to develop a framework to measure the behavioural outcomes.

Secondly, understanding a pro-environmental behaviour change, especially in Lagos, involves unidentified and uncontrolled variables precisely when measuring a behavioural outcome such as recycling. Therefore, this research will not be satisfactory if restricted only to quantitative and controlled settings based on this thesis relying heavily on theory testing rather than theory building (Maxwell et al. 1986; Manicas and Secord 1983). Lastly, several scholars have advocated the triangulation approach to produce a richer and more contextual basis for interpreting and validating the research results, which has led to more affluent, valid

¹⁸ Refer to Chapter One for the Lagos characteristics

¹⁹ Refer to Chapter Three for the research hypotheses

and valuable outcomes and findings that complete the picture of the phenomenon (Kelle 2001).

4.7.2 Objective vs Subjective Measure/Data

When undertaking any research, there is always a need to choose between objective and subjective data (Goods et al., 2019). As a result, it is essential to understand the critical distinctions between objective and personal data and measures when deciding on what to base your beliefs or perception or empirical attitudes, or observation (Wang and Gianakis 1999).

Therefore, this thesis utilised objective and subjective measures and data to achieve the aims and objectives as semi-structured interviews were also conducted to collect subjective data to develop the scale items used through questionnaires. At the same time, objective measures and data were used to evaluate the main study and pilot scale by empirically analysing the data.

4.7.3. Primary vs. Secondary Data

The critical determinant of choosing between primary and secondary data was identified as necessary for research by Morgan and summers (2005). However, other dependencies affect the selection of primary and secondary data, such as the required data existence, relevance, research nature, and expected outcome of the research's reliability, accuracy, and validity. In addition, primary data is the raw data collected by the researcher, while secondary data can be referred to as data already existing in the public domain (Morgan and Summers 2005; Booth et al. 2008).

Although this thesis used primary and secondary data to answer the aim and objectives, existing secondary data was used as a foundation and background for the thesis while relying heavily on primary data due to the nature of the research. This thesis used a survey to generate primary data, in the form of quantitative data, alongside semi-structured interviews for preliminary qualitative data. In contrast, extant literature and statistics were collected for secondary data to help provide background and develop the scale for the thesis.

4.8 Data Collection Strategies

After identifying and discussing the various types of data/research and the triangulation strategy being utilised in this thesis, it is vital to examine the technique used for collecting this data in the next stage of the research process. According to Burns and Grove (2005), data collection systematically gathers relevant information to answer the aims and objectives, choosing between census and sample survey.

4.8.1 Census Vs. Sample Survey

According to Nirel and Glickman (2009), the terms census and sample survey have been contradictory. As census are surveys used to provide a core of official statistical data from demographic analyses, a samples survey is a systematic method of information gathering where a sample is used to represent the entire population (Groves 2004; Wiid and Diggines 2010). Within the social sciences, sample survey research has gained popularity due to its ability to empirically examine research's sociological, demographic and psychological variables (Nazari et al. 2006).

According to Nazari et al. (2006), some assumptions are associated with survey research methods' attitudes, perceptions, and opinions. Firstly, the reliable source of

information needs to be from the respondents. Concerning this thesis, Lagos residents were chosen as a reliable source on behavioural outcomes towards recycling.

Secondly, the organisational outcome should result from the subject's perception. Using a sample survey over census survey methods has many advantages, such as the accuracy and quality of data produced, cost and time efficiency, and practicality (Roberts 1999; Wiid and Diggines 2010). However, some limitations may hinder the use of sample survey methods, for example, the generalisation, validity and reliability of the research findings (Van Der-Stede et al. 2005). Hence, the researcher ensures that the decisions made towards collecting data and analysis methods warrant the research outcome's generalisability, validity, and reliability.

4.9 Data Analysis Strategies

The use of triangulation research and philosophical paradigm strategy was used to adopt this thesis's analysis strategy. Caracelli and Greene (1993) posited that using triangulation or a mixed-method approach, the mix-method analysis strategy of at least one quantitative and qualitative analysis method needs to be applied, resulting in the identification and use of various analytical strategies to analyse the data. Therefore, the following section will discuss the factor analyses of quantitative, qualitative, exploratory, and confirmatory data.

4.9.1 Qualitative Data Analysis

Qualitative data analysis is the interpretation of data collected through qualitative mediums such as interviews, videos, or diaries during qualitative research by coding and transcribing to identify the themes (Baxter and Eyles 1997). Several qualitative analysis techniques are available in social sciences, e.g., grounded theory, logical analysis, typology analysis, hermeneutical analysis, thematic analysis, and content analysis (Onwuegbuzie et al.

2009). Although there are advantages to using these analytical strategies, there are also

disadvantages to using this form of research, as shown in Table 4.8.

Table 4.8 Advantages and Disadvantages of Qualitative Data Analysis This item has been removed due to 3rd Party Copyright. The unabridged version of the thesis can be found in the Lanchester Library, Coventry University.

Source: (Matveev 2002)

4.9.2 Quantitative Data Analysis

Quantitative data analysis quantifies information/data to provide an acceptable conclusion to research (Abeyasekera 2005). Analysing raw data to generate evidential data helps the research process formulate and verify the research hypotheses (Frankfort-Nachmias and Nachmias 1992). Reacher's bias and subjective interpretation are eliminated by implementing quantitative analyses. The numerical summaries of the results can be reported by separating large numbers of confounding factors and drawing meaningful results from those large amounts of quantitative data with a specified degree of confidence (Abeyasekera 2005). Table 5.9 highlights the advantages and disadvantages of quantitative analysis.

Table 4.9 Advantages and Disadvantages of Quantitative Data Analysis

Advantages	Disadvantages
-	

This item has been removed due to 3rd Party Copyright. The unabridged version of the thesis can be found in the Lanchester Library, Coventry University.

Source (Matveev 2002)

4.10 Research Context

This thesis focuses on expanding the theory of planned behaviour by offering a new model and perspective to how behavioural change with specific and general context to recycling in Lagos. For example, the lack of effective waste management measures and the burning of waste in Lagos cause unsafe air pollution (IAMAT 2020). Nevertheless, these geophysical environmental concerns resulting from the consequences of accumulated human activities, such as extreme weather changes, global warming, and environmental degradation, need to be addressed.

Lagos's attitude towards waste management and recycling has been criticised for environmental and health issues (Mogo et al. 2017). The operating climate for recycling in Lagos differs from developed countries, mainly due to the lack of drivers observed in Lagos characteristics (Amosun 2019). Section 1.3.1 highlights and expands on some Lagos characteristics related to recycling.

4.10.1 Lagos Characteristics

• Lack of knowledge: Compared to developed countries such as Sweden, which have been educating their citizens on the importance and effective ways to recycle, e.g., waste sorting, since the 1980s, Lagos citizens have limited knowledge (Tin-yau 2020). it is easily understandable why most citizens of Lagos lack the basic understanding and reasoning

for the importance of recycling and effective ways to recycle. The Lagos government has failed to implement adequate laws and regulations to tackle the environmental problems due to insufficient funds available at the local level and a lack of investment in technical resources or training. (Otitoju 2014; Khalil et al., 2017).

- Trust in Government: There has been a decline in trust between Lagos residents and their government. And this became apparent after the 2007 general election in Nigeria, which led to most Nigerians demanding electoral reform (Paul 2014). According to an Afrobarometer Survey (2008), only 17% of residents trusted the government. In studies on trust, a factor usually used to measure the resident's level of trust in their government's perception of corruption was identified (Iroghama 2005; Transparency International 2006; Bourne 2010; Paul 2014). According to (Hazan 2016), Lagos is plagued with corruption in its government, leading to government instability. This lack of trust can lead to the erosion of public confidence in its citizens. Unlike the Japanese government, which has also introduced a strict recycling law mandating their citizens to participate in recycling by minimising their waste generation, the Nigerian government will struggle with implementing policies unless they incorporate the help of the community leaders. Most Lagos residents have more confidence in the community leaders than the government due to their elders' community (Paul 2014).
- Lack of Effective Policies and Attitude Towards Recycling: In Lagos, formal recycling is a glaring absence. As a result, informal sectors are trying to promote avenues for introducing recycling (Ogunseye et al. 2020). For example, the University of Lagos recycling project rewards individuals who return plastic bottles for recycling (Abila 2018). However, attitude toward recycling is also lacking. A study conducted by Ezeah and Roberts (2012) showed that Nigerians are mainly motivated to engage in environmental

preservation when there is monetary awareness and community support. This was supported by studies such as (Ogiemwonyi et al. 2020; Noah et al. 2020), which highlighted the lack of enforcement of environmental regulations in Nigeria, with some regulations being outdated and complex to implement.

- **Power Distance:** Power distance in Lagos deals with the individual inequality in societies due to the immense power gap among Lagos residents, which the authorities can also perceive. The large gap between the rich and the poor and attitudes towards inequality are two main reasons behind Lagos's power distance. According to Daniel et al. (2014), power distance is how unequally distributed power is accepted by the less powerful members of an organisation or institution. Lagos scores are high on this dimension; due to the high-power power allocation within the societies in Lagos, as the hierarchical order is accepted by everyone and has a place that needs no further justification (Dokpesi 2013). As a result, the apex of the hierarchy is based on authority by dichotomy within the social class system. For example, children depend on their parents, from subordinates to their managers. Authority's choice characterises high power distances in Lagos through education, age, experience, and political systems that support the centralisation of power and exercising authority (Adejumo and Adejumo 2014). Therefore, Lagos is justified as a high-power distance culture as authorities are centralised with a downward flow of information and rules passed down from top to bottom.
- Moral and Cultural Values in Lagos: Culture summarises society's way of life. In most cases, cultural infrastructure and heritage can serve as an influential strategic drivers for environmental sustainability by conserving historic environments while supporting sustainable processes and goals (Hosagrahar 2013). However, it is essential to understand

the critical role values and culture plays in defining a society's attitude and strength for implementing effective policies and achieving a pleasant environment (Holm 2003). According to Grierson (2009), Pro-environmental behaviours are enabled by the culture at different levels, such as the intrinsic link between biodiversity and cultural diversity, its contribution towards sustainable environmental management practices through traditional and social knowledge, and its influence on consumer behaviour and patterns. Consequently, there needs to be an integration of sustainable implementation that can improve the behaviour and attitude of society when tackling pro-environmental behaviours (Opoku 2015).

Lagos is a state that values its morals and rich cultural values. Although there are variations of cultures in Lagos, commonalities bind them together, giving room for unity in diversity (Effiong, 2018). According to Ukadike and Iwegbu (2012), values are the Lagosians guiding principles that define their actions, conduct, and attitudes in every human environment. The following section will highlight some of these Lagos's cultural values concerning sustainability.

• Value for Community Life: Lagos culture places a significant value on the community or a unit group. Lagos residents perceive this cherished value as a single entity that needs protection (Ighovojah and Okumagba 2000). These communal values guide individuals' social interaction towards a common goal, as the interpersonal bonds go beyond biological affinity within a community (Igboin 2011). Lagos residents perceive communalism as a material and super-sensible system through mutually and interdependent processes such as caring for one another. For instance, no matter how wealthy or civilised a Lagosian is, they tend to be present within their community as a sign

of responsibility. Whatever happens to one happens to the community as a whole, showing the importance of helping others develop a community (Okobia et al., 2016). Although, collectivism is the primary practice valued based on their consideration and perception of groups. As is seen by the extended social family fabric and concept in Lagos societies (Hofstede 2004), when an intent look is taken at Lagos residents, there can be individualistic values that sometimes clash with communal values. But the community still takes priority and is the superintendent (Okobia et al. 2016). Addressing religion, politics, socialisation, environments, rules, and traditional programs are done within the community and among community members. In Lagos, an identity of a society cannot be overshadowed by an individual's identity, hence the lack of individualism in Lagos.

• Value for Family Oneness: The family value in Lagos cannot be overemphasised. Lagos residents are family-oriented and highly value family, perceiving it as the bedrock of human creation protected (Ighovojah and Okumagba 2000). Unlike some western cultures, Lagosians view family as the primary unit of the community's social life, which goes beyond, husband, wife and children but with extended relatives (Okobia et al. 2016). The authors posited further that families include moral and social values in Lagosian culture, with children accounting for the higher proportion. Interestingly, the man is viewed as the head of the family with responsibilities, duties and privileges for both immediate and extended families. Parents have their rights and obligation toward their children, just as children have their obligation and rights toward their parents protected (Ighovojah and Okumagba 2000). Lagos residents still gather, during special occasions, with all members of that family and community expected to participate. Caring for one another is an integral part of Lagos culture, and most times, this virtue is exhibited

unconsciously. The family's priority is to execute social needs, showing the family as an essential aspect of Lagos culture (Okobia et al. 2016).

• Value for Religion, Age, and Authority: Religion plays a significant role in Lagos's perception, behaviour and attitudes towards concepts, beliefs and practices, as it is an integral and inseparable part of the entire culture (Opoku 2015). Pamu (2012) posited that researchers studying religion's role in the development of sustainability are too focused on religion's problems rather than religion's role and place in sustainable development. Narayanan (2016) added that the tendency for religious support in societies is central to current social theory due to attaining values that strive for prestige and power. Lagos has three major religions, with Individuals participating in at least one of these religions. Therefore, religion is a vital tool that provides values and ideals for sustainable development. E.g., religious groups such as the Christian Association of Nigeria (CAN) and the Nigerian Supreme Council of Islamic Affairs (NSCIA) can influence individuals toward a specific attitude (Olakunle et al. 2009; Adejumo and Adejumo 2014).

Lagos residents are known to appreciate the value of age, with an aging population growth rate of 3.2% (Population Reference Bureau 2019), and have been estimated to double by 2050 (Mbah 2016). There is a coexistence of intergenerational relationships in Lagos society, as older and younger generations live in sustained cooperation with the notion that the older you get, the wiser you are perceived to be (Okobia et al. 2016). Although respecting the elderly is common in different parts of the world, this practice goes beyond Lagos culture. Old age is a cultural value to Lagos residents, and the elders must fulfil many responsibilities (Mathias and Madumelu 2014).

Many multilateral organizations have advocated for the need for sustainable environmental strategies such as recycling in developing countries due to recognising peculiarities within those developing countries (Bass and Dalal-Clayton 2012). As mentioned earlier, Lagos, a representative of developing countries, is one of the largest and fastestgrowing economies, with rapid urbanisation and a large and fast-growing population. Even with the wealth and environmental agencies, for example, the National Environmental Standards And Regulations Enforcement Agency (NESREA) and Lagos Waste Management Authority (LAWMA), Lagos still lacks an efficient recycling presence based on characteristics such as lack of community participation, particularly in the rural areas, lack of knowledge towards recycling and effective recycling technologies and methods (Jiboye 2011; Aliyu and Amadu 2017). Although environmental problems have been acknowledged by studies such as (Matagi 2001; Walter et al. 2005; Daramola 2010), little attention has been given to the implication of recycling techniques and principles in Lagos. As a result, Lagos generates an abundance of solid waste annually, with less than 30% of it being collected due to the reckless disposal of municipal waste (Bakare 2020). Lagos currently lacks an adequate framework for implementing waste management across the state, resulting in a perceived urgency from the government to acquire a regulatory framework that will be attractive to the communities and private sector.

Studies such as (Marshall and Farahbakhsh 2013; Gandy 2014; Jambeck et al. 2015; Charter 2017) have suggested that neglecting critical environmental issues result in a negative environmental impact. Therefore, developing states such as Lagos should achieve green success through a social and economic impact on the environment (Adejumo and Adejumo 2014).

4.12 Conclusion

Following the critical philosophy paradigm, research required investigating and selecting from various paradigms. The first section addressed the different research philosophies while justifying the researcher's choice of Philosophical Paradigm applied in the research strategy; in addition to the issues of encompassing the reflective measurement of construct, the handling of data collected in both a confirmatory and exploratory manner, alongside the collected data analysis in both contextual and information capacity.

Further, the choice between qualitative and quantitative research was revealed to be based more on the researcher's philosophical knowledge and how it can be understood in reality. However, qualitative and quantitative strategies should be complementary rather than incompatible (Onwuegbuzie et al. 2009). The author added further that even though their procedures for textual interpretation may differ from statistical analysis, their underlying principles are much the same as qualitative and quantitative research have a role in academic marketing research.

Three distinct strategic phases were used to collect this research: pilot and final data collection. Each phase had different objectives, with a similar overall aim of collecting data representing responses with a high validity suitable for analysis. Previous studies have suggested that a vast amount of academic marketing research is quantitative with an overriding positivist paradigm (Harris et al. 2018; Mikalef et al. 2019; Machín et al. 2020). Therefore, this thesis followed a post-positivist paradigm with a bias favouring quantitative methods. The following section describes the implementation of the data collection strategy, consistent with the research paradigms assumptions and the measurements model strategy.

5 Research Methods

This section covers the research methods employed in this thesis by highlighting the research process and the paradigm choice emphasised in the research methodology chapter. This thesis follows a positivist paradigm favouring quantitative methods extracted from the interpretivist end of the continuum, especially at the scale development phase. These methods were chosen to ground and guide the research by providing the systems, rules and procedures against gauged research claims based on the critical realist selected paradigm (Frankfort-Nachmias and Nachmias 2007; Burrell and Morgan 2017).

5.1 Introduction

This chapter provides an understanding of generating empirical evidence through techniques that facilitate judging methods used in this thesis by assembling evidence to refute or support the research model and justify the thesis claims of theory contribution. Therefore, the research design incorporated logical methods to connect the data to the causal inferences emphasised in this thesis.

Although there are numerous available research methods options, this section justifies using research methods to assemble evidence to support or refute the research model. At the same time, it contributes to theory by connecting to the causal inferences asserted by the researcher through logical methods, research design, and the collection of data and analysis, resulting in the behavioural attributes that can influence recycling behaviours in Lagos. The structured patterns displayed influenced the provision of a new insight towards recycling behaviour by extending the theory of planned behaviour based on Lagos characteristics. In line with Remenyi et al. (1998), the specific research methods displayed in Figure 5.1 added precision to the research process by ensuring a logical routine progression was followed during the data collection and analysis. Therefore, the relevant outputs and precise inputs transformed the chosen methodology into a process that delivered the research aim. At the same time, the applied techniques produced numerical evidence outcomes by presenting the framework used to design and validate the primary constructs measurement models shown in the research strategy.





Source: The Author

Based on the structure of the research design, in Figure 5.1, which aligns with the main

thesis objectives and methodological contribution is as follows:

- Define the constructs: an updated definition of recycling excellence
- Building the research scale based on the developed items
- Developing the customised research instrument for recycling in Nigeria concerning refining the items.
- Examining the relationship between the research constructs and model.

5.2 Scale Development Method

This thesis integrated several approaches to the scale developed, with the classical Churchillian (1979) approach being the main focus of this thesis scale development. This approach begins by specifying the construct's domains and ends with the analysis of the structural model, as presented in Figure 6.1.

The decision to use Churchill's (1979) paradigm to develop the scale for this thesis was based on its development capability of marketing constructs and its measurement ability (Webster 1990, 1993). In contrast, this thesis implemented Rossiter's (2002) C-OAR-SE produced mainly for the formation of the scale development due to the lack of clear instructions that Churchill (1979) did not dwell on. However, this thesis did not adopt Rossiter's (2002) paradigm as the major reference for this thesis scale development due to the over-specification of the details in the paradigm.

5.2.1 Domain Specification

The definition of the decision-making theories, especially the theory of planned behaviour, which was established earlier in the thesis, served to specify the main and domain constructs for this thesis. As a reminder, this thesis focuses on understanding recycling participation by identifying constructs influencing recycling in Lagos. This thesis is unique as it
reveals intentional and behavioural beliefs towards Lagos residents' recycling by providing a framework tailed to Lagos residents on promoting recycling participation by extending the theory of planned behaviour. Therefore, the opposed definitions in this thesis are customised and dynamic to represent this research's research domain adequately. Thus, as a preliminary step of scale development, the entire constructs were defined within the conceptual model of this thesis.

As this thesis lies within the sustainable marketing domain, the perception of individual behavioural change was assessed by extensively searching peer-reviewed databases and literature to capture the domain of this research construct antecedents and items. More details are provided in the next steps of scale development.

5.2.2 Generation of Scale Items

A set of sixty-nine items was initially generated from literature, focusing on expanding the theory of planned behaviour and the Lagos characteristics. To confirm the items and Lagos characteristics, a semi-structured interview with Lagos residents was conducted to check and compare the item's interpretation to the characteristics. Finally, the interview results were analysed and grouped into themes to help reword and edit the items. This led to the labeling and formation of the main research constructs: attitude, social norms, perceived behavioural control, word-of-mouth, trust, collectivism, motivation, intention, and behavioural outcome.

5.3 Measurement Model

According to Borsboom et al. (2004), the structural relationships among latent unobserved constructs are often identified by the statical relationship between indicators or unobserved variables and constructs. Coltman et al. (2008) added that the foundations for content validity are provided by empirical analyses, especially when detecting misspecifications and errors or wrongly conceived theories. Hence, the importance of comparing the differences between the available measurement options, casual relationships, underlying assumptions, and measurement methods. As a result, this thesis followed the empirical viewpoint of using the resultant procedure and measurement perspective results.

There are two main measurement options for assessing the latent constructs: reflective and formative measurement models, which might produce different material results when used in the coordination measures concerning parsimony, criterion validity, and content (Harris et al. 2018). Knowing the difference between relative and formative measures is essential, based on the importance of using the proper measurement specifications to help assign meaningful relationships in the structural model (Coltman et al. 2008).

In a reflective model, the latent constructs are generally referred to as indicators presumably assumed to result in consequences (Borsboom et al. 2004). The reflective model occurs when the construct causes the constructs indicators. Hence, when a change occurs within the latent constructs, it changes the value of the reflective indicators, showing a causal relationship between the construct and the indicators, as seen in the reflective models of Figure 5.2 (Baxter 2009). For example, attitudes or values with underlying indicators such as behaviour (Diamantopoulos and Siguaw 2006). Therefore, reflective models include critical scale properties such as inter-correlations among items and convergent, internal consistency, and discriminant validity (Churchill 1979; Rossiter 2002).

Figure 5.2: Reflective Measurement Model



Source: Adapted from Jarvis et al. (2003)

On the other hand, formative models assume that the change in indicators causes variation within the latent construct (Diamantopoulos and Winklhofer 2001). Hence, the direction of the causal relationship is opposite to the reflective models. An example of a formative construct is social status, resulting from several characteristics such as income, education and occupation, and other formative indicators (Podsakoff et al. 2006).

According to Diamantopoulos and Siguaw (2006), index constructions are usually required with formative models instead of multi-scale development in reflective models. Index construction includes explaining multicollinearity among the indicator's unobserved variance while emphasising the role of the predictors rather than the predicted variables (Diamantopoulos and Siguaw 2006).

Figure 5.3: Formative Measurement Model



Source: Adapted from Jarvis et al. (2003)

This thesis measurement model was not easy to choose due to the different factors necessary for invalidating the choice. Firstly, the choice between a reflective and a formative specification was primarily based on the theoretical aspect rather than pure empirical considerations that concern the relationships between the latent constructs and indicators under examination (Edward and Bagozzi 2000). Secondly, numerous studies have debated choosing adequate measurement models (Chin 1998; Diamantopoulos 2005; Finn and Kayande 2005). Chin (1998) highlighted the importance of noticing that some constructs may be considered reflective and formative in measurement models. However, this thesis incorporated criteria deemed to be based on (Jarvis et al., 2003) to determine whether the primary constructs were reflective or formative.

According to Jarvis et al. (2003), a primary condition is the direction of causality, based on the construct in reflective models and items to construct in a formative model. This thesis suggested a reflective model relationship based on the primary construct and direction of the

arrows from the antecedents/constructs towards the items. This also logically applies to all the hypothesised relationships in this thesis²⁰.

Although Jarvis et al.'s (2003) criteria for identifying measurement are helpful, few aspects lack this criterion. For example, researchers have no consensus on whether constructs should be considered formative or reflective. Nevertheless, this makes Jarvis et al.'s (2003) criteria insufficient to decide on the best model specification for this thesis. There were investigations of informative model specifications constructed to enhance the argument of the measurement model, primarily where many limitations of the formative measure were found to be present in the literature.

Firstly, a census of indicators is required for formative specification (Bellon and Lennox 1991), implying that the items used as indicators must cover the entire construct scope as described under the content specification. Due to the lack of literature, choosing a census of indications for recycling behaviour in Lagos through the theory of planned behaviour was challenging. Most studies on recycling behaviours tend to focus on developed cities and, particularly in the U.S.A., the U.K., and economically stable Asian countries, such as China, Japan, and Malaysia, where recycling is heavily industrialised through formal sectors, with frameworks tailed to those specific areas (Williams 2005; Adhikari 2018; Kamble and Bahadure 2019; Ferronato 2020; Wang et al. 2020). Therefore, the accompanying items and indicators were extracted from a large pool of items in the literature, which suggests a reflective specification. Diamantopoulos and Winklhofer (2001) posited that guidelines for constructing indexes based on formative indicators are much harder to find due to the lack of a consistent standard for assessing the psychometric properties of formative measures. Hence, a formative

²⁰ Refer to chapter 3 for the hypothesised relationships in this thesis

model does not allow parameter estimation with a structural equation model without having the construct linked to at least one other construct (Diamantopoulos and Winklhofer 2001).

Usually, when focusing on business research, especially marketing, reflective models are traditionally used when testing the variables via multi-item scales constructed (Edwards and Bagozzi 2000; Diamantopoulos et al. 2008). Therefore, a multi-item scale was developed rather than an index construction.

5.4 Descriptive Methods

The use of variance, mean, standard deviation, skewness, and kurtosis of data sets are generally characterised by the univariate normality of distribution. In addition, data outliers were also screened (Knief and Forstmeier 2021). These statistical tests were the foundation for assessing the univariate normality outlined in the descriptive data analysis.

5.4.1 Measures of Central Tendency

Most variables were calculated by the central tendency measure of arithmetic mean and the median and mean calculations. These values were reported to influence the understanding of the deviation of the measurement from the normal distribution (Knief and Forstmeier 2021). The maximum and minimum values were also recorded to statistically help indicate the range of values encountered, based on all the possible values in the variables scale range, along with reducing the range on the indicated analysis.

5.4.2 Variance Indicators

The deviation square between the mean of the sample set and the value from which it derives is expressed through the variable sample variance (Mestdagh et al. 2018). The sample

value is usually represented by X, while the \overline{x} represents the sample mean, and n is the number of samples (Rhemtulla et al., 2020). The variance indicator can be in the mathematical form of:

 $S 2 = \sum (X - \overline{x}) / 2 n - 1$

The F-statistic is the ratio of the variation between the sample group's means divided by the variation within the sample (Mestdagh et al. 2018). The F-static tests the null hypothesis by possessing two populations of the same variance, and if the null hypothesis is true, then the value of the F-static will lean towards one (Vani 2015). According to Wasserstein and Lazar (2016), the F value is reported alongside a significance value of <0.05. A significant difference is considered in the group variation when it is below this threshold.

Levene's test is an inferential statistic used to test the null hypothesis between two groups. According to Wasserstein and Lazar (2016), the p-value results should have a value of <0.05, which is based on the rejection of the null hypothesis of equal variances and the conclusion of the difference between the variances in the population.

5.4.3 Standard Deviation

The standard deviation represents how spread out the numbers are in distribution by square rooting the variance (Thompson et al., 2002). The standard deviation sample can be mathematically expressed as:

 $sd = \sqrt{\Sigma} (X - \overline{x}) / 2n - 1$

The interpretation of how severely the deviation of values from normality is aided by using the standard deviation in conjunction with other measures, such as the variance, kurtosis, and skewness, aid the statistical description of a distribution curve (Myers et al., 2013).

5.4.4 Kurtosis and Skewness

Kurtosis and skewness are terms used to describe how a data distribution deviates from a standard bell-shaped distribution curve. In addition, kurtosis is a term used to describe how flat or peaked distribution is compared to a normal distribution. For example, when there is a flattened distribution, this is called platykurtic, whereas when the distribution is peaked compared to a normal distribution is referred to as leptokurtic (Hair et al. 2010). Therefore, kurtosis is the measurement of a distribution's tail extremity that reflects the distribution's propensity to produce outliers or the presence of outliers in the distribution (Westfall 2014).

On the other hand, Skewness describes how balanced the values are, with values showing positive skew predominately shifted toward the left of the centre (Hair et al. 2010). Conversely, negative skew is referred to the distribution where values tend toward the right of the centre. When statistical tests of Kurtosis and skewness (z-scores) are calculated, if the values exceed (\pm) 1.96 for kurtosis and (\pm) 2.58 for skewness, then the distribution can be said to be non-normal for the characteristics (Hair et al. 2010).

5.4.5 Outliers

An interval Likert scale was used to score and collect the variable, with respondents' opinions on the items on a standard five-point structured scale with a maximum score of 5 (Strongly Agree) and a minimum score of 1 (Strongly Disagree). In addition, the respondent self-reported classifications were collected through the demographic data from a mandatory list. Therefore, the collected data were less prone to extreme univariate outlier data than if a freely scored open-ended series of questions had been asked.

5.4.6 Descriptive Methods Summary

The indicators of non-normality and normality were calculated using the statistical method described in this subsection above to assess whether sufficient proximity was displayed by normally distributed variables included as part of the multivariate data analysis.

5.5 SEM Modelling Methods

Structural Equation Modelling (SEM) is related to the statistical modelling techniques to explain the relationships between multiple constructs composed in the structural model (Hair et al., 2010). SEM models are also used to examine the interrelationship structure expressed in a series of equations similar to the series of multiple regression equations. Despite all the relationships between independent and dependent constructs, the SEM models estimate interrelated and multiple dependence relationships (Astrachan et al., 2014).

The SEM model also tends to have the ability to represent unobserved concepts within the relationships while accounting for measurement error in the estimation process (Hair et al., 2010). The nature of research in different areas has been changed by the advent of SEM with latent constructs, making SEM one of the essential methods for empirical research (MacCallum and Austin 2000). Hence, its popularity in fields such as psychology and marketing (Baumgartner and Pieters 2003).

There are currently two general approaches to SEM: Covariance-Based structural equation modelling (CB-SEM) which can be executed with software such as AMOS, LISREL and EQS. And the variance-based structural modelling, also known as Partial Least Square (PLS-SEM), is executed in software such as Smart PLS (Astrachan et al., 2014). When using CB-SEM, the estimating model parameter sets demonstrate how well a theoretical model fits the

observed data to the empirical covariance matrix observed within the fitted model (Chin et al., 2020). Hence, when a model is fitted using Maximum Likelihood (ML), there is a requirement to estimate sets of assumptions to be fulfilled, like multivariate normal distribution of the observed indicators and sufficient sample size (Klein and Moosbrugger 2000). Therefore, PLS-SEM will become suitable for the study (Hair et al., 2005). In contrast to CB-SEM, distributional assumptions are not required to be filled with PLS-SEM as they can provide accurate and robust fits for relatively smaller sample sizes (Tenenhaus et al. 2005).

5.5.1 Comparison of CB-SEM and PLS-SEM

There are distinct differences between the CB-SEM approach and the PLS-SEM approach (Gefen et al. 2000). For example, their underlying statistical assumptions, their objective analysis, and the nature of produced fit statistics. However, the CB-SEM approach is based on the foundation of Jöreskog's (1972) and Wiley's (1973) developments by utilising a maximum likelihood estimation that involves using a separate set of relationships for the groups of dependent variables. First, a series of simultaneous independent but separate multiple regression equations were estimated by SEM, specifying the structural model used by the statistical program. Then, a model relationship of each dependent variable was translated into a series of structural equations to test the dependence relationships between the constructs, allowing for multiple relationships between independent and dependent variables.

The statistical method used to derive parameter estimates is the Maximum Likelihood Estimation (MLE), by maximising the likelihood that data are drawn from the population based on the strength of the covariance between the values (Astrachan et al. 2014). The maximum Likelihood is founded on the principles of Normal Theory. It assumes that the population

distribution of the endogenous variables is multivariate normal, with the assumption rarely held in the data's research collection (Falk 2018). Nevertheless, the MLE is robust to deviations of non-normality, especially with a large sample size, while requiring no missing values in the records (Hu et al. 1992).

The complex fitting function and the candidate model fitted iteratively drive the estimation of parameter values by using the estimated start values from the model parameters while continuing until the appropriate estimates level off, leading to a converged solution. The regression coefficient in multiple regression equations was used to interpret the results of estimated path coefficients (Astrachan et al. 2014). Thus, the coefficients that control for correlations among multiple indicators are estimated by Maximum Likelihood.

In contrast, According to Chin (1998), the PLS-SEM originated in the 1970s by an econometrician named Herman Wold. The PLS-SEM algorithm extends the principal component and canonical correlation analysis by alternating least squares algorithms (Henseler et al. 2009). The author added further that there usually are two sets of linear equations known as the measurement model and structural model applied to the path of the PLS model. The measurement model, also known as the outer model, identifies the relationship between the latent and unobserved construct. While the structural model, also known as the inner model, identifies the relationship between the inner model, identifies the relationship between the latent and unobserved construct. While the structural model, also known as the inner model, identifies the relationship between the latent and unobserved construct. While the structural model, also known as the inner model, identifies the relationship between the latent and unobserved construct. While the structural model, also known as the inner model, identifies the relationship between the latent and unobserved construct. While the structural model, also known as the inner model, identifies the relationship between the items and the latent constructs.

Henseler et al. (2009) posited that the PLS algorithm is an essential sequence of weight vectors regressions processed through the following stages: stage one, the iterative estimation of latent constructs scores of procedures (outer approximation of the latent variable scores; estimation of inner weights; inner approximation of the latent variable scores;

and estimation of the outer weights) that is obtained by repeating the convergence. Stage two: the estimation of the outer loadings and path coefficients. And lastly, the estimation of location parameters.

There has been a rise in PLS-SEM use in the marketing field, with scholars such as (Henseler et al. (2009) viewing this approach as a more robust structural model estimation. Hair et al. (2011) added that when CB-SEM distributional assumption cannot be met, PLS-SEM can be viewed as an alternative method. Table 5.2 summarises the comparison between CB-SEM and PLS-SEM.

Feature	CB-SEM	PLS-SEM
Objective	Parameter-oriented	Prediction-oriented
Approach	Covariance-based	Variance-based
Assumption	Multivariate normal distribution	Predictor specification
	and independent observations	(nonparametric)
	(parametric)	
Parameter estimates	Consistent	Consistent as indicators and
		sample size increase
Latent construct	Indeterminate	Explicitly estimated
scores		
Epistemic relationship	Only with reflective models	It can be modelled in either
between constructs		formative or reflective
and their measures		measurement models
Model Complexity	Small to moderate complexity	Large complexity
Implications	Optimal for parameter accuracy	Optimal for prediction accuracy
Sample size	It is ideally based on a power	Power analysis is based on the
	analysis specific model. Minimal	model's portion with the most
	recommendations range from	significant number of predictors.
	200 to 800.	Minimal recommendations range
		from 30 to 300 cases.

5.5.2 Rules of Thumb for Selecting CB-SEM or PLS-SEM

It is essential to understand the statistical methods required to determine which

methods to employ. According to Hair et al. (2011), several factors need to be evaluated when

selecting between CB-SEM and PLS-SEM, such as the research objective, measurement model specification types, structural model modelling, and model evaluation data characteristics. Additionally, rules of thumb should be used as a guideline when selecting between PLS-SEM and CB-SEM, listed below.

Firstly, the researcher must identify the research objective when choosing between these two methods. When the objective is necessary to confirm or test a theory, CB-SEM is an appropriate method. It is based on its requirement to demonstrate how well a theoretical model fits observed data (Barclay et al. 1995). On the other hand, CB-SEM is a more appropriate modelling method when an objective is required to minimise the covariance matrix. Whereas the PLS-SEM approach is suitable for objectives requiring prediction and theory development, this type of modelling focuses on identifying the best relationship prediction among the constructs while focusing on maximising covariance among the latent construct to boost the interpretation of the model (Sosik et al. 2009).

Secondly, there is a limitation to using CB-SEM, as it can only be used in research models that consist of reflective constructs. Although, studies such as (Henseler et al. 2009) have utilised formative measures within the structural model, leading to identification problems. For example, a situation could be created using formative constructs where it is impossible to explain all the indicators' covariance (Chin 1998). Urbach and Ahlemann (2010) added that using CB-SEM is relatively varied when handling both reflective and formative constructs. In contrast, a research model consisting of reflective and formative constructs can utilise PLS-SEM to analyse the research (Chin 1998). Hence, researchers can utilise either formative or reflective or a combination of both constructs simultaneously.

Thirdly, several assumptions must be met before any further analysis can be done with CB-SEM. Such as multivariate data normality, observation independence, and variable metric uniformity (Sosik et al. 2009). Hair et al. (2011) posited that research is required to have a large sample size and the data having a normal distribution when using CB-SEM. If these requirements are not met, the CB-SEM results will be inaccurate. In contrast, the PLS-SEM algorithm is a more robust approach to analysing non-normality distribution data. Data normality is not required for PLS because its standardisation mechanism transforms any non-normal data into data that adheres to the central limit theorem (Beebe et al. 1998).

Finally, the main objective of PLS-SEMs is to predict or test the suggested theoretical model based on the literature while not testing which alternative model fits the data better (Sosik et al., 2009). PLS is therefore allowed to "estimate" due to the correlation of the residual manifest and latent constructs in PLS (Falk and Miller 1992).

Overall, PLS-SEM can be an adequate alternative to CB-SEM, especially when the following problems have the following characteristics (Chin and Dibbern 2007):

- When the investigated phenomenon is relatively new, and the measurement models need to be newly developed.
- When using a complex structural equation model with many constructs and items.
- When the relationship between the indicators and the constructs has a formative and reflective measurement model.
- When the conditions relating to independence, normality distribution and sample are not met
- When the parameter is less important than the prediction estimation.

5.5.3 Justification for choosing PLS-SEM

Even though PLS-SEM is methodologically well-established and frequently applied in studies within social sciences, a researcher needs to justify their choice of method (Chin 2010; Ali et al. 2018). According to Hair et al. (2021), there are several reasons for choosing PLS-SEM, e.g., the research objective, sample size, and model formation. However, for this thesis, some important research constraints and objectives led to the choice of PLS-SEM for this data analysis.

Firstly, the nature of this thesis required testing a theoretical framework from a predictive perspective by developing hypotheses²¹. The PLS-SEM approach is suitable for objectives requiring prediction and theory development, allowing the focus on identifying the best prediction of the relationship among the constructs to boost the interpretation of the model (Sosik et al. 2009). The main objective of PLS-SEMs is to predict and test the suggested theoretical model based on the literature while not testing which alternative model fits the data better (Sosik et al., 2009). PLS is therefore allowed to "estimate" due to the correlation of the residual manifest and latent constructs in PLS (Falk and Miller 1992). The study model was tested among Lagos residents to predict their recycling behaviours.

Second, the other reasons for adopting the PLS-SEM method include its flexibility in accommodating small sample sizes and avoiding normality assumptions (Hair et al. 2017; Hair et al. 2021). In addition, it offers high predictive power and a robust way to analyse data (Chin and Dibbern 2007).

²¹ Refer to chapter 3 for the proposed hypotheses for this thesis model

5.6 Partial Least Squares Structural Equation Modelling

The partial Least Suares Structural Equation Model (PLS-SEM) algorithm can be linked to wold's early work on principal component analysis (Hair et al. 2014). PLS-SEM was first completely formalised in 1979, with its primary reference in 1985 (Wold 1985). According to Chin and Newsted (1999); Lohmöller (1989), over the years, several researchers have built on Wold's work to enhance the development and refining of this algorithm. The following sections highlight the PLS-SEM basic concept and the framework for applying PLS-SEM.

5.6.1 The Basic Concept of PLS-SEM

PLS-SEM is used to analyse the data, resulting in a full collinearity test conducted as a statistical check by detecting and controlling the common method bias (Hair et al., 2014). Based on a confirmation factor analysis, PLS-SEM analysis provides a powerful test in identifying a common method basis compared to the other standard criteria of the convergent and discriminant validity assessment (Kock 2015). This study used PLS-SEM to help analyse the data, as Smart-PLS was chosen based on its advantage of handling non-normal data explaining the variance among target constructs (Ringle et al. 2005). The PLS approach allows researchers to simultaneously assess measurement model parameters and structural path coefficients (Park et al. 2015).

When using PLS-SEM, there are two statistical analyses carried out: the measurement model, also known as the outer model, describes the relationships between the latent constructs and their items, and the structural model assessment, which represents the relationships between the latent construct and is also referred to as the inner model as it focuses on hypothesis testing (Hair et al. 2018). The measurement or outer model can be

reflective or formative (Hulland 1998). In a reflective model, the unobserved or latent construct causes the observed measurement items or indicators to occur, also known as factor loading (Henseler et al. 2009; Ringle et al. 2010). On the other hand, in a formative model, the observed measurement items or indicators cause or predict the unobserved or latent variable to occur, also known as the weight coefficients (Heseler et al. 2009; Ringle et al. 2010). The first step of structural equation modelling is the measurement model assessment. The structural model is operationalised at a higher level as second-order constructs that reflect a type of reflective-formative model following Jiang and Messersmith's (2018) recommendations.

5.6.2 The PLS-SEM Algorithm

The PLS-SEM has two phases: a main iterative procedure and a final stage. During the initial stage, all the variables are normalised to make it easier to interpret the results while making the primary procedure use a more straightforward computation (Hair et al. 2014). There are two steps linked with the primary process, with the first step called outside approximation. This step estimates all the latent constructs in the form of the weighted aggregated of the manifest construct (Heseler et al. 2009). The estimations are derived when equal weights are allocated to each block indicator, with the latent constructs scores calculating each case (Ringle et al. 2010). The approximation procedure produces a more appropriate weight estimated using ordinary least squares regression based on the empirical data.

The second step creates proxies for each endogenous latent construct based on their relationships with the neighbouring latent constructs (Heseler et al. 2009). This step is also

known as an inside approximation. The following aspects (factor loadings, regression coefficients, and validation measures) are computed during this algorithm phase.

5.7 Measurement Model

When assessing models using PLS-SEM, there are two main sets to measure reliability and validity, also known as the "psychometric properties" of measurement scales towards the accuracy and adequacy of the evaluation of the measurement procedure (Matthews and Ross 2010; Kock 2015; Park et al. 2015; Hair et al. 2018). According to Matthews and Ross (2010), a measure can be reliable while not valid, likewise being valid but not reliable. Especially when it is measuring the right construct, but not consistently, reliability and validity are essential to ensure adequate measurement of the constructs (Hair et al. 2018). Reliability focuses on the extent to which an item sets measures a construct dependably or consistently, not accurately. In other words, if a set of items are used to measure a construct multiple times with the assumption that the underlying phenomenon is constant, the same results should be produced every time (Matthews and Ross 2010).

The measurement model aims to produce evidence from the data to refute or support the research models by observing the hypothesis relationship outlined in the study. According to Straub et al. (2004); Lewis et al. (2005); Hair et al. (2011), the measurement model can be recognised by examining the following:

5.7.1 Internal Consistency

Traditionally, Cronbach Alpha (CA) is used to assess the internal consistency of a measurement model. CA represents the instrument's internal consistency used during data collection by determining the consistency index for each construct and presents values between 0 and 1 (Cronbach 1971). According to Hair et al. (2010), the threshold level for CA should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. When CA is employed, an estimate of the reliability based on indicator intercorrelation is offered.

5.11.1 Composite Reliability (CR)

When using PLS, the other method used to measure internal consistency is Composite reliability (Chin 1998). Both composite reliability and Cronbach's alpha measure internal consistency; however, composite reliability is considered the items' congeneric, providing a reliability measure of the composed latent variable. In contrast, the measurement of individual items is the basis for Cronbach's alpha value, resulting in each item is assumed to load equally to the factor.

Although Cronbach's alpha measure was strengthened by calculating the internal reliability of the constructs by utilising the factor analysis loading obtained through the calculated analysis of each construct's composite reliability (Raykov 1997), the composite reliability is considered the items' congeneric, providing a reliability measure of the composed latent variable. In contrast, the measurement of individual items is the basis for Cronbach's alpha value, resulting in each item is assumed to load equally to the factor. Additionally, heterogeneous correlations between the indicators allow a composite reliability score to be calculated more precisely than the alpha scores (Geldhof et al. 2014). Therefore, the measurement for composite reliability of 0.7 thresholds was used for composite reliability measurement.

5.7.2 Indicator Reliability

Indicator reliability is obtained from squaring outer loadings of reflective constructs to produce a necessary and sufficient measure of the measurement model while clearly describing the relationship between the latent construct and their measures (Urbach and Ahlemann 2010). Nevertheless, the construct reliability is independent of a precise calculation from other constructs. When observed measures share a common cause, they also tend to be correlated, and as a result, they are latent constructs. The latent constructs account for the latent constructs' inter-correlation through the linear function that describes a unique factor alongside a more common factor. To confirm that high item loadings supported the factors, they were tested to the construct and checked to ensure that none of the items was crossloading to multiple factors.

5.7.2.1 Item Loadings

The relationship between recorded indicators, measures, and latent factors or variables has been tested with PLS (Brown and Moore 2012). When the observed measures share a common cause, they also tend to be correlated, and as a result, they are latent constructs. The latent constructs account for the latent constructs' inter-correlation through the linear function that describes a unique factor alongside one or more common factors (Hair et al. 2010).

To confirm that high item loadings supported the factors, they were tested to the construct and checked to ensure that none of the items was cross loading to multiple factors. All the items with standardised loading of 0.50 and greater were considered significant (Hair et al. 2010).

5.7.3 Convergent Validity

Convergent Validity is used to test the degree of correlation between the chosen items to supposedly be theoretically related to each other (Henseler et al. 2009). It is measured by the Average Variance Extracted (AVE) by reflecting the proportion of the explained variance captured for a specific latent construct concerning the measurement error variance produced.

5.7.3.1 Average Variance Extracted (AVE)

Average Variance Extracted (AVE) is the amount of variance captured by the construct in relation to the amount of variance resulting from measurement error (Fornel and Larcker 1981). AVE is calculated by dividing the sum of the squared factor loading with the sum of squared factor loadings added to the sum of the error variances to produce a measure of the variance extracted from the measurement by the factor. The variance based on measurement error tends to be less than the variance extended due to the construct when the AVE is .0.50, lending convergent validity to the model (Bagozzi et al. 1991).

5.7.4 Discriminant Validity

Discriminant validity was used to determine whether each item shared more significant variances with its latent construct than the other constructs (Fornell and Bookstein, 1982; Chin 1998; Todorova 2013). Urbach and Ahlemann (2010) posited that discriminant validity refers to the level of correlation between the items used to measure a construct with items of other unrelated constructs that theoretically should not have any correlation. Hair et al. (2014) added that discriminant validity could also efficiently measure the degree of difference between overlapping constructs. In contrast to convergent validity, discriminant

validity tests whether an item unintentionally measures other constructs other than its intended construct while determining if there is well-established factor loading.

Discriminant validity was then evaluated in this study using two approaches—first, the Fornell-Larcker criterion, which has been considered a conventional approach to assess discriminant validity by testing whether the square root of each construct's AVE is more significant than its correlation with each of the remaining constructs (Hair et al. 2010). According to Fornell and Larckers (1981), the correlations among AVE and constructs can establish discriminant validity. The authors further posited that the square root of the construct AVE needs to be greater than the correlations between constructs to satisfy the discriminant validity. Fornell-Larcker's criterion has been considered a conventional approach to assessing discriminant validity. However, other approaches include the cross-loading examination method and the HTMT ratio (Hair et al. 2010). And secondly, an examination of the cross-loading revealed no indicator loaded higher on an opposing construct (Hair et al. 2011).

5.11.4.1 Fornell-Larcker Criterion

According to Hair et al. (2010), Fornell-Larcker's criterion is considered a conventional approach to assessing discriminant validity by testing whether the square root of each construct's AVE is more significant than its correlation with each of the remaining constructs. As shown in Table 8.5, all the constructs exhibited discriminant validity, as all the square roots of the AVE construct have a more significant construct correlation than any other (Gye-Soo 2016).

5.11.4.2 Cross Loading

Cross-loading is an approach used to establish discriminant validity, also known as "item-level discriminant validity" (Henseler et al. 2014). When using cross-loading, the discriminant validity is determined when each measured item weakly correlates with all other constructs apart from the one it is theoretically associated with (Gefen and Straub 2005). When all the measurement items are more strongly correlated with their theoretically associated constructs than others. Thus, discriminant validity will be established.

5.8 Multicollinearity Detection Methods

Hair et al. (2010) posited that when the bivariate relationship between constructs is high, generally from 0.9 or above, this is the simplest way to test for multicollinearity in a dataset. According to Kenny (1979), multicollinearity is a case of empirical underidentification, which may result in difficulties when evaluating the covariance between highly correlated constructs based on the insufficient separations between the measures of one item against another. Therefore, levels of multicollinearity with high correlation values of 0.85 and above tend to lead to bias analysis due to the exaggerated effects of multiple factors that are not discriminated sufficiently (Kline 2005). Nevertheless, as is often the case in social sciences, a certain degree of correlation is expected between the factors (Costello and Osborne 2005). There are generally two options when multicollinearity is suspected: to merge the two into a single item where redundancy is suggested or remove the item from the constructs (Kline 2005). Therefore, to ascertain how closely the observed values fit the represented constructs, this thesis used the squared multiple correlations of the constructs (R^2) to calculate the percentage variation.

5.8.1 Variance Inflation Factor

The Variance Inflation Factor (VIF) represents the total standardised variance ratio to unique variance, which is calculated as $1/(1-R^2)$. Values are considered redundant when over 10; however, some values less than five tend to be acceptable for analysing purposes (Sheather 2009).

5.9 Structural Model

The assessment of a structural model can only be analysed once the measurement model has been successfully validated (Heseler et al. 2009). A structural model can systematically evaluate whether the data support the proposed hypotheses by estimating the path significance between the constructs and the explained variance (R²) for the endogenous constructs (Henseler et al. 2009; Karim and Weisz 2010; Urbach and Ahlemann 2010). The first criterion for assessing the structural model is evaluating the endogenous latent construct coefficient of determination (R²). According to hair et al. (2010), the R² value is obtained by taking the square of the correlation coefficient while indicating the percentage of the total variance in an independent variable explained by the model of which the construct is part.

The following criterion used in assessing the structural model is the path significance through the bootstrapping procedure, which resamples information relating to the confidence intervals for the parameter estimates, including the estimate of spread and bias of the sampling distribution of specific statistics (Henseler et al. 2009). In the bootstrap procedure, t-values are produced for each path model by creating a large sample number that treats each recreated sample to represent the population and randomly draws cases from the original samples. Hence the pre-specified sample number for the bootstrap needs to be equal to the number of observed cases of the original sample (Henseler et al. 2009). Therefore, the greater the resampling number is, the more reliable the t-statistics will be.

5.9.1 SEM Modelling Method Summary

This chapter reflected on the discourse of SEM while comparing both CB-SEM and PLS-SEM. PLS-SEM has become increasingly popular in many fields, especially marketing and psychology. This chapter also outlined the differences between the PLS-SEM and covariance-based approaches to SEM, resulting in PLS-SEM being the method chosen to determine the relationships between the constructs models.

The following sections highlight the different types of fit indexes used in determining the goodness-of-fit, with other statistical techniques deemed helpful in evaluating the research model.

5.10 Goodness-of-fit for PLS-SEM

Although the concept of model fit is strongly relied on with CB-SEM, this is not the case with PLS-SEM (Hair et al., 2019). Consequently, researchers such as (Westland 2015 and Henseler et al. 2016) have suggested model fit measures for PLS-SEM. However, Hair et al. (2019) posited that the ability of these measures needs to be considered with caution based on three reasons. Firstly, there has been a lack of comprehensive assessment of the proposed methods to date; therefore, they should tentatively be considered. Secondly, the PLS algorithm solution is not based on minimising divergence between the estimated and observed covariance matrices.

Consequently, the methods used in CB-SEM, such as the concept of Chi-square-based model fit measures and their extensions, do not apply to PLS-SEM. In addition, the bootstrap-

based model fit assessment, for example, the SRME used to quantify divergence between the estimated and observed covariance matrices should be considered extreme. Lastly, scholars such as (Rigdon 2012; Hair et al. 2017) have questioned whether the model fit concept used in CB-SEM context research is generally of value to PLS-SEM applications.

Therefore, the PLS-SEM model of fit should be validated by its primary focus on the interplay between theory testing and prediction (Shmueli 2010; shmueli et al. 2016). Therefore, this study evaluation procedure is based on PLS-SEM's prediction-oriented nature.

5.11 Mediation and Moderation

After completing the model fitting, the following procedure used the mediation and moderation testing techniques to explore the mechanism of why, when, and how the extended theory of planned behaviour mediates the influence of recycling predictors on the intention to influence recycling behaviours in Lagos. The mediation analysis tested the research model to understand and shed light on the likely triggered effects based on why and how the dependent variable's predictors/ independent values significantly affect and trigger.

5.11.1 Path Analysis

Path analysis is a common term for estimating SEM model relationships through bivariate correlation and analysis. This research strength of the portrayed path within the path diagram was determined through the path analysis by estimating the strength within the loaded items to the construct. The structural models assessed the significance of the directionality relationship and the constructs. This directly allowed the calculation for the corresponding construct diagram notes and relationship with the hypothesis testing.

The following section describes the special cases of path analysis research methods utilised to assess the mediating and moderating variables.

5.11.2 Mediation Analysis

The mediation analysis aims to better understand the relationship between the constructs by obtaining statistical significance and an accurate understanding of the independent and dependent constructs. According to Hair et al. (2010), a construct between two related constructs is known as mediation. This process helps explain the reasoning behind the occurrence of the effect.

For there to be mediation, some criteria need to be satisfied: firstly, the mediator path needs to be affected by the independent construct; secondly, the dependent construct must be affected by the independent construct; and lastly, the dependent variable must be affected by the mediator, which can be seen in Figure 5.1.





Using the path analysis of the validated research model helps determine the strength of the mediating process or construct was determined. These results are used to interpret the

Source: (Baron and Kenny 1986)

significance covariance between dependent and independent constructs while producing the strengths of the effects from the weight of both constructs. Full mediation was inferred when detecting a significant relationship without the mediator. Equally, the absence of mediation effects was noted during significant covariance evidence without the mediator while becoming insignificant with the mediating construct. Lastly, when the significant relationship was shown to reduce without the mediator, the mediating construct, when added, showed a reduced significant effect, known as partial mediation.

5.12 Researcher Bias

It is incredibly impossible to be free of bias from latent constructs that are so entrenched into the researchers' background and life layer without producing an implied attitude when trying to prove and seek the concept of legitimacy impacting their day-to-day events. In addition, what is the possibility of separating the qualitative viewpoints of the semiinterview advisors and researcher-expressed opinions? (Chenail 2011). Even though an anonymous survey was the preferred choice of this thesis to preserve the respondent's personal identity and embeddedness, along with the preservation of personal conflicts of interest of the outcome that was necessary for declaration and acceptance of ethical approval. Conclusively, the interpretation and analysis of the results were based on the creative efforts on the author's part while challenging assumptions by taking confirmation bias measures to prevent partiality to the best of efforts. The following section discusses the data collection process.

5.13 Research Data Collection Methods

The data collection process aimed to gather the primary data used to test the research hypotheses and model outlined in chapter 3²², such as the type of data and analysis that guided the data collection process. In addition, a semi-structured interview was conducted through qualitative analyses, while the initial pilot and the main questionnaire were gathered by employing quantitative data. As a result, the following section is broken into different subsections detailing the timescale of collection, the tools used to capture, analyse and store data collected, and the granting of ethical approvals.

5.13.1 Introduction

The research method is based on the researcher's position on epistemology (which is the study of knowledge to examine reality) and ontology (the study of the nature of human existence in society) (Ponterotto 2005). Studies have shown that different techniques can be utilised under positivist and interpretivist research philosophies, as qualitative and quantitative data gathering methods have widely been discussed based on their rise as a central theme based on their competing paradigm (Hunt 2001; Sobh and Perry 2006). Therefore, this ontological thesis position is a positivist paradigm favouring quantitative methods extracted from the interpretivist end of the continuum, especially at the scale development phase.

In some cases, synonymous terms such as scholars have used interpretivist, ethnographic, naturalistic field research, and constructivist to replace qualitative or quantitative distinction while being used as the same fundamental approach. In contrast, the

²² Refer to chapter 3 for the conceptualisation and hypotheses development

terms empiricist and positivist have often been used instead of quantitative (Singh et al. 2019). The author further added that there is still a debate on the distinctiveness and compatibility between qualitative and quantitative methodologies against particular techniques.

Despite the debates in the literature on the distinctiveness and compatibility between qualitative and quantitative methods, the procedures in qualitative and quantitative research methods are different based on their different assumptions and nature towards data and questions to be answered (Malterud 2001). Additionally, the researcher's background tends to affect the principles and consequences of sampling and the process of organising and interpreting data with the different aspects of validity (Malterud 2001).

5.13.2 Tools for Data Collection

This thesis took its lead from Churchill (1979) for the data collection phase in two parts. The first phase was directly conducted after the items were generated through qualitative data collection (semi-interviews). The second was after the purified measures and was developed through quantitative data collection. Although this thesis depended heavily on quantitative data, qualitative data was essential as it was used to purify items and scale development to help support the new construct added to the theory of planned behaviour based on the Lagos characteristics.

Figure 5.5 Thesis Model



5.14 Qualitative Research

Following Churchill's (1979) approach, the data collection process is generally implemented in parts. The first phase is promptly conducted after the items are generated and the second after the measures are purified. Thus, qualitative data collection was utilised for the first phase of data collection, followed by quantitative data for the second phase. Although this thesis relied extensively on quantitative data, qualitative data was used for item purification and scale development, confirming that the added constructs aligned with the Lagos characteristics.

Studies have found qualitative research to provide essential contributions to academic business research. Stoner and Holland (2004) observed how employing the qualitative research method uses a systematic set of procedures to develop an inductively derived grounded theory on a phenomenon involving an iteratively reciprocal relationship between the theory, data collection and analysis. When research is conducted by systematically analysing the data, such as interview documents or transcripts, this might result in the qualitative studies being perceived as enhancers for science. Nevertheless, Malterud (2001) posited that a better understanding of the meaning and implications of the findings is gained by adding qualitative methods to quantitative ones. Hence, triangulation has consecutively increased confirmation by improving the researcher's ability to conclude their studies with a more robust, complete and generalised set of findings (Hussein 2009).

For this thesis, qualitative data is represented through a semi-structured interview but was not purely undertaken with the intention of data collection. Nevertheless, it acted as a point of assurance and an initial screening phase that defined generated items and constructs that match the perceptions of the preliminary sample. Thus, qualitative methods contributed to the data purification.

5.14.1 Semi-Structured Interview

At the beginning of the empirical research, semi-structured interview data collection was utilised in the initial exploratory phase of the research, with a sample size of seven respondents. These interviews were conducted during the Covid-19 lockdown, resulting in a small sample size. However, Crouch and McKenzie (2006); Hennink and Kaiser (2022) concluded that a small number of cases (less than 20) is efficient in providing strong and practical empirical guidance in qualitative research. The participants were chosen purposely to ensure that they were Lagos residents. They were asked to explain their recycling participation based on their experience and how recycling is perceived in Lagos. The semistructured interview exercise identified the content selection, participant selection, and interview preparation to ensure that all participants were Lagos residents (Spenser and Warfel 2004; Sekhon et al. 2014). The preliminary interview participants gave feedback to improve the understanding, syntax, flow, and order of the final item stems and constructs²³.

The different viewpoints from the interview helped with the domain problem of classifying items to the relevant construct, even with prior research in the field. While stemming from a positive approach, the interviews were documented and counted the number of item occurrences was. The interview lasted for around 15 minutes, as they acted as a check for the added constructs. This led to numerous advantages such as administration ease, the economy of handling significant stimuli or object numbers, low susceptibility to experimental demand characteristics, different types of objects utility, and theoretical framework grounding (Whaley and Longoria 2009). The interview provided an overview of Lagos's behaviours towards recycling.

5.14.2 One-to-One Interviews

Although this thesis was mainly led toward the positivist end of the philosophical stance continuum, the triangulation approach was used in the scale development stage through integrating qualitative research in the form of interviews. Based on qualitative research is a critical application toward scale development (Churchill 1979). The semi-structured interviews acted as an additional check to the initial stage of this thesis by increasing the validity and quality of this research (Mazzocchi 2008). Therefore, it was necessary to rely on a semi-structured interview with a smaller number of participants to

²³ Refer to Table 6.5 for the Interview Identified constructs

ensure that the consensus on the constructs' content and attributes focused on the Lagos characteristics.

5.14.3 Analysis of interview data

The collection and analysis of the interview data for this thesis was an iterative process. The early analysis helped to inform data collection and was treated as part of the research design (Busetto et al. 2020). After each interview, a detailed note was written to help the interviewer reflect on the interview questions for future interviews. A simplified transcription system by Jefferson (1985) was used to assist in writing detailed and accurate transcripts.

During the transcription, notes were made on emerging themes, key segments were highlighted, and codes were inserted. This was a helpful process, as it helped make links to subsequent data. Finally, the audio recording was checked against all the transcripts to ensure all the details missed were added, and the recordings were listened to again during analysis. This time-consuming process enabled the researcher to become intensely familiar with the data and begin analysis early as critical themes were identified (Mihas 2019).

Generating Codes and Themes

The codes that emerged from the data were coded using a flexible Word document of interview data separated into logical chapters and subchapters. All text was coded, and the codes corresponded with headings in the final document. Using this systematic manual coding ensured that all the content was coded, not just words or terms extracted from the text.

Once all transcripts had been coded, the codes were categorised and grouped around each research question in order to contribute to answering them. This produced some themes,

and these themes were analysed across all transcripts to identify patterns. This approach allowed the researcher to compare and contrast themes and explore regular patterns across all respondents, patterns relevant to only a few respondents, and those specifically applicable to a particular respondent.

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Participant ID	Gender	Age Group	Education Level		
001	Female	31-40	Masters Level		
002	Male	31-40	Bachelors Level		
003	Male	21-30	Masters Level		
004	Female	21-30	Higher Education		
005	Female	31-40	Bachelors Level		
006	Male	21-30	Bachelors Level		
007	Male	41-50	Higher Education		

Table 5.3 Semi-Structured Interview Participant Demographics

The semi-structured interview was carried out with seven respondents from the Lagos community, recruited as a convenience sample, and conducted virtually. Crouch and McKenzie (2006); Hennink and Kaiser (2022) concluded that a small number of cases (less than 20) is efficient in providing strong and practical empirical guidance in qualitative research. There was the inclusion of non-expert raters in the interview to ensure that the understanding of the abstract construct was consistent among the various level of potential questionnaire participants while ensuring that the denotative and connotative meanings of the constructs were widely held therefore reducing the bias of the researchers by misclassification (Boeschoten et al., 2018). The interview ensured that the selected interviewees could discuss their thoughts on how they perceived recycling and what they thought would determine it.

The semi-structured interview was also used to reduce and formulate the item pool from and centred on the ratio of items associated with the constructs aligned with the interview results. The most popular choices for each construct were typical indicators by calculating raw rater counts of each item relevant to the construct. Thus, the semi-structured interview provided an independent measure of construct validity where prior scales were

used-resulting in comments from respondents incorporated into the measurement model,

as highlighted in Table 6.4.

Table 5.4 Some Comments from Interviews with Residents in Lagos Nigeria

Comments	General Theme
"A lot really, I feel like recycling can well maybe because of like my scientific background, I knew that anything can be converted from one form to another, so anything can be recycled really. But I think when general people speak about recycling I think they mean things like, bottles, plastic containers things that can be reused you know, metallic components. And anything that can go back into the manufacturing processes raw material or not necessarily like proper, raw material, maybe like a semi-finished like a bottle for instance, I think something like that can be recycled alongside other stuff. I mean, there are a lot of examples, but I mean, I don't know. I feel like I've been able to give you an idea".	Positive / Negative feelings
"Because Lagos is multicultural in a sense, despite being in the western part of Nigeria. You will find all sorts of people who embrace all cultures. And that's me speaking from an ethnic point of view. But in relation to social relationships and people embracing their neighbours, there is no need for bad blood if there is no bad blood. So, people relate very well. And I feel like social relationships are welcomed in Lagos. There is no need for any sort of antagonism. Except, there is a cause that has caused a rift or something I don't know. On the ground level, we believe in relating with one another, participating in communities' stuff, and doing stuff as an estate. For example, throwing parties is why Nigerians throw one of the best parties in the world. Because we welcome ourselves and relate very well with one another".	Accepting group conduct Individual perceptions of particular group conduct. People who approve: Families and friends
"I can't speak authoritatively on that, but within my macro circle we're quite not comfortable with pollution. Well, the truth is the typical I should say like an average Lagosians, changes by the day. And the reason is because like a lot of people are actually getting educated, but to be candid I think based on what I know, if I am to say rather that an average Nigerian is not proactive when you come to recycling, waste management. Like I said my circle of friends because we are literally you know, I just feel like we understand what is going on. We are like out there on social media, we see terrible images of pollution and we are conscious of pollution, waste management, recycling and every other waste related concept. Well I can't speak irritatingly for other people but I feel like an average Nigerian do not care about recycling. And I feel like this is a perspective which does not reflect the truth of any absolute fact. I don't think an average or should I say every like a Lagosian spends a lot of time thinking about the environment and sustainability".	Factors that facilitate Factors that impact recycling
"Usually, you know Nigerians; we have that communal kind of living. You understand we have that kind of communal living. I see my neighbours every day, I say hello even as I speak to you, and right now I'm inside my neighbour's	Culture, Customs tradition
apartments, just saying hello, having a good time just you know, talking about	
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stuff, you know, so there's that kind of communal vibe."	
responsibility because people in a community would look up to and are more	
willing to agree with the community leaders than they are with the	
government like you pointed out because the government may not be too	
effective due to the lack of trust and relationship. But if let's say community	
leader or someone that the community looks up to comes up saying guys this	
is our land this is where we live we need to take care of ourselves this	
message would be better coming from the community leaders than from the	
government"	
"We do not have responsible leaders, and you could just say, we don't have a	Trust
lot of respect for them. There is no trust: there is no respect because we know	indst
they are just there to, for their reasons, and not to make life better for the	
neonle."	
"They are leaders who basically want the power and all the effects that come	
with the office, but they don't want the responsibility that comes with it. As	
you watch, one famous phrase in a popular Hollywood movie says, with great	
power comes great responsibility".	
"If the facilities are put in place, for example, laws are put in place so that	Motivation
society can be organised. If those laws are put in place definitely people most	Monetary
likely, more often than not, people will follow the rules people follow the	incentive
laws".	Laws and policies
"Mainly, I think that cost-cutting is the major driver behind recycling because	Financial motive
they are doing it to benefit themselves".	and reward
"So as long as they do not feel the effects directly, they don't really care. They	schemes
don't care, especially when they are disillusioned about the situation".	
"However, if you come down to their level, tell them about these things in	
layman's terms and tell them what they are going to gain. Forget about what	
is going to happen on a global level. Honestly, they really don't care if you tell	
them that unless you say this waste you people are throwing about is going to	
affect your child".	
"But the problem is that they find themselves in a bad situation. Because	Inconvenience
what's the alternative. You can go to McDonald's in the UK, and you can get a	Alternative
burger and go on the streets and eat your burger, and very close to you may	
be a trashcan you can dump that. Okay, that's not existent here, Nigeria."	
"In Lagos, I feel like Lagos is a rough place, so with recycling, I don't know if	Knowledge
there are too many people who participate in that. I don't think a lot of people	Lack of promotion
know about it in Lagos, or should I say if there are people that do that, those	and
are like the educated ones or the ones that learned and they're exposed to the	advertisement
concept of recycling, but as an average Lagosians I don't think he knows to	Lack of verbal
recycle".	encouragement
I will definitely say the government is not helping because if there was a kind	and
or enlightenment campaign or 1 v and radio about now we can put recycling in	Lack of
place, i think it would help matters.	information
	diccomination

Based on the comments, the participants were shown to have a common ground with the construct selected to extend the theory of planned behaviour. For example, "motivation, communication, trust, and education" were repeated in the comments by the majority of the participants, which showed that these constructs are essential to the recycling behavioural outcome in Lagos.

5.14.4 Sampling and Time Horizon

An essential element in conducting research is the choice of sample. According to Zikmund (2003), planning sample size and type are critical in producing representative analyses of the total population. Furthermore, the aims and objectives of the research are clarified through sampling by improving the statistical reliability and outcome through a complete coverage that thoroughly investigates the interesting phenomena (Deming 1990).

Sampling techniques could either be probability-based or non-probability-based (Langer 2018). Probability-based sampling involves random selection by setting up a procedure or process that assures every population element has an equal probability of being included in the sample. Whereas with non-probability sampling, a subset of the population is chosen based on the subjective judgment of the researcher to represent the whole population (Chen et al., 2019). There is also a probability that each population element may not be included in the sampling (Bryman and Bell 2007). Although, it is good to test a sample that represents the population. However, a non-probability sampling technique was used in the construction of this thesis, specifically purposive sampling. This sample was favoured over convenience sampling to ensure the selected samples were based on judging the appropriateness and suitability of the study rather than a random selection. This study focused on Lagos's recycling behaviour. The sample participants had to be residents of Lagos,

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with some being asked to refer to the research to liaise with other potential participants, which enabled snowball sampling.

Drawing from a positivist approach and referring to the primary purpose of this thesis, the population was Lagos residents, with the perception of recycling behaviours being assessed by surveying a sample of 500 participants. The sample was chosen with the help of an online survey software Qualtrics²⁴. According to Kline (2005), a sample size of >100 participants is defined as low, 100-200 as medium and >200 as a high sample. Considering that the sample size can influence the detection of a significant relationship, differences and interactions (Peers 1996), the captured data set of 500 respondents is considered high and exceeds the critical sample limit size (Kline 2005; Hoe 2008).

5.14.5 Measurement Instrument Design

When collecting research data, it is essential to ensure the measurement instrument design to ensure systematic data collection, especially with quantitative data. However, this thesis adapted Rossiter (2002), referencing the actual formation and measurement instrument design in line with the distribution of the pilot study and main questionnaire.

Firstly, the constructs' items were combined for the initial part of the design, referred to as objects and attributes items (Rossiter 2002). These items were then phased into questions or the item stem and assigned alternative answers to each item or item leaf. The wording of the questions was considered to ensure the simplicity of the terms and enable the respondent to interpret them easily. The second step focused on selecting the appropriate rating scales for each item. This step required using a numerical response format on a 5-point Likert scale, with (1) standing for Strongly Disagree and (5) for Strongly Agree. This thesis used

²⁴ Refer to chapter 7 for the data analysis and results

a Likert scale based on the scale's popularity in the marketing literature (Allen and Seaman 2007).

Multiple items were randomised before the distribution to the pilot raters across the constructs and attributes to reduce response perception alternations of the obtained scores (Rossiter 2002).

5.14.6 Scale Purification – Pilot Survey

The questionnaires for the pilot survey were distributed to Lagos resident respondents to access the content while identifying the reliability and validity of the questionnaires before the main questionnaire was distributed. After the pilot test, a few aspects, such as completion time and difficulties in answering the questions, were assessed to gather feedback that effectively affected the primary survey. For example, discarding unnecessary or any expected, ambiguous questions from the pilot test to help produce adequate questions for the main survey, especially the wording of the questions. Therefore, the final questionnaires were used in this thesis to conform to the research's face validity and content validity.

Following the recommendation of Churchill (1979), the survey's outcome was intended to reduction by investigating its reliability. For this purpose, each construct produced coefficient alpha and items potted to total scale correlation²⁵. Although no items were reduced due to the positive result, minor revisions were carried out to the questionnaire to rephrase some questions. After the pilot test result analyses and a set of well-established items, each construct measures a relatively compact set of items. The second phase of the

²⁵ The results and analysis are available in the Scale Development Chapter of this thesis, Chapter 6

research began by administering the main questionnaire through the online survey tool Qualtrics.

5.15 Quantitative Research – Main survey

Empirically, quantitative methods have routinely been depicted as applied in natural science, mainly towards social phenomena. Quantitative data, therefore, focuses on the careful control of empirical variables and strict quantification of data (Uher 2018). Historically, science heavily emphasizes quantification, incorporating statistical procedures to examine group variances and means and large-scale sampling (Ponterotto and Grieger 1999). Furthermore, according to Denzin and Lincoln (2000), quantitative studies stress analysing and measuring variables' correlational and causal relationships.

The quantification of phenomena is carried out to provide an overview of the quantitative material; however, such numbers should be applied with caution (Uher 2018). Therefore, researchers who employ quantitative methods tend to be clustered as positivists while typically pursuing modern or scientific paradigms to achieve consistency and fixed assessing criteria with the quantitative approach (Sovacool et al., 2018).

For this thesis, a digital survey and data collection software called Qualtrics was used to collect and administer the final and Online surveys (formerly BOS) for the pilot data. Online surveys provide advantages such as lower cost, ease of distribution, participant anonymity, clock availability, and, most importantly, safety, especially during Covid-19 (Nayak et al. 2019). However, the response consistency or integrity of the test questions is neither statistically diminished nor enhanced with the online survey (Oppenheim 2000; Riva et al. 2003). Therefore, the digital survey and data collection software was selected as a suitable alternative to traditional methods due to the circumstance that occurred during the research (Covid-19). Furthermore, expert knowledge was not required for the nature of the questions asked, as it was militated towards selecting samples from the general population in Lagos state, to be exact.

The sample size was baselined, even though there was no possibility of legislating the sampling error. A statically heuristic of at least 150 was used to calculate the number of respondents required for the final questionnaire (Hair et al. 2010), based on the structural model's number of indicators and constructs. However, according to (Floyd and Widaman 1995; Tinsley and Tinsley 1987), the baseline could have been relaxed if more than 300 samples were achieved. Therefore, the questionnaire aimed to process the maximum number of respondents possible to allow for any sample errors. The following subsection breaks down the timescale used in all the phases of data collection and the number of participants involved.

5.15.1 Data Collection Timescales

For this project, three phases were carried out for data collection: initial, pilot, and final data collection (Table 5.1). Each stage had different objectives and an overall data collection aim, collecting responses with high validity suitable for analysis.

Phase	Research Method	Objective	Timescale	Sample size
Initial	Theory, Literature and Professional/expert Review	Evaluate themes and contexts.	May 2018 - May 2019	
Pilot	Semi-structured Interview	Determining Inter-rater consensus of the item stems and constructs validity.	2weeks July 2020- August 2020	7
	Pilot Online Questionnaire	Item purification and scale validation, survey layout and timings.	Two weeks August- September	75

Table 5.5: Data Collection Timescale

Final	Online questionnaire	Quantitative data for	Four weeks	500
	distributed to Nigerian	modelling, analysis, testing	March 2021- April 2021	
	respondents	hypotheses and contribution	April 2021	

After the data collection, the results were collated and analysed using the software tools detailed in the next section.

5.16 Data Analysis Tools

For this research, different research data analysis tools were utilised based on the type of data collected and the objectives of the data collection exercise. Microsoft word was used to organise, analyse and find insights into the qualitative data. It helped reveal the meaning and relationship between the findings in the data. The raw data from the interviews were then transcribed for analysis. The participants provided a manual record of notes relating to the data capture and qualitative data assessment on the layout and item clarification. Additionally, this thesis used both quantitative and qualitative subsequently for the Rater Identification processes.

The online survey instrument "Onelinesurvey.co.uk", formally known as Bristol Online, was used to create the ethically approved pilot survey. Using this survey instrument allowed quicker updates and design flexibility on the preparation layout for the final survey questionnaire. The data collected from the questionnaire were downloaded from the website and transferred to an excel spreadsheet, then stored in a university-secured storage file. The pilot survey feedback was recorded via email or manually and then transcribed into an excel spreadsheet.

Qualtrics online survey platform was used to collect the complete survey data, as the respondent panel is held by the Qualtrics providers, with individuals able to aces and complete the questions anonymously. Five hundred respondents were instructed to be provided by the

provider by targeting the general Lagos residents aged over 18 with evenly split respondents between the research context scenarios. The following data collection and cleansing services were provided as part of the contract:

- Technical redirect is set up to screen out and ensure connectivity.
- Survey review to ensure the questionnaire flow was correct.
- Dedicated Qualtrics project manager to ensure quotas were met.
- Replacement of unusable data.
- Managed soft launch to field test the questions before an entire release.
- Development of quality checks, including attention filters and survey timings.

The raw data was downloaded from the online survey platform into SPSS version 25.0.0.sav files and were screened and cleaned. SPSS was applied to descriptively analyse both univariate and bivariate data and the EFA analysis. It was then transferred to SmartPLS for measurement model analysis and hypothesis testing.

5.16.1 Data Collection Summary

The data collection was executed and planned using techniques that described and ensured that the research data were collected and stored ethically in the proper format. The use of suitable software tools for the type of analysis is required to investigate the research problem thoroughly.

5.17 Scale Development and Item Generation

Conceptualisation was defined in chapter 3²⁶ as a conceptual structural model that encompasses both the conjectured and constructed relationship relevant to the domain of

²⁶ Refer to Chapter 3 to view the conceptual structural model

recycling behavioural change in Lagos. This led to discussing the theoretical background of methods utilised during the scale development based on Churchill's (1979) and Rossiter's (2002) procedures in the previous chapter. Arising from a positivist philosophical stance, this thesis's general measurement model was advocated and defined as a reflective measurement model. The item generation and scale development objective were to generate variables to measure and operationalise the model constructs in a manner consistent with the rationale and methodology choice explained in chapter 4²⁷.

5.17.1 Introduction

The item generation process was based on identifying item parts and attributes that encapsulated reliable measurement of each construct, which were extracted from the literature²⁸. The construct definition was correctly captured by the process and measure of rule definition by ensuring the rule measures the generated attribute while selecting and generating items to form a scale that measures the construct, also referred to as scale development (Churchill 1979).

Based on the procedure suggested by Churchill (1979), the following procedures were carried out: item generation, modification of the contract and purification of pre-existing sales and measures required, and a re-appraisal of the validity and reliability of the measures. To ensure that the prior scales were suitable for reuse in the research thesis while retaining discriminant relevance and validity. Semi-structured interviews also refined these items to ensure clarity, precision, and confirmation for the used samples. The interviews were conducted with Lagos residents, discussing how recycling is perceived in Lagos and some of

²⁷ The Research Methodology Choice can be viewed in chapter 4

²⁸ Refer to Table 6.5 for a complete list of the generated item pool

Lagos's characteristics. This provided additional insight into some of these characteristics and reasoning for their recycling behaviours. Therefore, it was essential to develop a measurement instrument consistent with the scale development procedures recommended by Churchill (1979) and Rossiter (2002), Figure 6-1. The purpose of this chapter is to demonstrate how the scale was structured. The following subsection detailed the procedures employed in both scale validation and development and item generation utilised to produce the measures and scales used in the research.



5.17.2 Scale Development

According to authors e.g., Nunnally et al., 1967; Churchill 1979; Anderson and Gerbing 1988; Netemayer et al., 2004, there has been academic interest across several fields of inquiry within the social sciences in the iterative process of scale development which assess the measurement of constructs. Therefore, Churchill's (1979) and Rossiter's (2002) frameworks were used in achieving the standardisation of generating constructs and building measurement scales to ascertain the validity and consistency of the scales while increasing the reliability of research result measurement.

The procedure employed to provide measurement scales for the research indicators and construct based on the C-OAR-SE procedure proposed by Rossiter (2002), which stands for (**C**onstruct definition, **O**bject classification, **A**ttribute classification, **R**ater identification, **S**cale formation, and Enumeration and reporting). Rossiter (2002) procedure modified Churchill (1979) item generation process by incorporating an approach that accommodates pre-existing items into the scale development process, as seen in Table 5.6.

Table 5.6: Procedure for Scale Development (After Rossiter 2002) This item has been removed due to 3rd Party Copyright. The unabridged version of the thesis can be found in the Lanchester Library, Coventry University.

Source: (Rossiter 2002)

The aim of generating and identifying items was to produce a consistent system that assigned quantities to the attributes of the model constructs rather than directly to the construct itself. While the scale development techniques were used to provide a consistent measurement scale for the items while purifying and refining the items, the application of these steps is detailed in the following subsections.

5.17.2.1 Construct Definition Stage 1

Defining the tested construct conceptually was essential to ensure that the constructs' definitions could support the operational measurement (Rossiter 2002). This thesis research model comprises eight constructs measuring a conceptually separate component. According to Edwards and Bagozzi (2000), the constructs represent the phenomena of theoretical interest, with each construct differentiated from the others through attributes. Hence, the constructs were judged and rated due to their distinct and measurable attributes. Table 5.7 outlines the construct's attributes in detail.

Construct	Item Constituents (Item Parts)		
Attitude	Feelings or Emotions, Exposure, Beliefs, Thoughts and Attributes		
	Past behaviours.		
Social Norm	Acceptable, Appropriate, and Obligatory Actions, Approval and		
	Disapproval.		
Perceived	Account for behaviours, self-efficacy, controllability		
Behavioural Control			
Trust	Confidence, Belief, 'knowing.'		
Inconvenience	Time, ease and facilities		
Word Of Mouth	Communication, messages and information		
Intention	Willingness, inclination and predictor		
Behaviour	Outcome, performance and participation		

Table 5.7 Outlined Construct Attributes

5.17.2.2 Object Classification

The object classification category was used to classify the defined conceptual construct and the attributes they are most closely identified by and judged by towards the object. The results are highlighted in Table 5.8.

Object Classification	Meaning
Abstract Eliciting	Connotative
Abstract Collective	Denotative
Abstract Collective	Connotative
Abstract Eliciting	Connotative
Abstract Formed	Connotative
Abstract Formed	Connotative
Abstract Collective	Denotative
Abstract Collective	Denotative
	Object ClassificationAbstract ElicitingAbstract CollectiveAbstract CollectiveAbstract ElicitingAbstract FormedAbstract FormedAbstract CollectiveAbstract CollectiveAbstract Collective

Table 5.8 Object Classification

The research constructs were classified mainly into object types: abstract or concrete (Rossiter 2002). Abstract constructs are mentally observed differently by different individuals, for example, having a good attitude. At the same time, concrete constructs are observed nearly identically by all, for example, a table. The objects were also sub-classed as formed (meaning the attributes suggested the nature of the construct), eliciting (the relation of the abstract construct to an internal state or trait that has external manifestations), and collective (which is where the construct is formed through a census of its associated attributes).

In line with Diamantopoulos's (2005) critique of the C-OAR-SE method, an assessment was conducted to determine if each construct was deemed to be connotative (is implied by) or denotative (a sign of) with the results included in the object classification table. In an attempt to support the interpretation of the constructs, connective constructs are analysed in terms of what they mean, while denotative constructs are in terms of what they include. The assessment did not affect the scale development phase. Still, it implied the measurement invariance between scenarios. Once the object classification was done, the following subsection details the next phase: generating the attribute items to represent the constructs fully. Having classified the object types, the next step described in the subsection below highlights the steps of generating the attribute items to represent the constructs fully.

5.17.2.3 Attribute and Item generation

This thesis incorporated Churchill's (1979) suggested four steps to measure item generation for better measures, based on Nunnally's (1978) version of psychometric theory. Valid measures are presumed to be produced when a researcher follows and meets Churchill's (1979) spelt out scale development procedure. However, critiques such as (Rossiter 2011) have suggested that Churchill's methods can be dangerously misleading. Due to its ability to bypass the fundamental requirement of content validity, as seen by studies trying to justify and prop up low validity measures by claiming their scores meet widely agreed statistical criteria. Therefore, semi-structured interviews were used to ratify the content validity. The contents were checked alongside the scales' development to help ensure that the items proposed rationally represented the constructs in question.

The attribute items relating to the extension of the theory of planned behaviour were derived from existing behavioural literature on recycling in the first instance by drawing from behavioural change literature and recycling research to capture the behavioural-led nature of recycling. The addition of constructs such as Word of mouth, social norms, trust, and

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Inconvenience reflected the Lagos characteristics with the assessment of recycling outcome, which was reinforced with the semi-structured interview.

There initially were over two hundred items in the item pool number. Over time some items were dropped based on factors such as lack of relevance, overlapping with different constructs, or ambiguity within the initially chosen item scale. However, this led to further expert consultation (semi-structured interview) to reduce the item pool and identify and combine related items into a single measurable item. While reaffirming the C-OAR-SE content validity criteria, the resulting candidate items pool was found valid on the ground that "If the sample is appropriate and the items ``look right," the measure is said to have a face or content validity" (Churchill 1979).

Table 5.5. Interview-Identified Items		
Identified constructs from the Interviews	Research Reference	Literature Reference
Attitudes	Interview/Literature	(Ajzen 2002)
	Review	
Social norms	Interview/Literature	(Tonglet et al., 2004)
	Review	
Perceived behavioural Control	Interview/Literature	(Mayer and Davis
	Review	1993)
Trust	Interview/Literature	(Guay et al., 2000)
	Review	
inconvenience	Interview/Literature	Barr (2007)
	Review	
Word-of-mouth	Interview/Literature	Fan et al., 2019)
	Review	

Table 5.9: Interview-Identified Items

The items were reworded into context-specific questions in line with the chosen scenarios following the interview outcome. A set of attitude-based questions and introductory

demographics were added to create a record that would moderate gender, education level, age group, awareness, attitude, and behavioural preferences.

The survey questions incorporated statement contexts that account for the variation of attitudes and perceptions towards how Lagos residents perceive the concept of recycling and reuse in Lagos. Using the scale formation methods, the researcher achieved the scaling of the items for measurement and scoring purposes, detailed in the subsection below.

5.18.3 Scale Formation

C-OAR-SE scale formation combines object items corresponding to the attribute item parts where the scale items are formed (Rossiter 2002). This thesis adopted a standard fivepoint reverse-scored ordinal Likert scale for all the question items. However, some of the original questions were reworded, allowing for a five-scale type. Guidance on using the five scale items was based on the best fit for consumers' number of psychological discriminations (Miller 1956), even though most of the pre-existing items were initially scaled as a five-item choice. Table 6.6 details the numbers allocated to the questionnaire and the final choice of the items scales that characterised the demography, construct object measured, and the details of prior provenance.

The following subsection describes the enumeration and reporting of the evaluated characteristics of the questionnaire after the production of scales and contextualised questions.

Item	Item Source
Attitude	(Ajzen 2002)

Table 5.10: Item Pool Selected for Scale Development

• • • •	Recycling is an interesting thing to do. A1 Recycling is a good idea. A2 It is important to recycling. A3 Recycling is beneficial to the health of the environment. A4 Recycling is a wise thing to do. A5 Recycling is favourable to the environment. A6	(Arvola et al., 2008)
• • •	Social Norms The responsibility of recycling should be shared by the general public. SN1 The general population in Lagos are doing their part to address the issues on recycling. SN2 There is a positive reaction from within my community when I recycle. SN3 I will recycle in order to prevent others criticising me. SN4 I would be willing to recycle if everyone around me recycled. SN5 I am willing to follow the strategies introduced by the Lagos government on recycling. SN6 The Lagos population understands the relevant laws and regulations on recycling waste. SN7 In Lagos, recycling is considered the right thing to do. SN8	(Bezzina and Dimech 2011) (Sidique et al., 2010) (Tonglet et al., 2004)
•	In Lagos, individuals are encouraged to recycle their waste. SN9 I will recycle if those within the community believe recycling is the right thing to do. SN10 The people around me are concerned about issues relating to the environment's well-being. SN11	(Ajzen 2002) (Arvola et al., 2008)
Pe:	rceived Behavioural control If I wanted to recycle, I believe I would be able to do so. PBC1 It is mostly up to me whether or not I recycle. PBC2 There are plenty of opportunities for me to recycle. PBC3 I find recycling to be easy. PB4 The resources I need to recycle are available to me. PBC5 I know where to take my waste to be recycled. PBC6 If I wanted to recycle, it would be easy for me to do PBC7 It is easy for me to recycle when I want to PBC8 I am familiar with recycling facilities in my area PBC9	(Mayer and Davis 1999). (Jarvenpaa et al., 1998)
•	Trust I feel very confident about the Lagos government's recycling policies. T1	(Pelletier et al., 1995) (Guay et al., 2000)

-		
•	The Lagos government has much knowledge on the work that	
	needs to be done toward encouraging individuals to recycle.	
	Т2	
•	The Lagos government are very concerned with the welfare of	
	the environment. T3	
•	I am never doubtful about whether the Lagos government will	
	do what they promised to do. T4	
•	The authorities for recycling are doing their best to address	
	the issue associated with recycling. T5	
	, C	(Latif and Omar
	Motivation	2011).
•	I recycle because I like the feeling I get when I do things that	
	benefits the environment. MOT1	
•	Recycling is a sensible thing to do. MOT2	
•	There may be many reasons to recycle, but personally I do not	
	see any. MOT4	
•	I will recycle if monetary incentives are attached to doing so.	(Barr 2007).
	MOT5	(Robison and Read
•	I will recycle if it is made compulsory. MOT6	2005).
	Collectivism	
•	Even if I do not gain personal recognition. I will recycle	
	because it would benefit others. COL1	
•	I would recycle in order to participate in group activities. COL2	
•	I will recycle to help others. COL3	
•	I will recycle because it is what is best for the society. COL4	
		(Ramayan et al.,
	Inconvenience	2012). (Darr 2007)
•	I do not have time to recycle. INC1	(Bari 2007).
•	I find recycling to be an inconvenient task. INC2	
•	Recycling is too complicated. INC3	
•	It is convenient for me to recycle whenever I want to do so.	
	INC4	
•	Recycling takes up too much of my time. INC5	
•	I am familiar with the recycling facilities in my area. INC6	
	Knowledge	
•	I would recycle if there were more information available on	(Echegaray and
	recycling and ways to recycle. K1	Hansstein 2016).
•	I would recycle if the means to recycle are provided. K2	(Nguyen et al.,
•	I know how to recycle. K3	2015).
•	If I know what happens to the recyclable items, I will recycle	
	more often. K4	
•	There is little information on means to recycle in Lagos K5	
•	I do not know where to go to recycle. K6	
•	Recycling will help to reduce pollution of the environment. K7	

Int • •	ention I am willing to participate in information campaigns aimed at improving recycling behaviours. IN1 In the future when dealing with my waste, I am likely to contact professional recycling agencies. IN2 I am willing to get more information on effective ways to recycle. IN3 In the future I will actively participate in recycling.IN4 I am willing to speak to my friends and family on effective ways to recycle. IN5	(Ramayah et al., 2012). (Tonglet et al., 2004).
• • •	Word of Mouth (WOM) I will encourage my friends and relatives to recycle WOM1 I say positive about recyclingWOM2 I will speak favourably about recycling to others WOM3 I am glad to recommend ways to recycle to othersWOM4 I try to recommend ways to recycle to my friends and family WOM5	(Fan et al., 2019)
•	Behaviour I separate and dispose all my recyclable materials. B1 I am involved in recycling activities. B2 I always separate my recyclable waste. B3 I intend to recycle my recyclable items within the next month. B4 I will recycle my recyclable items every time it is ready for disposal. B5	(Esfandiar et al., 2019) (Keramitsoglou and Tsagarakis 2013)

5.19 Enumeration and Reporting

Regarding the online pilot questionnaire, item stems were contextualised into questions and were completed by thirty respondents. It was essential to produce the pilot questionnaire for the measure and item purification to triangulate the attributes, objects, and item relationships. The outlining and word timing was prototyped by this exercise of the operational structure and constructs they had created. The pilot survey participants were a convenience sample drawn from colleagues who met during conferences and seminars. In addition, a semi-structured interview was conducted to seek a more in-depth understanding of the constructs of their recycling behaviours. This feedback was incorporated into the final questionnaire design.

One of the additional aims of conducting a pilot study was to ensure sufficient discriminant validity among the retained items and provide summated multi-item scales of constructs measurement while delivering the required discriminant validity instead of depending on single-question scales (Churchill 1979). The selected five-point scale reflects most existing scales while being lower than an eleven-point scale (Diamantopoulos 2005). During the reliability measures, the loss of precision was not reflected due to the resultant stability of the scales that were subsequently calculated in Cronbach Alpha and item loading data within the application. Cronbach Alpha values measurement provided the nomological validity of the measured constructs concerning the theoretically related constructs to ways the theory was predicted (Sekhon et al. 2014).

5.20 Scale Development Limitations

In this thesis, the development of the items and scales highlighted the research approach used in the questionnaire development by progressively narrowing the used items through a semi-interview process and feedback from the respondents of the pilot questionnaire. Cronbach alpha, factor loading, and composite reliability were then used to analyse the reliability of the consequential produced scales. Hence, the increased difficulty with including the researcher's judgment based on these analyses. Having items dropped from scales, or the whole constructs enabled the researcher to ensure that the analysed questions

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directly aligned with the model to provide the best model fit values during the SEM modelling process.

Even though using this procedure yielded the most substantial evidence on which the multivariance conclusions are based, this purification process resulted in very narrow defined constructs, which allowed for a more comprehensive error margin on the measurement scales, along with the reduction of the model fit, which would have allowed the broader inclusion of response questions at the expense of minimal inferential power. Nevertheless, having a more decisive inferential conclusion results in better research outcomes, disputably at the cost of some extensiveness of coverage.

5.21 Analysis of the Pilot Survey

This thesis pilot survey was conducted among 76 Lagos residents in October 2020 while using a 5-point Likert scale study based on Churchill's (1979) recommendation that the calculation of coefficient alphas should be the beginning of the purification of an instrument. Based on general practice in marketing literature when developing scales within the social science context (Flake et al., 2017), the Cronbach alpha coefficient was calculated and assessed for all the required constructs within the proposed model. As a result, this thesis's Cronbach Alpha values were above the preferable 0.7 value (Hair et al. 2006).

5.21.1 Internal Reliability of the Research Constructs

Cronbach alpha was used to measure the internal consistency used during data collection by determining the consistency index for each construct with the lower limit for the construct reliability of acceptance between 0.6 and 0.7 (Hair et al., 2006). The following section addresses the implications of the item-total statistics, particularly for assessing the highest Cronbach Alpha for each construct.

Table 5.11 Cronbach's Alpha for Attitude

Cronbach's Alpha	No. of Items
.791	6

The responses of the five attitudes items produced a Cronbach Alpha of .791. Therefore, good internal consistency is indicated in Table 5.11. However, Table 5.11.1 SMC results state that the Cronbach Alpha would be higher if the "Recycling is an interesting thing to do" item was deleted.

Table 5.11.1 Item-Total Statistics

			Corrected Item-	Squared	Cronbach's
	Scale Mean if	Scale Variance if	Total	Multiple	Alpha if Item
Items	Item Deleted	Item Deleted	Correlation	Correlation	Deleted
Recycling is an	6.28	5.848	.309	.110	.836
Interesting thing to					
do					
Recycling is a good	6.75	6.093	.593	.452	.754
idea					
It is important to	6.69	5.423	.670	.483	.729
recycling					
Recycling is beneficial	6.63	5.103	.661	.499	.728
to the health of the					
environment.					
Recycling is a wise	6.74	5.992	.565	.398	.756
thing to do					
Recycling is	6.73	5.845	.605	.424	.748
favourable to the					
environment					



Cronbach's Alpha	N of Items	
.732	6	

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items

is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. A good Cronbach Alpha value of 0.732 was yielded for the overall behaviour scale, as seen in Table 5.12. However, in Table 5.12.1, the internal consistency results would be higher if the item "I Separate and dispose of all my recycle materials" were deleted. It would increase the Cronbach Alpha from 0.732 to 0.746.

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha
items	Item Deleted	Item Deleted	Total Correlation	if Item Deleted
separate and dispose of all	9.61	13.255	.330	.746
ny recyclable materials				
I am involved in recycling	9.60	12.203	.516	.679
activities.				
I always separate my	9.89	11.830	.586	.655
ecyclable waste				
l intend to recycle my	10.03	12.580	.617	.652
ecyclable items within the				
next month				
I will recycle my recyclable	10.25	13.755	.494	.689
tems every time they are				
eady for disposal.				
I will participate in the	10.65	16.060	.325	.731
ecycling scheme in the				
uture.				

Table 5.12.1 Item-Total Statistics

Table 5.13 Cronbach's Alpha for Intention

Cronbach's Alpha	N of Items
.731	5

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. The analyses of intention suggested acceptable reliability, based on Cronbach's alpha, Table

5.13, which is supported by Table 5.13.1 output. Hence deleting any items would cause the Corresponding Cronbach Alpha to decrease.

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha
Items	Item Deleted	Item Deleted	Total Correlation	if Item Deleted
I am willing to participate in	6.00	5.135	.484	.688
nformation campaigns aimed				
at improving recycling				
behaviours				
In the future, when dealing	5.67	4.782	.410	.728
with my waste, I am likely to				
contact professional recycling				
agencies.				
I am willing to get more	6.10	5.613	.458	.701
nformation on effective ways				
to recycle.				
In the future, I will actively	6.06	5.054	.566	.661
participate in recycling				
I am willing to speak to my	5.90	4.425	.589	.644
friends and family on				
effective ways to recycle				

Table 5.13.1 Item-Total Statistics

Table 5.14 Cronbach's Alpha for Inconvenience

Cronbach's Alpha	N of Items
.591	5

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. A Cronbach Alpha of 0.591 was yielded in the reliability analysis of the inconvenience scale. This Cronbach alpha was considered unsatisfactory, as the regulated guideline is 0.7 and above (Hair et al., 2010). Due to the low Cronbach alpha, the item "I am familiar with the materials accepted for recycling

by the recycling facilities in my area" was deleted, which increased the Cronbach alpha to an acceptable value of 0.746, as seen in Table 5.14.1.

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha
Items	Item Deleted	Item Deleted	Total Correlation	if Item Deleted
I do not have time to recycle	11.81	9.579	.492	.460
I find recycling to be	12.21	9.380	.416	.495
inconvenient task				
Recycling is too complicated.	12.18	9.212	.489	.455
Recycling takes up too much	12.40	9.272	.537	.434
of my time				
I am familiar with the	13.16	13.328	068	<mark>.746</mark>
materials accepted for				
recycling by the recycling				
facilities in my area				

Table 5.14.1 Item-Total Statistics for Inconvenience

Table F 1F	Cranbach's	Vinha far	Dorociucad	Dehavioural	Change
19016 2.12	CIUIDACII S A		Perceiveu	Dellaviourai	Change

Cronbach's Alpha	N of Items
.837	8

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. The analyses of perceived behavioural control suggested acceptable reliability based on Cronbach's alpha, Table 5.15. Despite not producing highly acceptable values, the subsequent output in Table 5.15.1 indicates that deleting any items would cause the Corresponding Cronbach Alpha to decrease.

5.15.1 Item-Total Statistics

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha
Items	Item Deleted	Item Deleted	Total Correlation	if Item Deleted

If I wanted to recycle, I	16.52	34.097	.606	.813
believe I would be able to do				
SO				
It is mostly up to me whether	16.63	38.303	.266	.811
l recycle				
There are plenty of	16.15	32.348	.629	.809
opportunities for me to				
recycle.				
I find recycling to be easy	16.14	34.230	.600	.814
The resources I need to	15.40	32.771	.548	.821
recycle are available to me				
I know where to take my	15.92	33.251	.527	.824
waste to be recycled				
If I wanted to recycle, it	16.19	32.753	.674	.804
would be easy for me to do				
It is easy for me to recycle	16.09	31.711	.699	.800
when I want to.				

Table 5.16 Cronbach's Alpha for Social Norms

Cronbach's Alpha	N of Items	
.802	12	

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. The analyses of perceived behavioural control suggested acceptable reliability based on Cronbach's alpha, Table 5.16. Despite not producing highly acceptable values, the subsequent output in Table 5.16.1 indicates that deleting the following item "The general public should share the responsibility of recycling, I would be willing to recycle if everyone around me recycled, I am willing to follow the strategies introduced by the Lagos government on recycling, I will recycle if those within the community believe recycling is the right thing to do" would increase the Cronbach Alpha.

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha
Items	Item Deleted	Item Deleted	Total Correlation	if Item Deleted
The general public should	25.73	59.960	.102	.810
share the responsibility for				
recycling				
The general population in	24.24	47.892	.672	.764
Lagos are doing their part to				
address the issues of				
recycling				
There is a positive reaction	24.62	50.844	.588	.775
from within my community				
when I recycle.				
I will recycle to prevent	24.13	49.709	.523	.780
others from criticising me				
The authorities responsible	24.55	49.841	.533	.779
for recycling are doing their				
best to address the issue				
associated with recycling.				
I would be willing to recycle	25.21	58.661	.099	.817
if everyone around me				
recycled				
I am willing to follow the	25.59	58.773	.195	.805
strategies introduced by the				
Lagos government on				
recycling.				
The Lagos population	24.10	48.139	.585	.773
understands the relevant				
laws and regulations on				
recycling waste.				
In Lagos recycling is	25.07	51.780	.535	.780
considered the right thing to				
do				
In Lagos individuals are	24.68	49.996	.586	.774
encouraged to recycle their				
waste				
I will recycle if those within	24.76	54.807	.269	.806
the community believe				
recycling is the right thing to				
do				
The people around me are	24.94	50.808	.558	.777
concerned about issues				
relating to the well-being of				
the environment				

Table 5.16.1 Item-Total Statistics Social norms

Table 5.17 Cronbach's Alpha for Trust

Cronbach's Alpha	N of Items	
.798	4	

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item being assumed to load equally to the factor. A good Cronbach Alpha value of 0.798 was yielded for the overall behaviour scale, Table 5.17. Hence deleting any items would cause the Corresponding Cronbach Alpha to decrease.

5.17.1 Item-Total Statistics

	Scale Mean	Scale	Corrected Item-	Cronbach's
	if Item	Variance if	Total	Alpha if Item
Items	Deleted	Item Deleted	Correlation	Deleted
I feel very confident about the Lagos	6.87	8.163	.675	.715
government's recycling policies				
The Lagos state government has enough	7.08	8.513	.629	.738
knowledge of the work that needs to be				
done to encourage individuals to				
recycle.				
The formal recycling sectors in Lagos are	7.18	9.481	.528	.785
very concerned with the environment's				
welfare.				
I am never doubtful about whether the	6.63	8.196	.613	.747
Lagos government will do what they				
promised to do				

Table 5.18 Cronbach's Alpha for Word-of-Mouth

Cronbach's Alpha	N of Items	
.760	5	

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et

al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item

is assumed to load equally to the factor. The responses of the five attitudes items produced a Cronbach Alpha of .798. Therefore, an acceptable internal consistency was indicated in Table 5.18. However, with the SMC results, Table 5.18.1 shows that the Cronbach Alpha would increase to 0.769 if the item "I try to recommend ways to recycle to my friends and family" were deleted.

	Scale Mean if	Scale Variance if	Corrected Item-	Cronbach's Alpha if
Items	Item Deleted	Item Deleted	Total Correlation	Item Deleted
I will encourage my	6.48	6.251	.621	.693
riends and relatives				
to recycle				
I say positive things	6.39	6.394	.479	.734
about recycling.				
I will speak	6.54	6.595	.575	.711
favourably about				
recycling to others				
I am glad to	6.28	5.595	.619	.683
ecommend ways to				
recycle to others				
I try to recommend	5.94	5.427	.450	.769
ways to recycle to				
my friends and				
family				

Table 5.18.1 Item-Total Statistics

Based on the reliability analysis of the pilot study, some corrections were made to improve the quality of the main survey. This included removing some items identified earlier and rewording some questions to suit the Lagos participants better.

5.22 Scale Development Conclusion

The measurements obtained the observed values while composed of a random source of error, a systematic source of error, and the true value. This method's validity relied on the reliable measuring of the characteristics of a 'true' score. True value measurement depends on how much-observed variation is composed of attributable errors (Churchill 1979). The C- OAR-SE methodology was used to conceptually refine and define the added research model's reliability and validity measurement in investigating the problem. This resulted in incorporating several stages of objects, constructs, item part generation, attribute, scale development and rather identification into developing the conceptual products of the model into operationally variable questions.

During the item generation process, considerably more items were produced than were implemented in the final construct definitions used for analysis. An initial pool of 185 questions (Appendix A1) was later streamlined to a final of 67 questions (Appendix A2). However, dropping items involved a series of descending items when trying to increase the purity of the scales by measuring the required model variables while providing additional choices that the researcher had to adjudicate. Item reduction was derived through the initial process of literature and expert identification of similar or repeating items, which were used to differentiate between formatively right questions rather than using reflective scales (Diamantopoulos 2001).

The addition of rater identification helped reduce the item count, with some items strongly identifying with constructs. At the same time, other items did not identify with a single item, which resulted in them being discarded to guarantee a provision of discriminant validity by the developed scales required for the measurement purposes.

Therefore, the assurance of observed score, with the assistance of structured methodology used in analysing the true reality as closely as possible. Measurement of reliability is essential to obtain the 'true' data. It makes the findings reproducible by other researchers and, in this thesis, was a necessary ingredient in determining the validity of this research. The followed method did not depend on upfront measures of reliability indexes to

use the final data collection when quantifying the content validity as part of measurement model assessment analysis.

5.23 Ethical Considerations

For each substantive stage of the research, ethical approval was sought and granted, as highlighted in Table 5.19, the detail of each ethics approval to this thesis. The GDPR was introduced in May 2018, which requires the formatting of permission and approvals of respondents for Coventry University's ethical processes.

CU Ethics Approval Number	Purpose	Date Valid from	Date valid to
P75785	Literature search and desktop research	03/09/2018	19/10/2021
P115110	Pilot interview and semi-structure interview	26/02/2021	19/10/2022
P118851	Final interview	26/02/2021	31/05/2022

Table 5.19 Ethical Approvals

5.24 Methods Conclusion

This chapter highlighted, justified and discussed this thesis's philosophical paradigm position as a continuation of the conceptual chapter, which led to the justifying and debating

of the research and triangulation strategies adopted for this thesis. Following this discussion, the different data and research types utilised in this thesis were focused on alongside their justification. At the same time, the last section focused on the discussion and justification of the various data collection and analysis strategies utilised in the thesis.

The paradigm interplay position was adopted for this thesis by implementing both positivism and interpretivism. However, there was a greater emphasis on positivism in this thesis due to both confirmatory and exploratory research being utilised, quantitative and qualitative data and research, and a triangulation strategy. In addition, data was collected through a sample survey and analysed using quantitative and qualitative analysis.

Although most of the research constructs included in the model were seeded from prior research, they were not related to recycling behaviour in developing countries such as Lagos. This required the classification, definition, scale development, and item generation to identify the constructs with attributes that the chosen item parts are strongly related to the constructs in question. Flexibility was allowed by the approach taken to consider more items before crystallising the construct definition based on measurement reliability and item loading. Most of the final measurement indicators used were derived from previous research.

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6 Data Analysis and Results

This chapter covers the detailed statistical analysis results, hypothesis tests, procedures, and empirical results through the collected research survey. The subsequent sections illustrate the respondents' sample demographics and characteristics while examining the thesis's reliability and validity. Finally, this thesis analysed the research hypothesis and the statistical tools such as SPSS and SmartPLS. SPSS used for the descriptive analysis, while SmartPLS was used for the measurement model assessment.

The data collection was completed during two weeks in April 2021. The questionnaire was used for data collection, which was self-prepared, and data was collected via Qualtrics, a survey collector tool.

6.1 Survey Characteristics

A preliminary data analysis was performed to ensure that the collected data characteristics sets were suitable for the purpose of univariate analysis. In addition, the completed survey responses were assessed to provide adequate evidence that the sample met the analysis and testing requirements.

6.1.1 Sample size

According to Kline (2005), a large sample size is recommended for complex modelling to provide a more suitable solution. However, for this study, the actual number of cleansed and completed questionnaires was (n=500). Nevertheless, the detrimental effects of non-

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normality can be reduced when a large sample size is used, decreasing outliers' aggregate impact (Hair et al. 2010).

6.1.2 Incomplete Data

The collected data comprised 530 respondents, and thirty of those responses were incomplete (5.6%). These were deleted from the relevant records as they did not answer a single survey question, resulting in 500 remaining filled responses. The remaining 500 were entirely completed questionnaire responses, as no unfilled or partial section was utilised. This was strengthened by using electronic data collection, as all the questions had a non-optional requirement option. However, it was noted that

A completely filled questionnaire must be used to ensure that the collected data are directly from the respondents, without the precluded need to synthesise, substitute or replace values during analysis. By adding this regulation to the data collection phase, the use of replacing or providing missing data to calculate parameter estimates was avoided (Enders and Bandalos 2001).

6.1.3 Survey Characteristics Summary

This section highlights the statistics relevant to the conducted survey observation. At the same time, it describes the quality to proceed by including the univariate normality analysis technique and the provision of (n=500) sample size without missing data.

6.2 Demographics

The collected sample in this study varied widely on the simple, anonymous demographic data captured through the survey respondents. The following demographic

showed persistent data on characteristics that are independent of the tested survey environment. The following demographic data include those relating to the self-reported personal respondent characteristics (Gender, Age-group, Education, and Monthly income) and individuals recycling participation and beliefs.

6.2.1 Gender

The respondent sample comprised 294 (58.8%) men and 206 (41.2%) women.

Table 6.1 Respondent Gender		
Demographics	Frequency	Percentage %
Gender		
Male	294	58.8
Female	206	41.2

6.2.2 Age Group

The participants were asked to self-report their age groups (Table 6.2). Concerning age, the largest group of the respondents fall within the 35-44 years (32.2%), with a narrow gap between 25-34 years (31.6%), 18 - 24 years (13.4%), 45-54 years (18.6%), 55-64 years (4.0%) and just one respondent above 65 years age groups (.2%).

Table 6.2 Age Group				
Demographics	Frequency	Percentage %	Cumulative percentage	Lagos estimate %
Age Group				
18-24	67	13.4	13.4	19.4
25-34	158	31.6	45.0	13.6
35-44	161	32.2	77.2	10.1
45-54	93	18.6	95.8	6.6

55-64	20	4.0	99.8	4.1
65-74	1	.2	100	2.5

Source (Statista 2021)

6.2.3 Income

Participants were also asked to report their monthly income as part of the preliminary demographic questions. As reported in Table 6.3, the income was low to medium, as 29% of the sample earned a monthly income of more than ₦ 199,000 (\$490). Most of the respondents in this sample (67.8%) earn less than ₦ 200,000 a month.

Table 6.3 Income					
Demographics	Frequency	Percentage %			
Monthly Income N					
25,000 and below	22	4.4			
25,000- 49,999	51	10.2			
50,000- 79,999	69	13.8			
80,000 -99,999	52	10.4			
100,000- 199,999	145	29.0			
200,000- 150,000	94	18.8			
150,000 and above	50	10.0			
Prefer not to say	17	3.4			

6.2.4 Education Level

Most of the respondents had graduated with a four-year degree or higher (83%), as Table 6.4 illustrates the participants' education level. According to the collected data, 10.2% of the participants held a secondary school certificate alone, 6.8% had a two-year degree, 58.6% had a four-year degree, and 24.4% had a professional degree.
Demographics	Frequency	Percentage %
Education		
Secondary school	51	10.2
2-year degree	34	6.8
4-year degree	293	58.6
Professional degree	122	24.4

Table 6.4 Age Group

6.2.5 Recycling participation

Respondents' recycling participation were also asked as part of the preliminary demographic questions. To better understand how individuals in Lagos, Nigeria, participate in recycling. Table 7.5 shows that 76% of respondents said they had partaken in recycling, with 45.9 % suggesting this was an occasional occurrence. Additionally, 24% of the respondent have never recycled. While 91.2 % believe re-using is a form of recycling, 6.2% do not think re-using is recycling, as seen in Table 6.6.

Demographics	Frequency	Percentage %
Have you ever recycled		
Yes	379	76.0
No	120	24.0
How often do you recycle?		
Always	61	16.2
Usually	100	26.5
Sometimes	173	45.9
Rarely	42	11.1
Never	1	.3
Total	377	100

Table 6.5 Recycling Participation

Demographics	Frequency	Percentage %
Re-using as a form of recycling		
Yes	455	91.2
Νο	34	6.8
Do not know	10	2.0

Table 6.6 Recycling Participation

6.2.6 Demographics Summary

As an initial part of the online survey, these simple demographic data highlighted above were sought from the respondents. While demographic information has no significant impact on the level of analysis of this study, this reporting may provide a generalised view regarding individuals" participation and beliefs in recycling in Lagos, Nigeria.

6.3 Model Construct Normality

According to Hair et al. (2010), a multivariate analysis requirement assumes that the underlying statistical techniques need to be tested twice: based on the separation of variables and for the multivariate model variate. Normality is perceived as the underlining assumption of the significant test validity in MANOVA. At the same time, the multivariate analysis comprises the generalisation of the univariate normal distribution to the case of p variables.

Consequently, the constructs used in establishing the hypotheses' significance were composed of separate measurement items; therefore, they were subjected to normality assessment. Relationship among the constructs was demonstrated through the SEM structural model, as these constructs developed as aggregated measures of the component measurement items established in the measurement model. The items need to be purified through reliability assessment, factor loading, and multi-collinearity detection to report the underlying multivariate and univariate normality statics.

6.3.1 Item coding

The survey questionnaire initially contained 70 items. However, this number was reduced due to EFA and CFA analysis techniques to produce the most effective loading of the constructs used in this research model. Table 6.7 highlights the items used in the research model and the ID used to identify the items.

Table 6.7 Item Coding of the constructs and ID keys

ID	Items
A2	Recycling is a good idea
A3	It is important to recycling
A4	Recycling is beneficial to the health of the environment
A5	Recycling is a wise thing to do
A6	Recycling is favourable to the environment
B2	I am involved in recycling activities.
B3	I always separate my recyclable waste
B4	I intend to recycle my recyclable items within the next month
B5	I will recycle my recyclable items every time it is ready for disposal
IN1	I am willing to participate in information campaigns aimed at improving recycling
1012	benaviours.
IN3	I am willing to get more information on effective ways to recycle
IN4	In the future, I will actively participate in recycling
IN5	I am willing to speak to my friends and family on effective ways to recycle
INC1	I do not have time to recycle.
INC3	Recycling is too complicated.
INC5	Recycling takes up too much of my time.
PBC1	If I wanted to recycle, I believe I would be able to do so.
PBC3	There are plenty of opportunities for me to recycle
PBC4	I find recycling to be easy
PBC5	The resources I need to recycle are available to me
PBC6	I know where to take my waste to be recycled
PBC7	If I wanted to recycle, it would be easy for me to do
PBC8	It is easy for me to recycle when I want to
PBC9	I am familiar with recycling facilities in my area
SN11	The people around me are concerned about issues relating to the environment's well-being.

SN2	The general population in Lagos are doing their part to address the issues on recycling.
SN3	There is a positive reaction from within my community when I recycle
SN7	The Lagos population understands the relevant laws and regulations on recycling waste.
SN8	In Lagos, recycling is considered the right thing to do.
SN9	In Lagos, individuals are encouraged to recycle their waste.
T2	The Lagos government has much knowledge on the work that needs to be done toward encouraging individuals to recycle.
Т3	The Lagos government are very concerned with the welfare of the environment.
T4	I am never doubtful about whether the Lagos government will do what they promised to do
T5	The authorities for recycling are doing their best to address the issue associated with recycling
WOM1	I will encourage my friends and relatives to recycle
WOM2	I say positive about recycling
WOM3	I will speak favourably about recycling to others
WOM4	I am glad to recommend ways to recycle to others

6.3.2 Attitude

In Table 6.8, the descriptive statistics for the construct attitude were calculated, providing the mean values that ranged from 1.18 to 1.31, displaying an almost equal influence on the resultant construct. The data were positively skewed and showed a variable amount of kurtosis in the range of 9.168 to 14.413.

Atti	tude							
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
A2	Recycling is a good idea	1	5	1.18	.505	.255	3.427	14.413
A3	It is important to recycling	1	5	1.26	.618	.382	3.076	11.591
A4	Recycling is beneficial to the	1	5	1.31	.722	.521	2.879	9.168
	health of the environment.							
A5	Recycling is a wise thing to do	1	5	1.22	.581	.338	3.468	14.145
A6	Recycling is favourable to the	1	5	1.23	.570	.325	3.220	12.762
	environment							
Α	Composite construct- Attitude	1	5	1.3036	.43950	.193	2.205	5.986

6.3.3 Behaviour

The measurement of normality applied to the construct behaviour is highlighted in Table 6.9. B2 was the most influential item according to the mean values, while B5 was the least influential item. The values were positively skewness ranging from .729 to 1.293, and slightly mesokurtic.

Beh	Behaviour											
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis				
B2	I am involved in recycling activities.	1	5	2.34	1.258	1.582	.729	499				
B3	I always separate my recyclable waste	1	5	2.02	1.169	1.366	.974	025				
B4	I intend to recycle my recyclable items within the next month	1	5	1.96	1.010	1.020	.896	.139				
B5	I will recycle my recyclable items every time it is ready for disposal	1	5	1.71	.902	.814	1.293	1.236				
В	Composite construct- Behaviour	1	5	2.0058	.84228	.709	.807	.261				

6.3.4 Intention

Table 6.10 contains the calculated outcomes for the intention construct. The means values range from (1.27to 1.48) based on the measurement variables, with IN5 the most influential item and IN3 the least influential. The data were positively skewed, ranging from (2.189 – to 2.664), with mesokurtic kurtosis as the data was moderate and had a medium peak.

Inten	tion							
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
IN1	I am willing to participate in	1	5	1.34	.661	.437	2.203	5.362
	information campaigns							

	aimed at improving recycling behaviours.							
IN3	I am willing to get more information on effective ways to recycle	1	5	1.27	.551	.303	2.664	5.598
IN4	In the future I will actively participate in recycling	1	5	1.29	.606	.367	2.359	6.348
IN5	I am willing to speak to my friends and family on effective ways to recycle	1	5	1.48	.821	.673	2.189	5.502
IN	Composite construct - Intention	1	5	1.408	.4940	.244	1.520	2.626

6.3.5 Inconvenience

Inconvenience

Table 6.11 contains the calculated outcomes for the inconvenience construct and comprises three measurement items that displayed mean values ranging from (3.09- to 3.74). Item INC1 was slightly more influential, while INC5 was least influential in the value of the constructs. The data was negatively skewed, ranging from -.112 to -.728, and showed a leptokurtic kurtosis spread of values.

emence							
Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
I do not have time to	1	5	3.74	1.129	1.129	728	270
recycle.							
Recycling is too	1	5	3.37	1.202	1.444	405	678
complicated.							
Recycling takes up too	1	5	3.09	1.163	1.353	112	811
much of my time.							
Composite construct-	1	5	2.98	.7143	.510	452	.586
Inconvenience							
	Item I do not have time to recycle. Recycling is too complicated. Recycling takes up too much of my time. Composite construct- Inconvenience	Item Min I do not have time to 1 recycle. 1 Recycling is too 1 complicated. 1 Recycling takes up too 1 much of my time. 1 Composite construct- 1 Inconvenience 1	ItemMinMaxI do not have time to15recycle.15Recycling is too15complicated.15Recycling takes up too15much of my time.15Composite construct-Inconvenience15	ItemMinMaxMeanI do not have time to153.74recycle.153.74Recycling is too153.37complicated.153.09much of my time.152.98Inconvenience152.98	ItemMinMaxMeanSDI do not have time to153.741.129recycle.153.371.202Recycling is too153.371.202complicated.153.091.163much of my time.152.98.7143Inconvenience152.98.7143	ItemMinMaxMeanSDVarianceI do not have time to153.741.1291.129recycle.153.371.2021.444complicated.153.091.1631.353Recycling takes up too153.091.1631.353much of my time.152.98.7143.510Inconvenience152.98.7143.510	ItemMinMaxMeanSDVarianceSkewnessI do not have time to153.741.1291.129728recycle.153.371.2021.444405Recycling is too153.091.1631.353112Recycling takes up too153.091.1631.353112much of my time.152.98.7143.510452Inconvenience152.98.7143.510452

Table 6.11 Inconvenience Descriptive Statistics

6.3.6 Perceived Behavioural Control (PBC)

The perceived behavioural control construct in Table 6.12 comprised eight measurements to calculate the PBC outcome and displayed a mean value range of 1.89 to 3.02. Based on the mean, PBC1 was shown to have the least influence on the aggregate score, while PBC5 had the most influence. The values were positively skewed with a variably

leptokurtic spread of values. As such, the distribution of the value was normal and considered

severe for the purposes of the analysis.

Percei	ved Behavioural Control							
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
PBC1	If I wanted to recycle, I believe I	1	5	1.89	1.109	1.229	1.202	.613
	would be able to do so.							
PBC3	There are plenty of opportunities	1	5	2.15	1.207	1.457	.840	368
	for me to recycle							
PBC4	I find recycling to be easy	1	5	2.20	1.095	1.200	.866	.144
PBC5	The resources I need to recycle	1	5	3.02	1.359	1.846	033	-1.261
	are available to me							
PBC6	I know where to take my waste	1	5	2.40	1.358	1.843	.630	819
	to be recycled							
PBC7	If I wanted to recycle, it would be	1	5	2.14	1.153	1.329	.777	340
	easy for me to do							
PBC8	It is easy for me to recycle when I	1	5	2.32	1.241	1.541	.630	700
	want to							
PBC9	I am familiar with recycling	1	5	2.64	1.378	1.899	.313	-1.188
	facilities in my area							
PBC	Composite construct- Perceived	1	5	2.2851	.8564	.734	.565	253
	Behavioural Control							

Table 6.12 Perceived Behavioural Control Descriptive Statistics

6.3.6 Social Norms

Table 6.13 consists of measurement variables associated with social norms, with mean values ranging from (1.96 – to 2.75). Item SN11 was shown to have the most influence on the mean value, and SN3 had the lowest influence on the aggregate score. The data were positively skewed and displayed a variable amount of kurtosis in the range (-.031 to -1.123).

Social	Norms							
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
SN11	The people around me are concerned about issues relating to the environment's well-being	1	5	2.75	1.338	1.792	.213	-1.123
SN2	The general population in Lagos are doing their part to address the issues on recycling.	1	5	2.35	1.174	1.378	.524	593

SN	Composite construct- Social Norms	1	5	2.199	.6986	.488	.176	548
	encouraged to recycle their waste.							
SN9	In Lagos, individuals are	1	5	2.06	1.181	1.395	.880	324
SN8	In Lagos, recycling is considered the right thing to do.	1	5	2.33	1.234	1.523	.647	547
SN3	There is a positive reaction from within my community when I recycle	1	5	1.96	1.122	1.259	.963	.031

6.3.7 Trust

The measurement variable associated with the trust construct (Table 6.14) showed that T3 had the least influence on the mean value (1.99), with T4 (2.54) having the most influence on the aggregate score. The values were positively skewed with a mesokurtic spread value ranging from -.381 to -.945.

Table 6.14 Trust Descriptive Statistics	Table 6	6.14 Tru	st Descri	iptive Sta	tistics
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Tru	st							
ID	ltem	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
T2	The Lagos government has much knowledge on the work that needs to be done toward encouraging individuals to recycle.	1	5	2.13	1.217	1.481	.825	381
Т3	The Lagos government are very concerned with the welfare of the environment.	1	5	1.99	1.112	1.236	1.033	.329
Т4	I am never doubtful about whether the Lagos government will do what they promised to do	1	5	2.54	1.275	1.626	.458	801
Т5	The authorities for recycling are doing their best to address the issue associated with recycling	1	5	2.44	1.332	1.774	.526	945
Т	Composite construct- Trust	1	5	2.281	.9799	.960	.598	366

6.3.8 Word of Mouth (WOM)

Word of mouth was measured using measures that showed the mean values ranging between 1.36 and 1.56, with item WOM4 being the highest and WOM1 being the lowest

contributor to the construct WOM mean. The variables displayed apposite skewness ranging

from 1.601 to 2.150 and high kurtosis values.

Word of	Vord of Mouth									
ID	Item	Min	Max	Mean	SD	Variance	Skewness	Kurtosis		
WOM1	I will encourage my friends and relatives to recycle	1	5	1.36	.632	.399	2.009	4.842		
WOM2	I say positive about recycling	1	5	1.45	.735	.541	1.929	4.269		
WOM3	I will speak favourably about recycling to others	1	5	1.37	.658	.433	2.150	5.687		
WOM4	I am glad to recommend ways to recycle to others	1	5	1.56	.833	.694	1.601	2.326		
WOM	Composite construct- Word of Mouth	1	5	1.544	.5951	.354	1.468	2.500		

Table 6.15 Word of Mouth Descriptive Statistics

6.3.9 Model Construct Summary

Statistical techniques were used for the univariate normality of the constructs to calculate the descriptive necessary in describing the normality of the underlined item response collected from the survey. Applying these techniques to the construct ensured that the data would retain sufficient normality for future analysis purposes.

No outliers were detected in the dataset during the assessment of the constructs and their measurement component, as a full range of values was reported in their range variables.

6.4 Descriptive Analysis

This plans to produce evidence of a link between word-of-mouth, social, inconvenience, trust and behavioural outcomes of recycling in Lagos, Nigeria. These links are stable and present across the various age-group, gender, and social class utilised to collect data.

Therefore, it is essential to assess the significance of the deviations in response to the respondents' demographic section to demonstrate how stable the research finding is across the research. This was achieved by comparing the different demographic groups' mean scores, a Levene test of homogeneity of variance exerted from the construct and demography and assessing the p-value and F-statistics significance of the variation within and between the demographic groups through a one-way ANOVA. This section also includes the analysis of the effects due to the various gender, Age groups and educational level demographic differences.

6.4.1 Gender Descriptive Analysis

The constructs were cross tabulated with the respondent's gender to ensure that any variances in the sample population are not attributable to the difference in gender. While providing that there were no significant differences between the two samples' standard deviation and mean (Table 6.16). The analysis suggested a slight difference between the groups.

									Word
							Social		of
G	ender	Attitude	Behaviour	Intention	Inconvenience	PBC	Norms	Trust	Mouth
Male	Mean	1.2812	1.9691	1.3512	2.9709	2.2449	2.1679	2.1965	1.4841
	Ν	294	294	294	294	294	294	294	294
	Std. Dev	.43514	.83842	.45101	.71138	.86653	.71678	1.00364	.51859
Female	Mean	1.3271	2.0531	1.4827	3.0046	2.3386	2.2407	2.3988	1.6228
	Ν	206	206	206	206	206	206	206	206
	Std. Dev	.42995	.84657	.53071	.72160	.84169	.67075	.93593	.67627
Total	Mean	1.3001	2.0038	1.4054	2.9848	2.2836	2.1980	2.2800	1.5413
	Diff	-0.045	-0.083	-0.131	-0.033	-0.093	-0.072	-0.20	-0.138
	N	500	500	500	500	500	500	500	500
	Std. Dev	.43316	.84194	.48928	.71507	.85674	.69837	.98036	.59211

Table 6.16 Comparison of Mean by Gender and Construct

Table 6.17 analysed the variance between genders, which details a significant difference between the groups' F-statistic of variance in the construct intention, trust, and word-of-mouth. The Levene test was then carried out to test if the observed mean values of the group variance were evenly distributed across the range of responses to ensure that the constructs displayed heteroscedasticity. Again, there was significant variance between gender for the construct's intention and word-of-mouth.

			Sum of		Mean		F stat	Levene Statistic	Levene Sig
Constructs			Squares	Df	Square	F	Sig.		. 0
Attitude	Between	(Combined)	.249	1	.249	1.329	.250	.018	.892
	Groups								
	Within Gro	oups	90.936	498	.187				
	Total		91.186	499					
Behaviour	Between	(Combined)	.832	1	.832	1.174	.279	.0.40	.842
	Groups								
	Within Gro	oups	343.675	498	.709				
	Total		344.507	499					
Intention	Between	(Combined)	2.041	1	2.041	8.662	.003	4.936	.027
	Groups								
	Within Gro	oups	114.303	498	.236				
	Total		116.345	499					
Inconvenience	Between	(Combined)	.134	1	.134	.262	.609	.104	.747
	Groups								
	Within Gro	oups	248.371	498	.512				
	Total		248.505	499					
Perceived	Between	(Combined)	1.036	1	1.036	1.413	.235	.431	.512
Behavioural	Groups								
Control	Within Gro	oups	355.686	498	.733				
	Total		356.722	499					
Social Norms	Between	(Combined)	.625	1	.625	1.281	.258	1.119	.541
	Groups								
	Within Gro	oups	236.408	498	.487				
	Total		237.033	499					

Table 6.17 Analysis of Variance (ANOVA) by Gender and Constructs

Trust	Between	(Combined)	4.829	1	4.829	5.066	.025	1.279	.259
	Groups								
	Within Gro	ups	462.269	498	.953				
	Total		467.097	499					
Word of Mouth	Between	(Combined)	2.271	1	2.271	6.552	.011	10.678	.001
	Groups								
	Within Gro	ups	168.115	498	.347				
	Total		170.387	499					

6.4.2 Age Group Descriptive Analysis

The research constructs and respondents' age groups were cross tabulated to ascertain whether the average rating given from each construct was influenced by the age group (Table 6.18). It was noted that there was no significant change between item scales ratings among the different age groups, apart from the construct inconvenience showing a consistent rise with the age group.

							Social		
Age Gro	oup	Attitude	Behaviour	Intention	Inconvenience	PBC	Norms	Trust	WOM
18 - 24	Mean	1.5346	2.1500	1.6482	2.7372	2.3385	2.0731	2.3046	1.7518
	N	67	67	67	67	67	67	67	67
	Std. Dev	.63000	.87812	.65559	.68263	.91528	.63703	.95139	.71662
25 - 34	Mean	1.2484	1.9286	1.3913	2.9178	2.2382	2.1654	2.3503	1.4946
	N	158	158	158	158	158	158	158	158
	Std. Dev	.36768	.76391	.47201	.73864	.82230	.68547	.99400	.58378
35 - 44	Mean	1.2596	1.9591	1.3631	3.0510	2.2079	2.1483	2.1481	1.5208
	N	161	161	161	161	161	161	161	161
	Std. Dev	.35115	.83187	.41580	.73469	.77229	.69077	.91798	.51502
45 - 54	Mean	1.2985	2.0815	1.3324	3.1310	2.4350	2.3833	2.4121	1.5289
	N	93	93	93	93	93	93	93	93
	Std. Dev	.44411	.93335	.45670	.63975	.98403	.74255	1.05891	.61367
55 - 64	Mean	1.2750	2.1500	1.4100	3.0917	2.3944	2.4273	2.1600	1.4600
	N	20	20	20	20	20	20	20	20
	Std. Dev	.45330	.90467	.48330	.60329	.91374	.70794	1.01484	.59507
65 - 74	Mean	1.0000	1.0000	1.0000	3.5000	1.5556	1.6364	1.0000	1.0000

Table 6.18 Comparison of Means by Age Group and Construct

	N	1	1	1	1	1	1	1	1
	Std. Dev								
Total	Mean	1.3001	2.0038	1.4054	2.9848	2.2836	2.1980	2.2800	1.5413
	N	500	500	500	500	500	500	500	500
	Std. Dev	.43316	.84194	.48928	.71507	.85674	.69837	.98036	.59211

Table 6.19 demonstrated significant variance in the analysis of variance for all the constructs except behaviour, perceived behavioural control, trust and word-of-mouth. Hence, different variations in responses regarding these indicators are based on the age group demographic.

							Levene	Levene
		Sum of		Mean			Statisti	Sig.
Construct		Squares	Df	Square	F	Sig.	С	
Attitude	Between	4.345	5	.869	4.814	.000	8.554	.000
	Groups							
	Within	86.840	494	.181				
	Groups							
	Total	91.186	499					
Behaviour	Between	4.551	5	.910	1.288	.268	1.777	.132
	Groups							
	Within	339.956	494	.707				
	Groups							
	Total	344.507	499					
Intention	Between	4.793	5	.959	4.134	.001	5.742	.000
	Groups							
	Within	111.551	494	.232				
	Groups							
	Total	116.345	499					
Inconvenienc	Between	7.798	5	1.560	3.117	.009	.960	.429
е	Groups							
	Within	240.707	494	.500				
	Groups							
	Total	248.505	499					
Perceived	Between	4.271	5	.854	1.166	.325	3.499	.008
Behaviour	Groups							

Table 6.19 Analysis of variance (ANOVA) by Age group

Control	Within	352.451	494	.733				
	Groups							
	Total	356.722	499					
Social	Between	6.057	5	1.211	2.523	.029	.325	.861
Norms	Groups							
	Within	230.976	494	.480				
	Groups							
	Total	237.033	499					
Trust	Between	7.042	5	1.408	1.473	.197	.616	.651
	Groups							
	Within	460.055	494	.956				
	Groups							
	Total	467.097	499					
Word of	Between	3.719	5	.744	2.147	.059	2.685	.031
Mouth	Groups							
	Within	166.667	481	.347				
	Groups							
	Total	170.387	486					

Levene test of homogeneity of variance was used to test the effects of age group on the research constructs. Demonstrating that the constructs' attitude, intention, PBC and WOM displayed significant heteroscedasticity due to age-group partitioning.

6.4.3 Income Level Descriptive Analysis

The research constructs variations of mean value concerning the respondent's income is detailed in Table 6.20. There was no clear-cut connection between the income levels reported and the construct level revealed in this Table.

Monthly Hou	sehold		Behaviou		Inconvenienc		Social		
Income		Attitude	r	Intention	е	PBC	Norms	Trust	WOM
Less than	Mean	1.4394	2.1818	1.6273	2.7348	2.2727	2.0579	2.1727	1.609
₦25,000									1
	N	22	22	22	22	22	22	22	22

Table 6.20 Comparison of Means by Income by Construct

	Std. Dev	.57631	.85629	.56668	.89481	.78622	.62642	1.1551 9	.5605 3
₩25,000 - ₩49,999	Mean	1.4134	1.9853	1.4183	2.7222	2.2908	1.9701	1.9216	1.611 8
	N	51	51	51	51	51	51	51	51
	Std. Dev	.57227	.73043	.50703	.84896	.92693	.64540	.85798	.6650 3
₩50,000 - ₩79,999	Mean	1.1998	1.9007	1.2990	2.9032	2.1070	2.0324	2.0779	1.456 9
	Ν	69	69	69	69	69	69	69	69
	Std. Dev	.28692	.72951	.36305	.80029	.76840	.69279	.89340	.5091 9
₩80,000 - ₩99,999	Mean	1.2708	1.9010	1.3677	3.1389	2.3549	2.1559	2.3094	1.444 8
	N	52	52	52	52	52	52	52	52
	Std. Dev	.36487	.83910	.50439	.60468	.89411	.56728	.92424	.5385 4
₩100,000 - ₩199,999	Mean	1.2843	1.9935	1.3897	3.0792	2.2757	2.3085	2.3766	1.521 4
	Ν	145	145	145	145	145	145	145	145
	Std. Dev	.46227	.88624	.49503	.60474	.80923	.71368	1.0291 9	.5728 9
₩200,000 - ₩499,999	Mean	1.2811	1.9881	1.3844	2.9625	2.3372	2.2363	2.3934	1.563 7
	N	94	91	91	91	91	91	91	91
	Std. Dev	.37570	.83135	.46823	.70637	.92884	.69165	.94690	.6707 4
More than ₦150,000	Mean	1.3265	2.2041	1.5061	3.2041	2.4240	2.3896	2.4735	1.624 5
	Ν	50	50	50	50	50	50	50	50
	Std. Dev	.41382	.98117	.52457	.61168	.90741	.75286	1.0744 7	.6346 0
Prefer not to say	Mean	1.4216	2.1225	1.5647	2.6912	2.1552	2.1698	2.2529	1.658 8
	Ν	17	17	17	17	17	17	17	17
	Std. Dev	.43747	.83392	.60098	.78604	.82584	.80698	.80165	.4287 5
Total	Mean	1.3001	2.0038	1.4054	2.9848	2.283	2.198	2.2800	1.541
						6	0		3
	Ν	500	500	500	500	500	500	500	500
	Std. Dev	.43316	.84194	.48928	.71507	.8567	.6983	.98036	.5921
						4	7		1

The ANOVA analysis (Table 6.21) reveals a significant variance in the means of the

constructs of inconvenience, social norms, and trust when compared with income.

		Sum of		Mean			Levene	Levene
Constructs		Squares	Df	Square	F	Sig.	Statistics	Sig.
Attitude	Between Groups	2.160	7	.309	1.661	.117	4.582	.000
	Within Groups	89.025	492	.186				
	Total	91.186	499					
Behaviour	Between Groups	4.186	7	.598	.842	.553	4.003	.000
	Within Groups	340.321	492	.710				
	Total	344.507	499					
Intention	Between Groups	2.932	7	.419	1.769	.091	2.307	.025
	Within Groups	113.412	492	.237				
	Total	116.345	499					
Inconvenience	Between Groups	11.607	7	1.658	3.353	.002	2.170	.036
	Within Groups	236.898	492	.495				
	Total	248.505	499					
Perceived	Between Groups	3.886	7	.555	.754	.627	.772	.611
Behavioural	Within Groups	352.836	492	.737				
Control	Total	356.722	499					
Social Norms	Between Groups	8.696	7	1.242	2.606	.012	1.043	.400
	Within Groups	228.337	492	.477				
	Total	237.033	499					
Trust	Between Groups	13.956	7	1.994	2.107	.041	1.176	.315
	Within Groups	453.142	492	.946				
	Total	467.097	499					
Word of	Between Groups	1.962	7	.280	.797	.590	1.283	.257
Mouth	Within Groups	168.425	492	.352				
	Total	170.387	499					

6.21 Analysis of Variance (ANOVA) by Income Level and Construct

Testing the effects of income levels on the research constructs by calculating the Levene test of homogeneity of variance demonstrated that the construct's attitude, behaviour, intention and inconvenience displayed significant heteroscedasticity due to being partitioned by income level.

6.4.4 Summary of Descriptive Analysis

The Software SPSS was used to produce a descriptive analysis of the proposed constructs against the produced demographic groups and multidimensional analysis. This analysis was completed to determine if the constructs and measures displayed sufficiently normal variance characteristics that effectively used multivariate statistical techniques on the sample. The following methods: comparison of mean values, ascertaining the F-statistic and significance of group differences in variance, and calculating the Levene test of homogeneity of variance) were used for the comparison of the constructs and the demographics.

There was no significant difference in the mean of the construct and respondent gender group. However, there were three significant differences in the F-statistic. First, it was detected that most of the variance found, except for intention and word-of-mouth, were not dispersed homogeneously among the groups. Second, a significant difference in the reported values between the groups was shown with the age group comparison of construct means. Third, the variance of value was demonstrated in the Levene tests indicating that it was dispersed evenly through the range of the constructs. Finally, income levels of the ANOVA showed that the variance present in inconvenience social norms and trust were significant, while attitude, behaviour, intention and inconvenience displayed unevenly distributed variance across the income range level.

In conclusion, a fully stable mean and variance were revealed across the participant gender group using descriptive statistical analysis with some heteroscedasticity in the present variance. Furthermore, the age group produced an evenly dispersed variance along with greater mean scores when compared by age group. Finally, income level showed mostly consistent homogeneity and variance.

6.5 Descriptive Analysis Conclusion

Descriptive statistics describe the data's basic features as a section of research. Therefore, assessing and checking the collected data is essential, ensuring that the raw materials used in the inferential production and multivariate statistics are not unduly influenced or compromised by the quality of suitable input variables.

This chapter covered the following assessment areas. An overall characteristic survey: a breakdown of persistent demographic data of collected items; appraisal of the normality characteristics of the constructs used in modelling; and a one-way ANOVA analysis of the effects of the demographic fields on these constructs. These analyses were executed to the fully congruent univariate characteristics to produce a well-formed multivariate inference.

The descriptive analysis demonstrated a reasonably normalised distribution of the traits of univariate normality, deeming them suitable to proceed with multivariate analysis. Smart PLS version 3.2.6 was used based on these distributions to carry out this analysis. The next chapter, chapter 8, details the analyses fulfilled as part of this research.

7 Measurement Model Assessment

The descriptive statistics analysis in the previous chapter identified the essential elements of the data evaluation process by ascertaining the preparation and distributional nature of the data collected suitable for the analysis used in the selected multivariate data analysis methods. Assurance was provided through univariate normality of the analysis of the collected data to indicate that the dataset was suitable for the multivariate data analysis. The measurement model aims to produce evidence from the data to refute or support the research models by observing the hypothesis relationship²⁹.

Introduction

PLS-SEM is a casual-predictive approach to SEM that focuses on estimating statistical models on structures designed to provide causal explanations (Sarstedt et al., 2017). According to Hair et al. (2019), PLS-SEM has been adopted by many researchers due to its estimating ability of complex models with many indicators' items, construct and structural paths without imposing distributional assumptions on the data. Therefore, this is the reasoning behind why PLS-SEM has been used for this thesis.

7.1 Construct Reliability and Validity Analysis

When assessing models using PLS-SEM, there are two main sets to measure reliability and validity, also known as the "psychometric properties" of measurement scales towards the

²⁹ Refer to chapter three for the hypothesis relationship

accuracy and adequacy of the evaluation of the measurement procedure (Matthews and Ross 2010; Kock 2015; Park et al., 2015; Hair et al., 2018). According to Matthews and Ross (2010), a measure can be reliable while not valid, likewise being valid but not reliable. Especially when it is measuring the right construct but not in a consistent manner, therefore, both reliability and validity are essential to assuring adequate measurement of the constructs (Hair et al., 2018).

- Reliability focuses on the extent to which an item sets measures a construct dependably or consistently and not accuracy. In other words, if a set of items are used to measure a construct multiple times with the assumption that the underlying phenomenon is constant, the same results should be produced every time (Matthews and Ross 2010).
- In contrast, construct validity is also known as construct validity; it investigates how an item performs according to its underlying constructs. For example, an item that measures the construct trust should not be measuring a different construct such as empathy (Matthews and Ross 2010; Hair et al. 2018).

These measures can be broken into four steps:

- The first step in assessing the reflective measurement model focuses on examining factor loading. According to Hair et al. (2019), the recommended values for loading should be above 0.70. They provide acceptable item reliability by indicating that the construct explains more than 50% of the items' construct.
- 2. The second step focuses on assessing internal consistency reliability through composite reliability and Cronbach's alpha.
- 3. The third step addresses the convergent validity of each construct's nature. Convergent validity refers to the extent to which a construct converges and therefore explains the

variance of its items; Average Variance Extracted (AVE) is the metric used in convergent validity with acceptable values of 0.5 or above.

4. The fourth step focuses on discriminant validity, which is how constructs are empirically distinct from other structural models by assessing the indicator's outer loadings and the Fornell-Larcker criterion (Hans et al., 2015; Gye-Soo 2016). First, therefore, to test the validity and reliability of latent constructs that include composite reliability (CR), average variance extracted (AVE), Cronbach's alpha (CA), inter-correlations among variables, and the square root of AVE on the diagonal, which will be discussed in the section below.

7.1.1 Factor Loading

As highlighted in Table 8, the factor loadings were examined to test for item reliability of the reflective constructs. According to Fornell and Larcker (1981), all the factor loading indicators must be equal to 0.7 or above, ensuring the shared variance between the items and construct is more significant than the error term. As seen in Table 7.1, all the items exceed this threshold except for IN3, PBC4, PBC5, and SN7, which are slightly below 0.7.

Factors	Items	Factor						
		Loadings						
Attitude	Recycling is a good idea	0.742						
	It is important to recycling	0.779						
	Recycling is beneficial to the health of the environment							
	Recycling is a wise thing to do	0.741						
	Recycling is favourable to the environment	0.742						
Behaviour	I am involved in recycling activities.	0.794						
	I always separate my recyclable waste	0.778						
	I intend to recycle my recyclable items within the next month	0.765						
	I will recycle my recyclable items every time it is ready for disposal	0.724						
Intention	I am willing to participate in information campaigns aimed at improving							
	recycling behaviours.	0.701						
	I am willing to get more information on effective ways to recycle	0.699						
	In the future, I will actively participate in recycling	0.785						
	I am willing to speak to my friends and family on effective ways to recycle	0.768						
Inconvenience	I do not have time to recycle.	0.823						

Tabla	7	Eactor	Loading	τ,
Table	1	Factor	LUauing	5

	Recycling is too complicated.	0.837
	Recycling takes up too much of my time.	0.777
Perceived	If I wanted to recycle, I believe I would be able to do so.	0.713
Behavioural	There are plenty of opportunities for me to recycle	0.714
Control	I find recycling to be easy	0.674
	The resources I need to recycle are available to me	0.689
	I know where to take my waste to be recycled	0.701
	If I wanted to recycle, it would be easy for me to do	0.772
	It is easy for me to recycle when I want to	0.792
	I am familiar with recycling facilities in my area	0.760
Social Norms	The people around me are concerned about issues relating to the environment's	
	well-being.	0.709
	The general population in Lagos are doing their part to address the issues on	
	recycling.	0.779
	There is a positive reaction from within my community when I recycle	0.767
	The Lagos population understands the relevant laws and regulations on	
	recycling waste.	0.680
	In Lagos, recycling is considered the right thing to do.	0.805
	In Lagos, individuals are encouraged to recycle their waste.	0.775
Trust	The Lagos government has much knowledge on the work that needs to be done	
	toward encouraging individuals to recycle.	0.758
	The Lagos government are very concerned with the welfare of the environment.	0.753
	I am never doubtful about whether the Lagos government will do what they	
	promised to do	0.785
	The authorities for recycling are doing their best to address the issue associated	
	with recycling	0.763
Word of Mouth	I will encourage my friends and relatives to recycle	0.818
	I say positive about recycling	0.697
	I will speak favourably about recycling to others	0.785
	I am glad to recommend ways to recycle to others	0.780

However, Hair et al. (2017) posits that indicators between 0.4 and 0.7 should only be removed if they negatively affect the AVE of their construct. Hence, items (A1: Recycling is an interesting thing to do, B1: I separate and dispose of all my recyclable materials, INC2: I find recycling to be an inconvenient task, INC6: I am familiar with the materials accepted for recycling by the recycling facilities in my area, It is mostly up to me whether or not I recycle, PBC2: The responsibility of recycling should be shared by the general public, SN1: I will recycle in order to prevent others criticising me, SN4: I would be willing to recycle if anyone around me recycled, SN5: I am willing to follow the strategies introduced by the Lagos government on recycling, SN6: I will recycle if those within the community believe recycling is the right thing to do, SN7: I feel very confident about the Lagos government recycling policies, SN10: I try to recommend ways to recycle to my friends and family) were removed. Therefore, all the items' indicators were 0.6 and above. The following section focuses on Cronbach's Alpha to further assess the internal consistency.

Item	Factor
	Loading
Recycling is an interesting thing to do	0.597
I separate and dispose of all my recyclable materials	0.391
I find recycling to be an inconvenient task	0.485
I am familiar with the materials accepted for recycling by the recycling facilities in my	0.542
area.	
It is mostly up to me whether or not I recycle	0.378
The responsibility of recycling should be shared by the general public	0.334
I will recycle in order to prevent others criticising me	0.475
I would be willing to recycle if anyone around me recycled	0.209
I am willing to follow the strategies introduced by the Lagos government on recycling.	0.414
I will recycle if those within the community believe recycling is the right thing to do.	0.265
I feel very confident about the Lagos government's recycling policies	0.584
I try to recommend ways to recycle to my friends and family.	0.475

7.1.2 Indicator Multicollinearity

According to Fornell and Bookstein (1982), Variance Inflation Factor (VIF) the statistic is used to assess an indicator's multicollinearity. Kock (2015) posited that when the VIF result from a full collinearity test is more significant than 3.3, the model indicates pathological collinearity. However, if the VIF is less than 3, the model is deemed free from common method bias.

Hair et al. (2016) added that multicollinearity is not a significant issue if the value for VIF is below 5. Subsequent, all the constructs were connected to conduct the PLS algorithm factor test to check its inner VIF values. With both inner and outer items being tested, as seen in Table 8.2, all the VIF values were less than 3.3. Therefore, the model is considered free of

common method bias, and therefore it is not an issue in the analysis. The SmartPLS fully automated the VIF values, and all the VIF values are clearly below the five thresholds: hence, no critical issues in collinearity among the predictor constructs.

Factors	Items	Inner	Outer Model
		model	
Attitude	Recycling is a good idea	1.470	1.555
	It is important to recycling	1.575	
	Recycling is beneficial to the health of the environment	1.521	
	Recycling is a wise thing to do	1.503	
	Recycling is favourable to the environment	1.573	
Behaviour	I am involved in recycling activities.	1.563	
	I always separate my recyclable waste	1.511	
	I intend to recycle my recyclable items within the next		
	month	1.461	
	I will recycle my recyclable items every time it is ready		
	for disposal	1.376	
Intention	I am willing to participate in information campaigns		1.134
	aimed at improving recycling behaviours.	1.294	
	I am willing to get more information on effective ways		
	to recycle	1.313	
	In the future, I will actively participate in recycling	1.488	
	I am willing to speak to my friends and family on		
	effective ways to recycle	1.397	
Inconvenience	I do not have time to recycle.	1.439	1.158
	Recycling is too complicated.	1.545	
	Recycling takes up too much of my time.	1.482	
Perceived	If I wanted to recycle, I believe I would be able to do so.	1.745	1.134
Benavioural	There are plenty of opportunities for me to recycle	1.692	
Control	I find recycling to be easy	1.637	
	The resources I need to recycle are available to me	1.662	
	I know where to take my waste to be recycled	1.823	
	If I wanted to recycle, it would be easy for me to do	2.170	
	It is easy for me to recycle when I want to	2.044	
	I am familiar with recycling facilities in my area	2.029	2.652
Social Norms	The people around me are concerned about issues	4 5 2 2	2.652
	relating to the environment's well-being.	1.533	
	address the issues on reguling	2 1 0 4	
	There is a positive reaction from within my community	2.184	
	when I recycle	1 500	
	The Lages population understands the relevant laws and	1.390	
	regulations on recycling waste	1 723	
	In Lagos recycling is considered the right thing to do	1.695	
	In Lagos, individuals are encouraged to recycle their	1.055	
	waste.	1.877	
Trust	The Lagos government has much knowledge on the		2.581
	work that needs to be done toward encouraging		
	individuals to recycle.	1.674	

Table 8.2 VIF Inner and Outer Model Multicollinearity Statistics

	The Lagos government are very concerned with the		
	welfare of the environment.	1.503	
	I am never doubtful about whether the Lagos		
	government will do what they promised to do	1.955	
	The authorities for recycling are doing their best to		
	address the issue associated with recycling	1.803	
Word of Mouth	I will encourage my friends and relatives to recycle	1.687	1.775
	I say positive about recycling	1.365	
	I will speak favourably about recycling to others	1.571	
	I am glad to recommend ways to recycle to others	1.577	

7.1.3 Cronbach's Alpha

Cronbach Alpha (α) represents the instrument's internal consistency used during data collection by determining the consistency index for each construct. According to Hair et al. (2010), the threshold level for Cronbach Alpha should be higher than 0.70. The measurement of individual items is the basis for Cronbach's Alpha value, resulting in each item is assumed to load equally to the factor. The lower limit for the construct reliability of acceptance is between 0.6 and 0.7. As highlighted in Table 7.3, the highest validity will be in values close to 1; hence all the contracts specified minimum validity. According to Hair et al. (2019), Cronbach's alpha may be too conservative, while the composite reliability may be too liberal. The construct's true reliability is typically viewed within these two extreme values. The following section addresses the implications of the item-total statistics, particularly for assessing the highest Cronbach Alpha for each construct.

Table 7.3	Cronbach's	Alpha	for	Attitude
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Cronbach's Alpha (α)	No. of Items
0.798	5

The responses of the five attitudes items produced a Cronbach Alpha of .798. Therefore a good internal consistency was established, Table 7.3. This was proven further with the SMC results, Table 7.3.1, which indicated that the items correlated well within the scale.

Table 7.3.1 Items-Total Statis	tics
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	Scale Mean	Scale Mean Scale Co		Cronbach's
	if Item	Variance if	Total	Alpha if Item
Items	Deleted	Item Deleted	Correlation	Deleted
Recycling is a good idea	5.02	3.722	.547	.766
It is important to recycling	4.94	3.312	.603	.746
Recycling is beneficial to the	4.90	3.049	.575	.761
health of the environment				
Recycling is a wise thing to do	4.99	3.458	.575	.755
Recycling is favourable to the	4.98	3.454	.600	.748
environment				

Reviewing Table 7.3.1, the internal consistency results would have been lower if any

items were deleted. Therefore, this was the basis for keeping all the items on the scale.

Table 7.3.2 Cronbach's Alpha

Cronbach's Alpha (α)		No. of Items	
0.764	XC	4	

A good Cronbach Alpha value of 0.764 was yielded for the overall behaviour scale,

Table 7.3.2. Hence deleting any items would cause the corresponding Cronbach Alpha (α) to

decrease.

Table 7.3.3 Items-Total Statistics

		Scale Variance if	Corrected Item-	Cronbach's
	Scale Mean if	Item	Total	Alpha if Item
Items	Item Deleted	Deleted	Correlation	Deleted
I am involved in recycling	5.69	5.921	.599	.693
activities.				
I always separate my recyclable	6.01	6.347	.584	.698
waste				
I intend to recycle my recyclable	6.07	7.072	.568	.708
items within the next month				
I will recycle my recyclable items	6.32	7.698	.531	.730
every time it is ready for disposal				

A decision was made to keep all the items on the scale based on the item-total statistics

Table 7.3.3. Consequently, deleting any item would decrease the corresponding Cronbach Alpha of the scale.

Table 7.3.4 Cronbach's Alpha for Intention

Cronbach's Alpha (α)	No. of Items
0.723	4

The internal consistency of the intention scale was suggested to be acceptable based

on the analyses of the rate with a Cronbach Alpha of 0.723 Table 7.3.4.

		Scale	Corrected	Cronbach'
	Scale Mean	Variance if	Item-Total	s Alpha if
	if Item	Item	Correlatio	Item
Items	Deleted	Deleted	n	Deleted
I am willing to participate in information	4.04	2.443	.476	.670
campaigns aimed at improving recycling				
behaviours.				
I am willing to get more information on	4.12	2.718	.473	.676
effective ways to recycle				
In the future, I will actively participate in	4.09	2.426	.569	.620
recycling				
I am willing to speak to my friends and family	3.91	1.976	.535	.647
on effective ways to recycle				

Based on the Items-Total Statistics values in Table 7.3.5, all items in the scale were kept

based on the inverse effect that deleting any of the four would have had on the Cronbach

Alpha scale.

Table 7.3.6 Cronbach's Alpha for Inconvenience

Cronbach's Alpha (α)

No. of Items

0.745

3

A similarly good Cronbach Alpha value equal to .745 was yielded in the reliability analysis for the inconvenience scale.

Table 7.3.7 Items-Total Statistics

	Scale	Scale	Corrected	Cronbach's
	Mean if	Variance if	Item-Total	Alpha if
	Item	Item	Correlatio	Item
Item	Deleted	Deleted	n	Deleted
I do not have time to recycle.	6.48	4.237	.555	.691
Recycling is too complicated.	6.85	3.831	.598	.641
Recycling takes up too much of my time.	7.11	4.066	.579	.663

Based on the output in Table 7.3.7, maintaining all three of the inconvenience items should be retained. Deleting any of the items would decrease the scale's corresponding

Cronbach Alpha(α).

Table 7.3.8 Cronbach's Alpha for Perceived Behavioural Control Cronbach's Alpha (a) No. of Items 0.873 8

It is worth noting that the highest Cronbach Alpha 0.873 was received by perceived

behavioural control compared to the other construct of the model, Table 7.38.

	Scale	Scale	Corrected	Cronbach'
	Mean if	Variance if	Item-Total	s Alpha if
	Item	Item	Correlatio	Item
Items	Deleted	Deleted	n	Deleted
If I wanted to recycle, I believe I would be able to	16.86	42.426	.606	.862
do so.				
There are plenty of opportunities for me to recycle	16.60	41.282	.623	.860
I find recycling to be easy	16.56	43.150	.572	.866
The resources I need to recycle are available to me	15.73	40.183	.602	.863
I know where to take my waste to be recycled	16.35	40.047	.615	.862
If I wanted to recycle it would be easy for me to do	16.60	41.065	.677	.855
It is easy for me to recycle when I want to	16.42	39.799	.706	.852
I am familiar with recycling facilities in my area	16.11	38.746	.685	.854

Table 7.3.9 Items-Total Statistics

54

Based on the output in Table 7.3.9, in other to maintain the highest Cronbach Alpha

result, none of the items should be deleted to avoid the risk of affecting scale validity.

Table 7.3.10 Cronbach's Alpha for Social Norms

Cronbach's Alpha (α)	No. of Items
0.854	6

A Cronbach Alpha(α) value of .854 was reached through the reliability analysis for the

overall social norms scale, Table 7.3.10.

Table 7.3.11 Items-Total Statistics

		_	Correcte	
	Scale	Scale	d Item-	Cronbach
	Mean if	Variance	Total	's Alpha if
	Item	if Item	Correlati	Item
Item	Deleted	Deleted	on	Deleted
The people around me are concerned about issues relating to the environment's well-being.	11.63	21.804	.734	.814
The general population in Lagos are doing their part to	12.03	24.469	.596	.840
address the issues on recycling.				
There is a positive reaction from within my community	12.42	24.430	.636	.834
when I recycle				
The Lagos population understands the relevant laws and	12.05	23.184	.675	.826
regulations on recycling waste.				
In Lagos, recycling is considered the right thing to do.	12.32	24.539	.585	.842
In Lagos, individuals are encouraged to recycle their	11.46	22.085	.647	.833
waste.				

Based on the item-total statistics, the corresponding Cronbach Alpha would decrease

if any of the items should be deleted, Table 7.3.11. Hence the decision to keep all six items

on the scale.

Table 7.3.12 Cronbach's Alpha for Trust

Cronbach's Alpha (α)	No. of Items
0.786	4

The internal consistency of the trust scale was suggested to be acceptable based on

the analyses of the rate with a Cronbach Alpha(α) of 0.786 Table 7.3.12.

Table 7.3.13	Items-Total	Statistics
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			Correcte	
	Scale	Scale	d Item-	Cronbac
	Mean if	Variance if	Total	h's Alpha
	Item	ltem	Correlati	if Item
Items	Deleted	Deleted	on	Deleted
The Lagos government has much knowledge on the work	6.97	9.087	.597	.738
that needs to be done toward encouraging individuals to				
recycle.				
The Lagos government are very concerned with the	7.12	9.909	.547	.763
welfare of the environment.				
I am never doubtful about whether the Lagos	6.57	8.715	.612	.731
government will do what they promised to do				
The authorities for recycling are doing their best to	6.66	8.275	.643	.715
address the issue associated with recycling				

Based on the Items-Total Statistics values in Table 7.3.13, all items in the scale were

kept based on the inverse effect that deleting any of the four would have had on the Cronbach

Alpha(α) scale.

Table 7.2.14 Cropbach's Al	nha for Wor	d of Mouth
Table 7.3.14 Crombach S Al	pha for wor	

	•		
Cronbach's Alpha (α)			No. of Items
0.772			4

An acceptable Cronbach Alpha(α) value equal to .772 was yielded in the reliability

analysis for the word-of-mouth scale.

Table 7.3.14 Items-Total Statistics

			Correcte	
	Scale	Scale	d Item-	Cronbach
	Mean if	Variance	Total	's Alpha
	Item	if Item	Correlati	if Item
Items	Deleted	Deleted	on	Deleted
I will encourage my friends and relatives to recycle	4.37	3.049	.624	.695
I say positive about recycling	4.29	3.031	.517	.745
I will speak favourably about recycling to others	4.36	3.061	.581	.713
I am glad to recommend ways to recycle to others	4.16	2.546	.595	.710

A decision was made to keep all the items based on the item-total statistics in Table 7.3.14. Therefore, deleting any item would decrease the scale's corresponding Cronbach Alpha(α).

7.1.4 Composite Reliability (CR), Average Variance Extracted and Rho_A

Unlike Cronbach Alpha(α), an equal indicator loading of constructs is not accepted with Composite reliability (CR). The threshold value of CR varies between 0 and 1; however, the value should not be lesser than 0.60, with a more desirable value of 0.70 and above. Average internal consistency is indicated when the CR values are between 0.60 and 0.70, while adequate internal consistency must be between 0.70 and 0.90 (Arif and Chohan 2002; Ghasriki and Mahmoodi 2015; Makhdoom et al. 2016).

Constructs	CR	AVE	Rho_A
Attitude	0.860	0.552	0.804
Behaviour	0.850	0.586	0.766
Inconvenience	0.854	0.660	0.755
Intention	0.828	0.547	0.728
Perceived Behavioural Control	0.900	0.530	0.876
Social Norms	0.887	0.568	0.885
Trust	0.887	0.611	0.854
Word of Mouth	0.854	0.595	0.780

Table 7.4 Composite Reliability (CR), Average Variance Extracted (AVE) and Rho_A

Once the reliability has been indicated, the next step is to demonstrate Convergent Validity. Convergent Validity refers to the theoretical relationship between the constructs. The amount of variance captured by the construct in the relationship among the amount of variance resulting from measurement error is represented by the Average Variance Extracted (AVE) (Fornell and Larcker 1981). AVE is calculated by dividing the sum of the squared factor loading with the sum squared factor loadings added to the sum of the error variances to produce a measure of the variance extracted from the measurement by the factor. AVE was used to identify the element of convergence within the measurement construct. For AVE to adequately show convergent Validity, the AVE value threshold must be above 0.50 (Han et al. 2015). And as seen in Table 8.4, all the AVE values are above 0.50.

Rho_A, also known as reliability rho and composite reliability, ranges between 0 and 1. Like Cronbach's alpha, the higher the rho_A value is, the more reliable the item scale, as good internal consistency is indicated with rho values above 0.8. At the same time, 0.7 represents the lower limit of adequacy (Cicchetti 1994). As seen in Table 7.4, all the values for each construct are above 0.7, with the lowest being 0.728 and the highest at 0.885.

As seen in Table 7.2, Cronbach's Alpha(α) and composite reliability results respectively exceeded the value threshold of 0.70 (Henseler 2013). In addition, the values of the composite reliability range from 0.828 to 0.900, indicating the measurement model's reliability. The most common measure to assess convergent validity in PLS-SEM is the average variance extracted (AVE), which will be discussed next.

7.1.5 Reliability Summary

After looking at the result, the convergent validity was established in this thesis by examining the factor loadings, Cronbach's Alphas, composite reliability, AVE and Rho_A values. As seen in Table 8.3, both Cronbach's Alpha(α) and the composite reliability results exceeded the threshold value of 0.70 (Henseler 2013). The composite reliability values ranged

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from 0.828 to 0.900, and Cronbach's Alpha(α) values ranged from 0.723 to 0.873. The AVE values ranged from **0.530 to 0.660**, which exceeds the required threshold value of 0.50. The Rho_A values ranged between **0.728 and 0.885**, which fall correctly between the expected values of **0 and 1**. These values highlighted above provide evidence that the convergent validity of this study was established.

7.2 Discriminant Validity

Discriminant validity was used to determine whether each item shared more significant variances with its latent construct than the other constructs (Fornell and Bookstein, 1982; Chin 1998; Todorova 2013). According to Fornell and Larckers (1981), the correlations between AVE and constructs can establish discriminant validity. The authors further posited that the square root of the construct AVE needs to be greater than the correlations between constructs to satisfy the discriminant validity. Fornell-Larcker's criterion has been considered a conventional approach to assessing discriminant validity. However, other approaches include the cross-loading examination method and the HTMT ratio (Hair et al. 2010). Discriminant validity was then evaluated in this study using two approaches—first, the Fornell-Larcker criterion. And secondly, an examination of the cross-loading revealed no indicator loaded higher on an opposing construct (Hair et al. 2011).

7.2.1 Fornell-Larcker Criterion

According to Hair et al. (2010), Fornell-Larcker's criterion is considered a conventional approach to assessing discriminant validity by testing whether the square root of each construct's AVE is more significant than its correlation with each of the remaining constructs. As shown in Table 8.5, all the constructs exhibited discriminant validity, as all the square roots

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of the AVE construct have a more significant construct correlation than any other (Gye-Soo

2016).

Construct	Attitude	Behaviour	Inconvenience	Intention	РВС	Social Norms	Trust	WOM
Attitude	0.743							
Behaviour	0.306	0.765						
Inconvenience	-0.297	-0.255	0.813					
Intention	0.604	0.549	-0.330	0.739				
РВС	0.183	0.717	-0.135	0.344	0.728			
Social Norms	0.107	0.436	0.028	0.269	0.591	0.769		
Trust	0.068	0.371	0.064	0.228	0.573	0.719	0.777	
WOM	0.577	0.597	-0.306	0.731	0.448	0.326	0.274	0.771

Table 8.5 Fornell-Larcker Criterion

Note: Bold and Italics represent the square root of AVE

7.2.2 Cross Loading

Cross-loading is an approach used to establish discriminant validity, also known as "item-level discriminant validity" (Henseler et al. 2014). When using cross-loading, the discriminant validity is determined when each measured item weakly correlates with all other constructs apart from the one it is theoretically associated with (Gefen and Straub 2005). As seen in Table 8.6, all the measurement items are more strongly correlated with their theoretically associated constructs than others. Thus, discriminant validity has been established. The items highlighted in Table 7.6 shows how well they measured with their associated constructs.

						Social		
Items	Attitude	Behaviour	Inconvenience	Intention	PBC	Norms	Trust	WOM
A2	<mark>0.742</mark>	0.226	-0.215	0.486	0.111	0.049	0.038	0.454
A3	<mark>0.779</mark>	0.262	-0.255	0.514	0.184	0.135	0.082	0.479
A4	<mark>0.709</mark>	0.212	-0.189	0.374	0.088	0.004	0.007	0.364

A5	<mark>0.741</mark>	0.221	-0.191	0.437	0.138	0.071	0.032	0.387
A6	<mark>0.742</mark>	0.210	-0.251	0.408	0.147	0.077	0.047	0.444
B2	0.168	<mark>0.794</mark>	-0.166	0.357	0.636	0.351	0.308	0.418
B3	0.211	<mark>0.778</mark>	-0.169	0.377	0.600	0.410	0.390	0.445
B4	0.287	<mark>0.765</mark>	-0.215	0.476	0.512	0.352	0.278	0.474
B5	0.280	<mark>0.724</mark>	-0.239	0.479	0.435	0.222	0.196	0.497
IN1	0.480	0.365	-0.224	<mark>0.701</mark>	0.204	0.126	0.149	0.496
IN3	0.437	0.339	-0.178	<mark>0.699</mark>	0.213	0.195	0.205	0.492
IN4	0.427	0.438	-0.309	<mark>0.785</mark>	0.252	0.183	0.141	0.583
IN5	0.448	0.469	-0.258	<mark>0.768</mark>	0.336	0.256	0.183	0.583
INC1	-0.236	-0.255	<mark>0.823</mark>	-0.29	-0.169	-0.008	0.024	-0.291
INC3	-0.293	-0.204	<mark>0.837</mark>	-0.285	-0.096	0.079	0.058	-0.253
INC5	-0.186	-0.152	<mark>0.777</mark>	-0.223	-0.050	0.031	0.081	-0.190
PBC1	0.231	0.538	-0.147	0.344	<mark>0.713</mark>	0.405	0.361	0.420
PBC3	0.179	0.467	-0.11	0.307	<mark>0.714</mark>	0.463	0.467	0.411
PBC4	0.140	0.533	-0.168	0.280	<mark>0.674</mark>	0.308	0.320	0.330
PBC5	0.020	0.455	-0.040	0.151	<mark>0.689</mark>	0.440	0.409	0.197
PBC6	0.113	0.483	-0.052	0.193	<mark>0.701</mark>	0.408	0.431	0.239
PBC7	0.148	0.561	-0.171	0.292	<mark>0.772</mark>	0.513	0.477	0.382
PBC8	0.170	0.590	-0.086	0.252	<mark>0.792</mark>	0.408	0.370	0.328
PBC9	0.044	0.523	0.006	0.168	<mark>0.760</mark>	0.554	0.518	0.286
SN11	0.040	0.278	0.059	0.167	0.383	<mark>0.709</mark>	0.530	0.200
SN2	-0.06	0.339	0.113	0.113	0.513	<mark>0.779</mark>	0.653	0.183
SN3	0.086	0.424	-0.062	0.247	0.518	<mark>0.767</mark>	0.526	0.283
SN8	0.188	0.277	0.017	0.259	0.387	<mark>0.805</mark>	0.639	0.287
SN9	0.057	0.356	0.051	0.178	0.505	<mark>0.775</mark>	0.650	0.255
T2	0.025	0.271	0.045	0.163	0.396	0.564	<mark>0.758</mark>	0.206
Т3	0.114	0.297	-0.003	0.218	0.432	0.510	<mark>0.753</mark>	0.223
T4	-0.002	0.267	0.099	0.166	0.382	0.601	<mark>0.785</mark>	0.197
T5	0.057	0.326	0.057	0.127	0.535	0.639	<mark>0.763</mark>	0.229
WOM1	0.458	0.498	-0.281	0.631	0.403	0.315	0.273	<mark>0.818</mark>
WOM2	0.424	0.394	-0.217	0.489	0.306	0.271	0.250	<mark>0.697</mark>
WOM3	0.533	0.416	-0.234	0.579	0.246	0.179	0.145	<mark>0.785</mark>
WOM4	0.360	0.529	-0.206	0.545	0.426	0.241	0.195	<mark>0.780</mark>

7.2.3 Construct Reliability and Validity Summary

Tables 7.4 and 7.5 showed that discriminant validity was assessed using two methods. First, Fornell and Larcker's (1981) criterion was used by testing the square root of each construct AVE to ensure they were more significant than the correlation of each remaining construct. Secondly, the items of each construct were cross loaded to ensure that no item was loading higher on an opposing construct (Hair et al. 2011). All the values of the outer loading exceed the suggested threshold of 0.5, showing a satisfactory contribution of items toward the constructs. Based on these results, all the constructs exhibited discriminant validity. Therefore, offering strong evidence for the reliability and validity of the measured latent constructs through the parameter estimates and diagnostics of the overall measurement model.

7.3 Models Predictive Capabilities

Once the discriminant validity was accomplished, the following procedure evaluated the structural (inner) model. As specified in the conceptual framework, this structural thesis model specifies the theoretical relationship between the construct's attitude, perceived behavioural control, social norms, trust, inconvenience, word of mouth and intention to determine individual behaviour towards recycling in Lagos. PLS-SEM was used to assess the structural model's predictive relevance and explanatory power alongside the hypothesised relationships through the significance of the path coefficients.

7.3.1 Variance Explained

The variance represents the central criterion for evaluating the structural model explained (R^2) within the PLS algorithm. According to Chin (1998), the R^2 values of 0.19, 0.33 or 0.67 for endogenous latent constructs of the structural model are described as weak, moderate or substantial. In this thesis, the R^2 values were used to calculate predictive relevance and the relationships among the reflective constructs. Table 7.7 highlights that the model explains 59.6% of the variance in intention and 61.8 % of the behaviour towards
recycling. Based on Chin (1998), the R^2 values in this model show a powerful statistical ability of the hypothesised structural model to predict intention and behaviour toward recycling in Lagos, Nigeria. Therefore, the structural model can be assumed to sufficiently reflect Lagosians ' intention and behaviour towards recycling.

Table 7.7 *R*²

	Original	Sample	Standard			
	Sample	Mean	Deviation	T Statistics		
Construct	(O)	(M)	(STDEV)	(O/STDEV)	P Values	
Behaviour	0.618	0.621	0.030	20.848	0.000	
Intention	0.595	0.606	0.042	14.184	0.000	

7.3.2 Predictive Validity (Q²)

According to Hair et al. (2014), the underlying theory for the Q² value is to show adequate predictive relevance. The Stone-Geisser's Q² test is the principal measure used to assess the exogenous latent construct (Geisser, 1974; Stone, 1974). The blindfolding technique was run using SmartPLS to predictive relevance to assess predictive relevance by estimating the cross-validated redundancy measure of Q². Based on Chin's (1998) recommendation, the omission distance was set to 7, as the Q² values were calculated based on the equation.

 Q^2 values greater than zero indicate that the observed values are well reconstructed, with the exogenous constructs having a predictive relevance for the endogenous construct under consideration. However, when there is a Q^2 value of less than zero, it implies a lack of predictive reliance. As shown in Table 8.8, the Q^2 value for the behaviour was 0.341, and the intention was 0.304. Both behaviour and intention signify that the model had adequate explanatory power, as a value of 0.20 is considered high in behavioural sciences (Hair et al. 2014).

Constructs	SSO	SSE	Q ² (=1SSE/SSO)
Attitude	2,650.00	2,650.00	
Behaviour	2,120.00	1,396.70	0.341
Inconvenience	1,590.00	1,590.00	
Intention	2,120.00	1,476.05	0.304
PBC	4,240.00	4,240.00	
Social Norms	2,650.00	2,650.00	
Trust	2,120.00	2,120.00	
WOM	2,120.00	2,120.00	

Table 7.8 The Prediction Relevance (Q²) Test

7.3.3 Effect Size F²

The impact on the endogenous constructs is measured through the effect size F^2 by omitting exogenous constructs from the structural model (Hair et al. 2018). F square measures the contribution of an exogenous construct to R^2 of its endogenous constructs. A guideline was provided by Cohen (1988) to show the contribution of the exogenous constructs to their respective endogenous construct. According to Cohen (1988), the effect size F^2 of 0.02 is considered small, with 0.15 as a medium and 0.35 as a significant effect. Furthermore, as seen in Table 8.9, perceived behavioural control (PBC) has a large effect size of 0.833 behavioural outcomes, and intention has a medium effect size of 0.276 on the behavioural outcome. Respectively, word-of-mouth has a large effect size of 0.385 on intention, while inconvenience (0.019), social norms (0.003), and Trust (0.001) have a small effect on intention.

Path	Original Sample (O)	Sample Mean (M)				
Attitude \rightarrow Intention	0.113	0.124				
Inconvenience \rightarrow Intention	0.019	0.021				
Intention \rightarrow Behaviour	0.268	0.276				
PBC \rightarrow Behaviour	0.833	0.841				
Social Norms \rightarrow Intention	0.003	0.006				
Trust \rightarrow Intention	0.001	0.004				
WOM \rightarrow Intention	0.385	0.395				

Table 7.9 F² Values in the Structural Model

Figure 7 Research Model



7.4 Hypotheses Testing

The next step is to analyse the structural model by testing the hypothesis of this thesis to produce a clear image of the perceived outcome. Structural Equation Modelling (SEM) was utilised to examine each hypothesis, specifically Smart PLS. Using SEM can help analyse the assumptions and casual relationships (Gefen et al. 2000). SEM's main strength is constructing the latent constructs while testing the relationship influenced between the interactive constructs and their indicators. As seen with Smart PLS, latent construct analysis examines the reliability testing and factor loading and constructs the path coefficient table that includes t-test and visualising the latent constructs. According to Gefen et al. (2000), SEM has become an essential validating linkage and testing instrument among constructs. Smart PLS uses bootstrapping to calculate the t-statistics for significance testing of both the inner and outer models. Taking many subsamples from the original sample to be replaced and generating standard bootstrap errors, in turn, produces approximated t-values for the structural path significance testing. In addition, data normality is also approximated in the bootstrapping result (Wong 2013).

Using Smart PLS, t-values were calculated using bootstrapping to help test if the path coefficients differ significantly from zero. The non-parametric bootstrapping was used with 5,000 sub-samples and individual sign changes, the standard measurement required for a study (Haier et al. 2011, 2012). The analysis revealed that five out of the seven hypothesised relationships in the inner path model were statistically significant. All the structural path estimates were in the expected direction. The only two non-significant path estimates were the direct relationship between social norms and intention and trust and intentions, even though the estimates were in the hypothesised directions. Table 7.10 highlights the hypotheses testing results.

Нур	Relationship	Path Coeff(β)	p-Values	Decision
H1	Attitude \rightarrow Intention	0.266***	0.000	Supported
H2	PBC→ Behaviour	0.601***	0.000	Supported
H3	Social Norms → Intention	0.047	0.326	Not Supported
H4	Inconvenience \rightarrow Intention	-0.095**	0.002	Supported
H5	Trust \rightarrow Intention	0.034	0.479	Not supported
H6	WOM \rightarrow Intention	0.524***	0.000	Supported
H7	Intention \rightarrow Behaviour	0.341***	0.000	Supported

* *P* < 0.05, ** *p* < 0.01, *** *p* < 0.001

The coefficient obtained from the path analysis from the complete dataset confirmed that the research hypothesis (H¹, H², H⁴, H⁶, H⁷) with the varying degrees of correspondence to the observed data, with the expectation of H⁴ and H⁵ not being significant, in addition to their t-statistics being lower than 2.0. Therefore, the acceptance of the model and the β significant relationships prove inferential statistical evidence used to test the validity of the claims made in this research thesis. Hypothesis 1 posited that attitude has a positive relationship with intention. The hypothesis was tested by examining the path coefficient between the construct's attitude and intention. As seen in Table 7.20, the path coefficient from the perceived credibility to attitude was positive and significant (p<0.000); therefore, hypothesis1 was supported. This finding contributes to previous literature by highlighting that for Lagos, a region that possesses a low level of awareness of the positive outcomes of recycling (Filimonau et al. 2020; Dawodu et al. 2021; Okudo et al. 2021), there exists a strong and favourable positive relationship between an individual's attitude and their intention to recycle. This differs from those studies, as recycling is processed through informal sectors in Lagos, a representative of developing countries, with limited signalling of the relative importance of the positive benefits of recycling activities are in developed countries that are relatively removed from their residents' daily lives due to the environmentally viable acceptance of recycling (van Beukering and van den Bergh 2006; Tesfaye and Kitaw 2020).

Hypothesis 2 proposed that there was a positive relationship between Perceived Behavioural Control (PBC) and Behaviour. The hypothesis was tested by examining the path coefficient between the exogenous construct PBC and the endogenous construct Behavioural outcome. The path coefficient from PBC to Behavioural outcome was positive and highly significant (P<0.000). Therefore, this hypothesis was supported. Furthermore, the results of the construct perceived behavioural control in this thesis are in line with results that show that self-efficacy is significant in influencing recycling behaviours (Barr et al. 2001; Lee and Paik 2011; Wan et al. 2012; Chan and Bishop, 2013; Wan et al. 2014; Ma et al. 2018; Khan et al. 2019; Sujata et al. 2019; Rousta et al. 2020). Perceived behavioural control, according to Ajzen, refers to an individual's perception of the ease or difficulty of performing the behaviour in question. Hence, within this study's scope, perceived behavioural control is conceptualised as the ease or difficulty of recycling behaviour perceived by a Lagos resident individual. Therefore, it can be inferred that the more a Lagos resident perceives being able to partake in recycling in consideration of the availability of the facilities and resources towards the encouragement of the particular behaviour, the higher their likelihood of engaging in the behaviour and vice versa.

Hypothesis 3 posited that social norms positively influence the intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct's social norms and intention. This direct relationship between social norms and intention was positive but not statistically significant (P<0.326). Therefore hypothesis 3 was not supported. This finding contradicts prior findings concerning the role of social norms influencing recycling intentions, showing that external social pressures significantly increase an individual's willingness to participate in behaviour such as recycling. For example, Doran and Larsen (2016) argued that social norms could also be used to predict and explain recycling intentions. At the same time, Nguyen et al. (2020) added that social norms were essential in explaining an individual's intention toward pro-environmental behaviours.

Hypothesis 4 proposed that inconvenience is positively related to intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct inconvenience and the construct intention. The path coefficient was positive and highly significant (p<0.002); thus, hypothesis 4 was supported. This study confirms inconvenience as a predictive power towards Lagos residents' a case study of developing countries' recycling intention. Recycling inconvenience is perceived differently in developed countries such as the UK, with relatively more established norms within the formal section (Kumar 2019; Amoatey et al. 2020; Akkalatham and Taghipour 2021). Therefore, there are levels of inconveniences experienced by individuals in developing versus developed countries concerning recycling.

Hypothesis 5 posited a positive relation between trust influencing intention to recycle, and the hypothesis was tested by evaluating the path coefficient between the construct trust and intention to recycle. The direct relationship between trust and intention was not statistically significant (P< 0.479); thus, hypothesis 5 was not supported. Evaluating the results for the impact of trust, confidence in institutions does not seem to play a significant role in Lagos residents recycling intentions, possibly suggesting the lack of trust between the institutions (such as the Lagos government/agencies) and residents hinders their ability to recycle. Therefore, it is reasonable to support that in this context, Lagos residents are less responsive to recycling even with the government's support. Welfens et al. (2016) posited that trust is another barrier to recycling intention, as mistrust reduces the effect of capable and effective recycling policies and schemes. Therefore, Lagos residents feeling about the government's ability to provide adequate procedures are essential to their perception of recycling policies.

Hypothesis 6 specified that word of mouth positively influences intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct word of mouth and intention. The path coefficient was positive and highly significant (P<0.000); this hypothesis was supported. The result shows that word-of-mouth is a crucial motivator for Lagos's recycling behaviour, implying that credible sources on recycling positively enhance the Lagos residents' recycling behaviour. Although prior studies, e.g. (Sweeney et al. 2014; Gilal et

al. 2018), have shown that word-of-mouth improves pro-environmental behaviours, most of these studies focus on general waste management. Nevertheless, this thesis is one of the first attempts to link word-of-mouth to recycling behaviours in Lagos, a case study of developing countries. Therefore, this thesis provides a theoretical explanation by observing the effects of recycling in Lagos while encouraging recycling policy interventions through successful word-of-mouth via social media or community forums.

Lastly, hypothesis 7 postulated that intention positively affects the behavioural outcome. The hypothesis was tested by examining the path coefficient between the construct's intention and behaviour. Resulting in a positive and highly significant (P<0.000); thus, this hypothesis was supported. This result suggests that the more motivations the Lagos residents have towards performing recycling behaviour, the more they engage in recycling. Consequently, this result suggests a meaningful relationship between recycling intention and recycling behaviour, as this finding contributes to the considerable amounts of existing literature demonstrating that the inclusion of additional constructs to the theory of planned behaviour would indicate the significant power of recycling intention on recycling behaviour (Ru et al. 2019; Kumar 2019; Arli et al. 2020; Liu et al. 2020).

7.4.1 Model Predictive Capabilities Summary

Based on the results of the SEM analysis, this section can be concluded by stating that five out of the seven proposed hypothesised models have been statistically validated and accepted. However, the direct relationship between social norms and intention, trust and intention, were the only two hypotheses not to be accepted due to their lack of statistical Validity in the hypothesised causal path³⁰. Ultimately, the influence of the relevant factors on recycling behaviours in Lagos, Nigeria, is reflected in these paths.

7.5 Mediating Effects

Mediation was used to classify the relationship between the independent and dependent constructs while indicating mediation in the relationship. In this thesis, mediation analysis was conducted to better understand the relationship between the constructs by obtaining the extent to which the mediating construct (intention) mediates the relationship between the independent constructs (attitude, social norm, trust, inconvenience and word of mouth) and the dependent construct recycling behaviour.

According to Hair et al. (2017), there are a series of stages to determine the types and existence of mediation. Firstly, it is essential to determine whether there is mediation within the indirect relationship between the two constructs. The indirect relationship needs to be significant for the next step to be performed. Only then can you check the type of mediation by confirming if the mediator construct accounts for either (full mediation) all of the observed relation or (partial mediation) some of the empirical relationship between the two latent constructs that are under consideration.

This research used the bootstrapped test approach Zhao et al. (2010) proposed to analyse the mediation. According to Hair et al. (2018), this approach has overcome the methodological and conceptual problems highlighted in the literature regarding the Sobel test

³⁰ Refer to Section 8.1 for the futher explanation on the importances on the lack of significances between the two constructs and intention.

(1982) and Baron and Kenny approach (1986). SmartPLS bootstrapping was implemented to examine the mediating role of Intention between (attitude, social norm, trust, inconvenience, and word of mouth) and behaviour. This was done by yielding higher levels of statistical power as it evaluates the influence of the exogenous construct through the mediating construct (Hair et al. 2017). This mediation analysis considers all mediators simultaneously in the same model to obtain the active aspect of the mechanism, including indirect effects and the total indirect effect in the structural model (Hair et al. 2018). Table 8.11 consists of the path coefficient, direct effect, indirect effect, total effect and t-values.

	Direct	Indirect	Total Effect	Result
Path	Effect	Effect		
Attitude \rightarrow Behaviour	-	0.091	0.091(<0.000)	
Attitude \rightarrow Intention	0.266	-	0.266 (<0.000)	Partial mediation
Inconvenience \rightarrow Behaviour	-	-0.032	-0.032(<0.002)	
Inconvenience \rightarrow Intention	-0.095	-	-0.095(<0.002)	Partial mediation
Intention → Behaviour	0.341	-	0.341(<0.000)	
$PBC \rightarrow Behaviour$	0.601	-	0.601 (<0.000)	
Social Norms → Behaviour	-	0.016	0.016 (<0.337)	
Social Norms \rightarrow Intention	0.047	-	0.047 (<0.326)	No mediation
Trust → Behaviour	-	0.012	0.012 (<0.488)	
Trust \rightarrow Intention	0.034	-	0.034 (<0.479)	No mediation
WOM \rightarrow Behaviour	-	0.179	0.179 (<0.000)	
WOM \rightarrow Intention	0.524	-	0.524 (<0.000)	Partial mediation

Table 7.11 Direct, Indirect and Total Effects

As seen in Table 7.11, these results show the significant relationship between dependent and independent constructs while producing the strengths of the effects from the weight of both constructs. There was no full mediation inferred during the bootstrapping, as there was no detection of a significant relationship without the mediator. The absence of mediation effects was noted during significant relationship evidence with trust and social norms, as the mediator was still insignificant in the mediating construct. Lastly, when the significant relationship was shown to reduce without the mediator, the mediating construct, when added, showed a reduced significant effect known as the presence of partial mediation. Therefore, the mediator construct intention accounted for some of the empirical relationships between the independent and dependent constructs.

7.5.1 Mediation Summary

Bootstrapping provided an in-depth relationship into the nature of the mediation while confirming when mediation was not present. The results also highlighted the indirect mediated construct relationship when the mediation existed without directly affecting the independent and dependent construct when both present and act in the same direction.

The mediation path analysis shows the significant relationship between the independent, mediator, and dependent constructs. Therefore, the following points were formed using the direct and indirect effects.

- Intention partially mediates the relationship between attitude and behavioural outcome.
- Intention demonstrates no mediation between social norms and behavioural outcomes.
- Intention demonstrates a significant partial mediation in the relationship between the construct inconvenience and behavioural outcome.
- Intention partially mediates the relationship between Word of Mouth and behavioural outcome

The use of mediation analysis provided additional insights into the nature of intention mediating between different constructs. The implication of the mediating finding is fully assessed in the Discussion and Conclusion chapter.

7.6 PLS-Based Multi-Group Analysis

Henseler et al. (2009) posited that heterogeneity of observation is a potential threat to SEM results interpretation. Hence, this study conducted a PLS-based multi-group analysis (PLS MGA) to analyse the group effects in the structural model relationships while determining how components of the structural model are similar across the different groups. The measures of the constructs must be invariant across groups when conducting a multi-group analysis (Sarstedt et al. 2011). Kline (2011) added that running a MGA implies that the requirement of the measurement invariance is satisfied because the set of items measures the same constructs of each group. The structural model is examined once the measures have been verified to be invariant across the groups.

Within the framework of PLS path modelling, there have been different approaches proposed for MGA. The earliest method was proposed by Keil et al. (2000), which entails a separate estimation of model parameters for each group while using standard errors derived from the bootstrapping for parametric test and is still generally regarded as the parametric approach. However, according to Chin and Dibbern (2010); Sarstedt et al. (2011), this MGA approach has been challenged because of its inherent distributional assumption. It does not fit the distribution-free characters for PLS path modelling. Another MGA approach that does not rely on distributional assumption was recommended by Henseler (2007) and Henseler et al. (2009), utilising a direct comparison of a specific group sub-sample's bootstrap estimation. Hence, Henseler (2007) suggests a separate bootstrap analysis on each sub-samples under consideration to test the group difference hypothesis test. Henseler et al. (2009) posited that the Henseler (2007) approach does not depend on the distributional assumption; instead, the observed distribution of the bootstrap outcome is evaluated. Therefore, this study implements the Henseler (2007) approach and SmartPLS generating the bootstrap outputs alongside MSExel spreadsheet software to produce the final calculation that determines the probability of whether or not the two multi-group parameters differed.

Considering categorical variables that strengthen or influence the relationship between the constructs is essential for group-specific comparison effects (Baron and Kenny 1986; Sarstedt et al. 2011). In cognisance of this, respondents' age, gender and previous recycling experience were utilised as a priori information for conducting the multi-group analysis.

7.6.1 Multi-Group Analysis: Age group 18-34 vs 35-74

The groups were chosen based on each group's individual similarities and the differences across the group. The 18-34 age group participants had similar mean values for each construct. The same is true for the 35-74 Age group participants, as seen in the age-group descriptive analysis results. Furthermore, dividing the sample at age 34/35 allowed each group to have a similar sample size

Table 7.12 highlights the group-specific results for assessing the measurement model. Evaluating the measurement model findings in the cumulative samples also applies to the agespecific sub-sample. Construct reliability was established within the two sub-samples, as all the reflective measurement loadings were above the recommended threshold of 0.7 and significantly above the 0.01 level. Multicollinearity was not a concern as the formative construct items' weight was all significant at the 0.01 level. The reliability of each sub-sample construct was demonstrated by the estimated indices of the composite reliability and Cronbach's alpha(α).

Similarly, each sub-sample's AVE value was above the minimum requirement of 0.50 (Hair et al. 2011), which confirmed convergent validity. Applying the Fornell and Larcker (1981) criterion and inspection of each construct cross-loading helped confirm the discriminant validity. When comparing both sub-sample measurements, there is a significant difference between Cronbach's Alpha of constructs inconvenience (0.1140) and attitude (0.069) as well as the inconvenience (0.093) and attitude (0.086) of the AVE. Therefore, indicating a measurement invariance among the 18-34 and 35-74.

	Constructs	Overall	18-34	35-74	IΔI
Рс	Attitude	0.860	0.877	0.834	0.043
	Behaviour	0.850	0.837	0.859	0.022
	Inconvenience	0.854	0.820	0.873	0.053
	Intention	0.828	0.825	0.821	0.004
	РВС	0.900	0.899	0.901	0.002
	Social Norms	0.878	0.878	0.876	0.002
	Trust	0.859	0.855	0.861	0.006
	WOM	0.854	0.859	0.846	0.013
(α)	Attitude	0.798	0.824	0.755	0.069
	Behaviour	0.764	0.740	0.781	0.041
	Inconvenience	0.745	0.673	0.787	0.114
	Intention	0.723	0.716	0.709	0.007
	РВС	0.873	0.871	0.874	0.003
	Social Norms	0.832	0.829	0.835	0.006
	Trust	0.786	0.779	0.790	0.011
	WOM	0.772	0.781	0.758	0.023
AVE	Attitude	0.552	0.588	0.502	0.086
	Behaviour	0.586	0.563	0.605	0.042
	Inconvenience	0.660	0.604	0.697	0.093
	Intention	0.547	0.543	0.536	0.007

Table 7.12 Age-Specific Measurement Model Evaluation

PBC	0.530	0.527	0.534	0.007
Social Norms	0.591	0.590	0.587	0.003
Trust	0.604	0.596	0.607	0.011
WOM	0.595	0.606	0.579	0.027

Note: $\Delta I = Absolute difference of Age 18-34 and 35-75 data results; <math>\rho c = Composite$ reliability; $\alpha = Cronbach's Alpha$

Once the validity of the measures for both age groups was established, the further action was to have the age-specific model's predictive relevance and exploratory power compared among each endogenous construct. Next, the magnitude, sign, and significance across the two sub-sample path coefficients inner model were compared to ascertain whether there is a difference in the strength and directionality of the structural relationships. The age-specific PLS model results are highlighted in Table 7.12, with the R^2 values of both sub-samples suggesting how the structural model adequately explains the variance of the endogenous constructs. Thus, the proposed model sufficiently reflects the intentions and behaviours of both groups towards recycling. However, some interesting findings are revealed when the R^2 value difference between the two samples is observed. It appears that the model does better at predicting intention to recycle of 35-74 (R^2 61.1%) than that of 18-34 (R^2 58%). Conversely, the percentage of variance explaining recycling behaviour among the two sub-samples was reasonably similar, though the age 35-74 (R^2 63%) was higher than the 18-34 counterparts (R^2 61%).

The following stage examined the significance, direction and magnitude of hypothesised paths across the sub-sample. In the finding, solid support was shown for the effectiveness and efficiency of the structural model estimation, especially in the age group 35-74, as the model had equal significance to the overall model. However, some differences were revealed in the path coefficient comparison between the two sub-samples. The I∆I symbol is

used to denote "a difference in or a change in values of the two possible scenarios" (*Delta* (Δ) 2021). This thesis represents the absolute difference between the two age groups (18-34 and 35-75). The hypothesised path of attitude to intention ($|\Delta|$ =0.055), PBC to behaviour ($|\Delta|$ =0.012), social norms to intention ($|\Delta|$ =0.073) and inconvenience to intention ($|\Delta|$ =0.050) have a more significant effect the age 35-74 sample than in the 18-34. However, in the case of the following path: trust and intention ($|\Delta|$ =0.032), WOM and intention ($|\Delta|$ =0.061) and intention and behaviour ($|\Delta|$ 0.006).

Therefore, the main question remains whether there is a statistical significance between the observed differences between ages 18-34 and 35-74.

Tuble 7.15.7	ge speenie i Es Modelling Results				
Нур	Hypothesised Paths	Overall	18-34	35-74	IΔI
H1	Attitude \rightarrow Intention	0.266***	0.230*	0.285***	0.055
H2	PBC \rightarrow Behaviour	0.601***	0.589***	0.604***	0.012
Н3	Social Norms→ Intention	0.047	0.030	0.103	0.073
H4	Inconvenience \rightarrow Intention	-0.095***	0.068	0.118**	0.050
H5	Trust \rightarrow Intention	0.034	0.034	0.002	0.032
H6	WOM \rightarrow Intention	0.524***	0.559***	0.498***	0.061
H7	Intention \rightarrow Behaviour	0.341***	0.353***	0.347***	0.006
R ²	Behaviour	0.617	0.610	0.630	0.020
	Intention	0.595	0.580	0.611	0.031
Q ²	Behaviour	0.341	0.321	0.356	0.035
	Intention	0.304	0.286	0.297	0.011

Table 7.13: Age-Specific PLS Modelling Results

Note: $|\Delta|$ = Absolute difference of *Age 18-34 and 35-75 data* results R² = Variance explained; Q 2 = Predictive Relevance; * *P* < 0.05, ** *p* < 0.01, *** *p* < 0.001

7.7 Chapter Conclusion

This chapter highlighted the main survey results. This chapter presented the report on various series of statistical testing such as measurement model validation, structural model

testing, hypothesis, mediation and multi-group analyses. The chapter described the data screening process by addressing the issues related to missing data, with 500 valid questionnaires retained for the analyses.

This chapter then focused on the respondent's profile description by evaluating the following demographic data: those relating to the self-reported personal respondent characteristics (Gender, Age-group, Education and Monthly income) and individuals' recycling participation and beliefs. The results showed persistent data on characteristics that are independent of the tested survey environment.

The model's goodness-of-fit was measured by applying the construct reliability and validity and discriminant validity through factor loading, Cronbach's Alpha, composite reliability, AVE, Rho_A, Fornell-Larcker criterion and cross-loading. In all the cases, the reliability and validity of each measurement model were found to be satisfactory.

Following the successful measurement model validation, the next appropriate step was to test the structural model. Based on the R² and Q² values, an individual's intention and behaviour to recycle were adequately demonstrated in the model. Five out of the seven hypotheses were fully supported at the aggregate data level, with most of the path coefficients all positive at a significant level of 0.01. The mediating effect was also examined and partially responsible for the direct relationship between intention and behaviour.

PLS-based multi-group analyses were also conducted to compare the performance of the structural and measurement models across the different age groups. This strengthened the findings and implications for practice presented in the following chapter. Chapter 8,

Discussion and Conclusions, highlights the research survey's raw observation into inferential statistical evidence.

8 Discussion

This thesis on the nature of recycling behaviour in Lagos contributes to expanding the theory of planned behaviour by offering a new model and perspective to how behavioural change with specific and general context to recycling.

8.1 Research Hypotheses and Discussion

This thesis used the Partial Least Squares Structural Equation Model (PLS-SEM) to test the relationship between the constructs within the proposed model³¹. The relationships were found to predict the model, with the null hypothesis rejected and the relationship proved, as seen in Table 8.1.

Нур	Relationship	Path Coeff(β)	p-Values
H1	Attitude → Intention	0.266***	0.000
H2	PBC→ Behaviour	0.601***	0.000
H3	Social Norms → Intention	0.047	0.326
H4	Inconvenience \rightarrow Intention	-0.095**	0.002
H5	Trust→ Intention	0.034	0.479
H6	WOM \rightarrow Intention	0.524***	0.000
H7	Intention → Behaviour	0.341***	0.000

Table 8.1 Hypothesis Testing Summary

³¹ Refer to Chapter 8 for the Measurement Model Analysis

A significant finding from these results is the positive relationship (β =0.266) between attitudes and intention among Lagos residents towards recycling, suggesting that individuals' attitudes are substantial predictors of recycling intentions. This finding contributes to previous literature by highlighting that for Lagos, a region that possesses a low level of awareness of the positive outcomes of recycling (Filimonau et al. 2020; Dawoduetal. 2021; Okudo et al. 2021), there exists a strong and favourable positive relationship between an individual's attitude and their intention to recycle. This differs from those studies, as recycling is processed through informal sectors in Lagos, a representative of developing countries, with limited signalling of the relative importance of the positive benefits of recycling (Aliyu and Amadu 2017; Idowu et al. 2021). Compared to how heavily formalised recycling activities are in developed countries that are relatively removed from their residents' daily lives due to the environmentally viable acceptance of recycling (van Beukering and van den Bergh 2006; Tesfaye and Kitaw 2020).

A considerable amount of research on recycling has been found to show that attitude and intention share a significant positive relationship in areas where recycling is carried out through formal sectors, with individuals having a high awareness of the positive outcomes of recycling (Tonglet et al. 2004; Pakpour et al. 2014; Cheung and Fok 2014; Wang et al. 2018; Pan et al. 2018; Liu et al. 2020; Patwary et al. 2020; Wang et al. 2020; Linder et al. 2021). For example, Tonglet et al. (2004) investigated the determinants of recycling behaviour of households in Brixworth, United Kingdom, concluding that an individual's attitude towards household recycling was the major contributor to intention to recycle (β = 0.51). Therefore, this thesis provides evidence that increases the scope of current literature by demonstrating the strong predictive power of individuals' attitudes, with low levels of awareness towards the

importance of recycling, on their intentions to recycle. This finding pushes the boundries of the envelope on our understanding of recycling behaviours in developing nations. This thesis examines the motivators of recycling behaviours with a parallel specificity between attitude toward recycling and intention to recycle.

Perceived behavioural control was a strong predictor of Lagos residents' toward recycling (β = 0.601, p<0.000). The results of the construct perceived behavioural control in this thesis are in line with results that show that self-efficacy is significant in influencing recycling behaviours (Barr et al. 2001; Lee 2011; Wan et al. 2012; Chan and Bishop 2013; Wan et al. 2014; Ma et al. 2018; Khan et al. 2019; Sujata et al. 2019; Rousta et al. 2020). Perceived behavioural control, according to Ajzen, refers to an individual's perception of the ease or difficulty of performing the behaviour in question. Hence, within this study's scope, perceived behavioural control is conceptualised as the ease or difficulty of recycling behaviour perceived by a Lagos resident. Therefore, it can be inferred that the more a Lagos resident perceives being able to partake in recycling in consideration of the availability of the facilities and resources towards the encouragement of the particular behaviour, the higher their likelihood of engaging in the behaviour and vice versa.

In this current thesis, Lagos, a representative of the developing countries' residents, perceives recycling as challenging behaviour based on the perceived difficulties and barriers such as lack of recycling facilities, lack of opportunity to recycle, and lack of familiarity and knowledge of recycling. Hence, the importance of this finding shows a significant difference between how recycling is perceived in developing countries versus developed countries, where recycling is viewed as a potential sustainable pathway to building resilient cities and safeguarding the natural environment (Galal and Abdul Moneim 2016). Therefore, this

indicates that self-efficacy's influence on recycling participation in Lagos can be enhanced by accessing adequate recycling facilities and programmes available to the residents. As a result, we can conclude from the relationship between perceived behavioural control and behaviour that the more difficult recycling is perceived by Lagos residents in consideration of the availability of facilities and resources, the greater their willingness to engage in recycling.

Based on the widespread consensus that individual intentions are strongly influenced by their social environments, as seen by studies positing that social influence strongly influences an individual's intention upon behaviour, with social norms being a significant component of an individual's intention to recycle (Fishbein and Ajzen 2011, Smith et al. 2012; Abrahamse and Steg 2013; Newell et al. 2014; Joshi and Rahman 2015; Reynolds 2015; Doran and Larsen 2016; Kim and Seock 2019; Fang et al. 2021).

According to Fang et al. (2021), social norms can be perceived as social pressure when influencing individuals to conform to others. Social norms were defined in this thesis as an individual's social pressure toward recycling, which was found not to be a statistically significant determinant of Lagos residents' intention to recycle (β = 0.047, p<0.326) hence the rejection of hypothesis H³. This finding contradicts prior findings concerning the role of social norms influencing recycling intentions, showing that external social pressures significantly increase an individual's willingness to participate in behaviour such as recycling. For example, Doran and Larsen (2016) argued that social norms could also be used to predict and explain recycling intentions among tourists visiting Queenstown, New Zealand. At the same time, Nigbur et al. (2010) added that social norms had been proven to be an essential aspect in explaining an individual's intention towards pro-environmental behaviours in a study conducted on two recycling collection rounds in districts of Guildford, Surrey (UK), where a

council-operated recycling scheme using the 'Green Box' for paper, glass and tin recycling served most areas in the Borough with fortnightly kerbside collections.

Although social norms are a socioeconomic force that influences individuals to interact with social prompts, this thesis did not deem social norms communication as a trigger towards recycling intentions among the Lagos participants. This could be due to Lagos residents not regarding recycling as legitimate within their confirmative culture, resulting in the lack of encouragement towards recycling as a principle model. For example, in the study conducted by Abd'Razack et al. (2017), individuals' environmental attitudes in many cities in Nigeria were multi-complex. They did not feel social pressure to partake in recycling because they lacked adequate plans for efficient, sustainable management. Therefore, Lagos residents, a representative of developing countries, do not perceive recycling as necessary behaviour to partake in due to the lack of relevant recycling behavioural signalling.

An alternative view for future research towards social pressures in Lagos, a representative of the developing countries, will be to motivate recycling through social norms that indirectly reflect the Lagos residents' moral obligations on the positives and negatives of recycling to indicate if recycling decisions are made based on their preference. This is based on the realistic assumption that there is a stronger emphasis on community-based relationships in Lagos, a representative of developing countries, compared to developed nations such as the UK (Boma et al. 2019; Nkwunonwo et al. 2020). Lagos is perceived as a collective social efficacy based on its sense of community and the outcome of social participation (Olufunmilola 2009; Adegbola and Gearhart 2019).

In addition to the theory of planned behaviour components, inconvenience is one of the additional constructs integrated into the present study. Inconvenience is continually cited as a significant barrier to recycling, with convenience being an effective motivator for recycling (Ewing 2001; Pinto et al. 2004; Kelly et al. 2006; Saphores et al. 2012; Thi Thu Nguyen et al. 2018). In this current thesis, the inconvenience was found to be a statistically significant determinant of the intentions of the Lagos residents to recycle (β = -0.095, p<0.002). Based on Ajzen's (1991) definition of inconvenience, which refers to an individual's convenience towards engaging in a behaviour, this study has defined it as the Lagos residents' belief on how inconvenient it is to partake in recycling³².

Previous studies have shown that individuals with a positive attitude toward recycling have a higher tendency toward recycling, irrespective of the convenience of facilities (Kollmuss and Agyeman 2002; Tonglet et al. 2004; Vassanadumrongdee and Kittipongvises 2018). In this regard, convenience, which relates to the extent of easiness or difficulty of engaging in recycling behaviour and the inconvenience of recycling, could discourage individuals from engaging in the corresponding behaviour. Therefore, it can be concluded that the more inconvenient an individual perceives recycling to be, the less they are willing to exhibit the corresponding behaviour (Thi Thu Nguyen et al. 2018). This study confirms inconvenience as a predictive power towards Lagos residents' a case study of developing countries' recycling intention. Recycling inconvenience is perceived differently in developed countries such as the UK, with relatively more established norms within the formal section (Kumar 2019; Amoatey et al. 2020; Akkalatham and Taghipour 2021). There are levels of inconveniences experienced by individuals in developing versus developed countries concerning recycling. True, it is a common human trait to resist inconvenience; however, the lack of a formal recycling sector and accessible recycling options for developing countries, when compared to the options

³² Refer to Chapter Two for this thesis definition of Inconvenience toward recycling in Lagos

available in developed countries, highlight the different levels of inconveniences experienced by residents in developing nations versus those in developed countries. Therefore, inconvenience does not carry as much weight or significance in recycling behaviours in developed countries compared to developing countries.

For this reason, inconvenience falls under the behavioural beliefs that directly influence Lagos residents toward recycling intentions, as convenience is essential in devising recycling behaviours. Hence, the current findings demonstrated that the Lagos participants considered recycling inconvenient to participate in. One of the possible explanations for this result might be that Lagos residents believe recycling to be time-consuming, not practical, complicated, and hard to engage in.

In contrast, it was not an unexpected finding that there was no direct relationship between trust in the government and recycling intentions (β = 0.034, p<0.475), especially among the participants in Lagos, as there is a lack of trust between the government and the community, is an established characteristic of Lagos (Eyisi et al. 2020; Ezeibe et al. 2020). Evaluating the results for the impact of trust, confidence in institutions does not seem to play a significant role in Lagos residents recycling intentions, possibly suggesting the lack of trust between the institutions (such as the Lagos government/agencies) and residents hinders their ability to recycle. Therefore, it is reasonable to support that in this context, Lagos residents are less responsive to recycling even with the government's support. Welfens et al. (2016) posited that trust is another barrier to recycling intention, as mistrust reduces the effect of capable and effective recycling policies and schemes. Therefore, Lagos residents feeling about the government's ability to provide adequate procedures are essential to their perception of recycling policies. Thus, to gain the trust of Lagos residents and ensure that the recycling

practices are successfully achieved in Lagos, the government and recycling institutions need to enhance community leaders' involvement. Community leaders guide and direct society's affairs toward achieving objectives, e.g., the traditional rulers or market leaders (Okobia et al. 2016). Similar to the ability to influence behaviour that social media "influencers" and celebrities have on their followers, community leaders in developing countries can influence the behaviours of those in their respective communities because they have garnered the trust of those in their respective communities by being accessible and, therefore, trustworthy. This is why any formal plan to promote recycling in developing countries needs to involve dissemination through community leaders closely by liaising on the recycling activities and policies towards impacting the Lagos residents' confidence to encourage recycling participation. In conclusion, this thesis result (β = 0.034, p<0.475), highlights the lack of trust between the residents of Lagos and the Lagos government by confirming the reasoning for Lagos residents' reactions to policies installed for recycling depends on the trust of the authority and perceived trust of the leader.

The amplified effect of word-of-mouth on recycling intention is a significant finding from the results based on the strong positive relationship between the two constructs (β =0.524, p<0.000). Therefore, this thesis views word-of-mouth as reliable information or communication between Lagos residents conveying pleasant or unpleasant experiences, complaints, or rumours regarding recycling. Furthermore, Chen et al. (2014) suggest that word-of-mouth is how individuals inform their relatives, communities, and friends about positive messages on pro-environmental behaviour, such as recycling. Hence, including wordof-mouth in the proposed framework helps strengthen the Lagos residents' recycling intention. Overall, the result shows that word-of-mouth is a crucial motivator for Lagos's recycling behaviour, implying that credible sources on recycling positively enhance the Lagos residents' recycling behaviour. Although prior studies, e.g. (Sweeney et al. 2014; Gilal et al. 2018), have shown that word-of-mouth improves pro-environmental behaviours, most of these studies focus on general waste management. Nevertheless, this thesis is one of the first attempts to link word-of-mouth to recycling behaviours in Lagos, a case study of developing countries. Therefore, this thesis provides a theoretical explanation by observing the effects of recycling in Lagos while encouraging recycling policy interventions through successful word-of-mouth via social media or community forums.

The final hypothesis from these results shows a strong significant relationship (β = 0.341 p<0.000) between recycling intention and recycling behavioural outcome, hence, the Lagos residents' recycling intention emerged as a significant predictor of their recycling behaviour. Ajzen (1991) defined intention as an individual's motivation to engage or not engage in a behaviour. Based on the definition, the more motivations the Lagos residents have towards performing recycling behaviour, the more they engage in recycling. Consequently, this result suggests a meaningful relationship between recycling intention and recycling behaviour, as this finding contributes to the considerable amounts of existing literature demonstrating that the inclusion of additional constructs to the theory of planned behaviour would indicate the significant power of recycling intention on recycling behaviour (Ru et al. 2019; Kumar 2019; Arli et al. 2020; Liu 2020).

This thesis differs from prior literature by showing that the recycling intentions of residents of developing countries, using Lagos as a case study, is a mediating factor of positive attitudes and the newly added constructs of Inconvenience and word-of-mouth towards

participating in recycling behaviours. This finding extends the theory of planned behaviours by incorporating significant characteristics of developing countries using Lagos as a case study on recycling behaviours, providing a new perspective tailored towards enhancing recycling in developed countries.

8.2 Research Aims

By focusing on the characteristics of the developing region through the case study on Lagos, this model provides a new perspective to the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents; at the same time, adding to the current literature by providing new insight into the under-researched area of recycling behaviour of Lagos, a case study of developing countries. At the same time, this model adds to the current literature by providing new insight into the under-researched area of recycling behaviour in Lagos, a case study of developing new insight into the under-researched area of recycling behaviour in Lagos, a case study of developing nations. This thesis reinforces the importance of using additional constructs to expand the theory of planned behaviour's ability to predict recycling behaviours of developing countries based on the characteristics of the Lagos case study.

Four major research questions directed this investigation to help this thesis investigate recycling behaviours in Lagos by creating new insight into implementing the planned behaviour theory on recycling. Accordingly, the following four research questions have been constructed, each subheading to address the research aim³³.

³³ Refer to chapter One for the research aim

8.2.1 How do the original constructs of the theory of planned behaviour influence recycling intentions in Lagos, a case study of developing nations?

All the primary predicting constructs from Ajzen's theory of planned behaviour model (attitude and perceived behavioural control), except for subjective norms, were used for this thesis and were shown to be positive predictors of recycling intent and behaviour with statistically significant varied strength among the Lagos participants. Although previous studies, e.g. (Boldero 1995; Davies et al. 2002; Tonglet et al. 2004) have indicated that perceived behavioural control, as a construct in the theory of planned behaviour, does not contribute significantly to explaining intention or behaviour. However, in this study, perceived behavioural control strongly shows a significant relationship with the recycling behaviour of the Lagos participants (β = 0.601, p<0.000). Hence, the more parameters available to an individual to recycle, the easier they perceive recycling behaviour. Moreover, the behavioural beliefs of Lagos residents towards recycling significantly predicted their attitude towards intention to recycle (β =0.266). In other words, positive evaluations of Lagos residents positively and directly depend on their positive ease towards recycling.

Although subjective norms have been included in the traditional theory of planned behaviour, its operationalisation has been based on injunctive social norms that focus on a significant approval or disapproval of a behaviour (Fang et al. 2017). However, the subjective norm has been perceived as prescriptive due to the social pressure required in performing a behaviour based on the positive effect when there is pressure to oppose or support the behaviour (Davies et al. 2002; Biel and Thoegersen 2007). Consequently, social norms, which represent how individuals perceive participation in behaviours based on their interaction with others and their impact on group norm-sharing processes (Hage et al. 2009; Fang et al. 2017), has not been adequately explored in developing cities such as Lagos. In Lagos, community and communal participation play a significant role in their culture (Okobia et al. 2016). Social interaction towards a common goal is guided by these communal values, based on the interpersonal bonds that goes beyond biological affinity within a community (Igboin 2011). Therefore, this thesis addresses the gap by adding the construct of social norms for subjective norms in the theory of planned behaviour, based on the vital role social pressure plays in influencing behaviours and collectivism being relatively dominant in many aspects of Lagos residents' daily life (Olufunmilola 2009; Adegbola and Gearhart 2019). The results found that social norms did not significantly predict recycling intentions in Lagos. Therefore, this Implies that Lagos residents are not likely to engage in recycling when they are perceived to be under pressure to conform to required expectations of social influence towards recycling. Hence the Lagos participant's intentions to recycle were not influenced by the social milieu towards recycling.

8.2.2 What does recycling practice mean in the case study Lagos, and can the theories used in pro-environmental behaviours, mainly in developed countries, apply to recycling in Lagos?

Recycling in Lagos is still perceived to be in an early stage, even with the rise of immediate challenges and problems related to the lack of recycling in Lagos. For Example, the increase in pollution such as toxins leaching into the soil and groundwater, landfills getting filled up faster and the destruction of natural habitats (Afon 2007; Opoko and Oluwatayo 2016; Adeyi et al. 2020; Gangaya 2021). Most of these challenges and problems can be attributed to the government or institutions' lack of promoting active recycling practices within Lagos (Benson 2020). Especially given that it is far removed from the more trusted community leaders. Prior research, e.g. (Alam and Siwar 2015; Fei et al. 2016; Ferronato et al.

2019; Alpizar et al. 2020) has indicated the recycling rate to be relatively low In most developing cities compared to the average developed cities. However, this thesis showed a contrary result to those studies. According to the demographic results on recycling participation, 76% of the Lagos respondents expressed that they had participated in recycling, with 45.9% suggesting this was an occasional occurrence, 16.2% indicating they always recycle, and 26.5% indicating they usually recycle. In other words, in contrast to previous studies, Lagos residents reported that they actively engage in recycling activities.

This is an essential finding as the results contradict earlier consensus on individual recycling participation in Lagos. In this respect, this current thesis revealed that the Lagos participants believe that concept reusing is a form of recycling, with 91.2 % believing re-using is a form of recycling while 6.2% indicating they are two separate concepts. This finding might have resulted from the Lagos participant's understanding of recycling, as recycling is perceived differently by individuals. Consequently, this result is in line with previous studies on the concept of recycling, suggesting that one of the main misconceptions about recycling is how recycling and reusing often become intertwined and misused (Geueke et al., 2018; lacovidou et al., 2021). Conversely, these studies do not consider the definite contrast between the participants' recycling participation levels. Thus, there needs to be future research emphasising the practical aspects that directly influence Lagos residents to perceive reusing as a form of recycling.

Nevertheless, Lagos focuses on the top-down model, as the government does not recognise the importance of public participation in decision-making processes such as recycling (Kofoworola 2007). Additionally, there exists a lack of Lagos residents' attitude and need to recycle and a lack of technical resources and training at a local level to tackle recycling

in Lagos (Otitoju 2014). Therefore, recycling has not received adequate attention from the Lagos institutions and government, as most recycling activities are carried out in informal sectors. Informal recycling is recycling activities carried out by, in most cases, poor or lower social groups, which lack a sophisticated structure and are out of the government's control mainly through waste picking or scavenging in exchange for monitory incentives (Wilson et al. 2006; Troschinetz and Mihelcic 2009; Ezeah et al. 2013; Raghupathy and Chaturvedi 2013; Fei et al. 2016).

In contrast, developed countries have adopted and implemented different recycling strategies based on their ambiguity and flexibility, mainly due to specific factors. E.g., reliance on pursuing social integration, environmental conservation, and economic sustainability on industrialised recycling activities that are more or less removed from their daily lives due to the environmentally viable acceptance of recycling (Vujić et al. 2015; Ghosh 2019; Duan et al. 2021). Hence, waste deposition in developed countries is transferred from landfills to recycling and energy recovery (Pujara et al. 2019). In contrast, a common problem faced by developing cities such as Lagos is their lack of an effective waste management system. Their waste is primarily disposed of by open dumping and landfilling (Kumar and Samadder 2017).

It is plausible to affirm that the frameworks and models that have been previously developed and successfully implemented to promote or enforce recycling behaviours in developed cities will not be as effective in Lagos. This is mainly due to Lagos's socio-economic development that cannot adequately support its current recycling stage, resulting in difficulties in achieving the expected results (Valenzuela-Levi et al. 2021). For example, the lack of these frameworks in considering the differences within the level of recycling participation and policies among Lagos residents and the developed cities that have

successfully implemented those theories and frameworks (Duan et al. 2021). As a result, it is reasonable that developing cities such as Lagos cannot underpin these policies and frameworks implemented in developed cities without considering their characteristics, such as socio-economic development, lack of trust in the government, heavier dependence on community leaders, lack of infrastructure, lack of funding, more tangible sense of community, knowledge, and legislation. Therefore, this thesis considered these necessary Lagos characteristics, i.e., lack of knowledge, collectivism, trust in government, and lack of effective policies and attitude towards recycling, to produce a new perspective on recycling behaviour in Lagos by modifying the theory of planned behaviour as a practical framework applicable to recycling in Lagos.

8.2.3 What are the roles of the additional constructs such as social norms, trust, inconvenience, and word of mouth in conjunction with the theory of planned behaviour components in predicting recycling behaviours among Lagos residents?

Additional constructs such as social norms, inconvenience, trust and word-of-mouth were incorporated into the theory of planned behaviour to decompose and study their effects in connection to the theory of planned behaviour on Lagos participants' intention to recycle. Based on their significance for recycling in Lagos, the additional constructs present in the model answered this question by revealing trust (β = 0.034, p<0.475) and social norms (β = 0.047, p<0.326) as non-significant predictors of recycling intention. Thus, trust and social norms did not significantly affect the recycling intention among the Lagos participant. In this respect, comprehensive research has shown a lack of trust between Lagos residents and the government or activities initiated by the government (Lucrezi and DigunAweto 2020), and Lagos residents perceive recycling as primarily the responsibility of the local authorities (Abila

2018). This thesis indicates that Lagos residents, a representative of developing countries, will not respond to trust given the lack of trust between the residents and the government, as shown by the result of the trust construct (β = 0.034, p<0.479). Hence, when implementing recycling policies or activities, the Lagos government should incorporate the help of the community leaders based on their impact on the Lagos resident's sense of collective responsibility.

The impact of the additional constructs inconvenience (β = -0.095, p<0.002) and wordof-mouth (β =0.524, p<0.000) were statistically significant for the Lagos participants recycling intention. This thesis reveals that implementing inconvenience and word-of-mouth to the theory of planned behaviour would be essential in influencing Lagos residents recycling intention and behaviour. For this reason, these two constructs should be added to the theory of planned behaviour as a requirement to predict Lagos residents' intentions on recycling.

8.2.4 What is the importance of incorporating a developing nation's characteristics, as depicted in a case study of Lagos, into the theory of planned behaviour in influencing its recycling behaviour?

It is clear from this research that Lagos's characteristics (lack of knowledge, collectivism, trust in government, and lack of effective policies and attitude) are essential in influencing recycling behaviours. These characteristics were used to modify the constructs added to the theory of planned behaviour to create a new perspective on recycling behaviour. In addition, this thesis identified inconvenience and word-of-mouth as critical influencers in expanding the theory of planned behaviour towards recycling in Lagos, providing a new understanding and insight into the under-researched area as most of the research on

incorporating the theory of planned behaviours on recycling tends to focus on developed cities.

By focusing on the Lagos characteristics, this model provides a new perspective to the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents; at the same time, adding to the current literature by providing new insight into the under-researched area of recycling behaviour in developing countries with Lagos as a case study. This thesis reinforces the importance of utilising additional constructs based on the characteristics of developing countries to expand the planned behaviour theory to predict recycling behaviours. Based on this model's ability to significantly predict recycling behaviour in Lagos, this thesis promises to develop practical recycling activities and behaviour-changing interventions in cities with low recycling behavioural rates through social influence.

8.3 Thesis Contributions

Considering that research on pro-environmental behaviour is an interdisciplinary and complex field (Heinz and Koessler 2021), this thesis draws from and contributes to knowledge in these areas of literature: sustainability literature, theory of planned behaviour, proenvironmental behaviour literature, and marketing literature. By providing a brand-new perspective and insight into recycling behaviour in developing cities, specifically Lagos.

Significantly, this thesis contributes to the literature by providing evidence on enhancing recycling behaviour in developing cities focusing on Lagos. Most studies on recycling behaviours tend to focus on developed cities and, particularly in the U.S.A., the U.K., and economically stable Asian countries, such as China, Japan, and Malaysia, where recycling is heavily industrialised through formal sectors, with frameworks tailed to those specific areas

(Williams 2005; Adhikari 2018; Kamble and Bahadure 2019; Ferronato 2020; Wang et al. 2020). For this reason, recycling behaviour in developing cities is under-researched compared to developed cities. Nevertheless, most studies on recycling in developing cities tend to implement similar theories and models generated and used in developed cities without considering the difference in characteristics between developed and developing cities (Dukhan et al. 2012; Hall et al. 2013; Strydom 2018; Debrah et al. 2021). For example, the attitude towards recycling, available facilities, knowledge, level of development and trust in government and institutions (Wang et al. 2018; Kumar 2019; Meys et al. 2020), making it pertinent to ascertain the effectiveness of these theories in other cultural settings of developing cities, especially in Lagos.

This thesis focuses on understanding recycling participation by identifying factors influencing Lagos recycling. This thesis is unique as it reveals intentional and behavioural beliefs towards Lagos residents' recycling by providing a framework tailed to Lagos residents on promoting recycling participation by extending the theory of planned behaviour (inconvenience and word-of-mouth) based on Lagos characteristics. In addition, this thesis also contributes specific empirical evidence to the literature on the relation between recycling inconvenience and intention to recycle and word of mouth and intention to recycle. The following subsections highlight these contributions.
Figure 8.1 Thesis Model



8.3.1 Contribution to The Theory of Planned Behaviour Literature

Significantly, this thesis has made a theoretical contribution to the knowledge of the theory of planned behaviour by generating a brand-new perspective and insight into recycling behaviour in developing cities, specifically Lagos, through the extension of the theory of planned behaviour. However, studies have shown the theory of planned behaviour to provide a practical foundation for its ability to explain recycling behaviours, its popularity in analysing recycling behaviours, and the significant correlation between Ajzen's predictor constructs and the recycling behaviours (Sutton 2002; McEachan et al., 2011). For example, Strydom (2018) study applied the theory of planned behaviour to understand the relationship between the theory's construct to guide decision-making in household recycling in South Africa; Si et al. (2019) also applied the theory of planned behaviour in environmental science to understand the application from a knowledge domain visualisation perspective holistically; and Hossain

et al. (2020) study aimed to understand the role of theory of planned behaviour in recycling behaviour context.

Simultaneously, the success of the theory of planned behaviour in investigating proenvironmental behaviours has been critical in shaping psychological theorising. Scholars, e.g. (Davis and Morgan 2008; Chen and Tung 2010; Nigbur et al. 2010 Ramayah et al. 2012; Chen and Bishop 2013) highlighted the success of the theory in explaining factors such as the ability to identify the studied behavioural beliefs and successively recognise the importance of the specified population. In addition, the theory of planned behaviour is an effective model for evolving behavioural interventions used in different areas and fields based on the flexible structure of the theory (Yuriev et al. 2020).

Despite the theoretical support of the theory of planned behaviour towards recycling, most of these studies have been conducted in developing cities where recycling is perceived to be a norm due to the formal recycling structure and societies being aware of proenvironmental activities' consequences (Khalil et al. 2017; Priestley 2020; Bening et al. 2021). Therefore, it is crucial to identify factors influencing recycling behaviours in developing cities, specifically Lagos, based on their characteristics.

This thesis contributes to the body of knowledge in the theory of planned behaviour by creating a new perspective by including word-of-mouth and inconveniences constructs to explain the recycling behaviour in Lagos. In particular, the research finding shows the mediation relationship that intention plays between the added constructs and the actual recycling behaviour. The finding also highlights the lack of trust between the Lagos residents and the governments while reinforcing that the recycling decision in Lagos is not made by adhering to social expectations and pressures of friends, community, or family. Instead, the

Lagos residents are more likely to develop an intention to recycle based on their personal beliefs about recycling when recycling is perceived as convenient, and they are willing to receive positive information about recycling. Furthermore, the current findings indicated that the Lagos participant's recycling behaviours were directly predicted by their intention to recycle and perceived behavioural control over recycling. Hence, if the Lagos residents feel an individual's motivation to recycle and consider recycling an easy task, they are more likely to engage in recycling behaviours.

8.3.2 Word of Mouth and Intention

This research contributes to the theoretical development of recycling behaviours by demonstrating strong empirical evidence of a significant relationship between word-of-mouth and recycling intentions (β =0.524). This research finding is essential as it provides new insight into the recycling intention. Although studies have shown word-of-mouth can impact individuals' judgment by allowing individuals to categorise and make their intention easier (Gupta and Harris 2010; Lovett et al. 2013; Cantallops and Salvi 2014; Jeong and Koo 2015). Most of these studies have been in the context of green practices such as greenwashing (Hameed et al. 2021) and green purchase intentions (Al-Gasawneh and Al-Adamat 2020), electronic waste disposal (Rezaei and Ho 2021), pro-environmental responsibility such as corporate and social responsibilities (CSR) (Ogunmokun and Timur 2019) and electronic waste management behaviours (Gilal et al. 2019). However, little to no research on word-of-mouth directly influence recycling intention. Hence, the importance of this thesis shows a significant relationship between word-of-mouth and recycling intention to provide a new perspective toward behavioural change in recycling. In the case of this thesis, the satisfaction of an individual's attitude towards recycling can positively enhance their intention based on

integrated motivation, such as positive word-of-mouth. Using word-of-mouth via community forums can be an effective tool to develop individual recycling intentions.

The nexus between word-of-mouth and intention in influencing recycling behaviours among Lagos residents has an important implication for Lagos policymakers. For example, this finding shows that word-of-mouth can be essential for implementing recycling intentions and, subsequently, recycling behaviours in Lagos. As a result, government agencies and policymakers seeking to implement and encourage recycling could consider implementing word-of-mouth forums (instead of commercial messages and traditional media) when designing and implementing recycling policies and frameworks. In addition, it enables the residents to express their recycling experience to influence or be influenced by others.

8.3.3 Inconvenience and Intention

This subsequent finding contributes to the theory of planned behaviour in a recycling context by confirming the significant relationship between inconvenience and recycling intentions (β = -0.095). Inconvenience and convenience have been used interchangeably when incorporated as an additional construct within the theory of planned behaviour to investigate recycling behaviours, as seen by Gadiraju (2016), who implemented the construct inconvenience to examine the underlying factors behind campus recycling behaviours of students in the U.S.A, while Wan et al. (2012) incorporated the construct inconvenience to determine recycling behaviours of student and staff on campus.

The results from this thesis align with the prior research (Barr et al. 2001; Tonglet et al. 2004; Wang et al. 2011; Wan et al. 2012; Gadiraju 2016; Thi Thu Nguyen et al. 2018; Sulaimanet al., 2019), which has concluded inconvenience as a significant factor towards the ability to influence an individual's recycling intention. Nevertheless, most of these studies

have been conducted in developed cities where recycling is performed via formal sectors with adequate resources. Hence the importance of this finding as it provides a new insight from a Lagos point of view by validating the addition of the construct inconvenience to the theory of planned behaviour to predict behavioural intentions in the context of recycling in an informal sector. This study confirms inconvenience as a predictive power towards Lagos residents' recycling intention. To the best of the author's knowledge and through searches in peerreviewed databases, extensive research has not empirically explored the effects of inconvenience on recycling intention in Lagos. This thesis is one of the first to significantly show the impact of including inconvenience in the theory of planned behaviour towards recycling in Lagos. This finding demonstrates that the Lagos resident participants considered recycling inconvenient, resulting in negative participation in recycling. It can be concluded that the more convenient partaking in recycling is perceived by Lagos residents, the greater their intention to participate in recycling.

8.4 Contribution to Practice

This thesis contributes to practice by providing a new insight into recycling behaviours in Lagos to assist academic researchers and practitioners (government and institution) in producing the best practice model that effectively encourages recycling participation in Lagos. In addition, the findings from this study have several implications that are tailored based on the characteristics of Lagos residents for the development and implementation of recycling schemes and the communication campaigns that advocate these schemes' use.

Therefore, this research's proposed and validated conceptual framework emphasised that the Lagos respondents are optimistic about their recycling intentions, especially when appropriately motivated. With Lagos as a case study, a significantly positive relationship exists between attitude, word of mouth, perceived behavioural control, inconvenience, and intentions as it relates to positively changing recycling behaviour in developing countries. This thesis presents several 'practical implementations for policymakers which are as follows:

- In this thesis, the construct trust had no significant impact on the Lagos participant's recycling intention (β = 0.034, p<0.475). In this respect, comprehensive research has shown a lack of trust between Lagos residents and the government or activities initiated by the government, which is an established Lagos characteristic (Lucrezi and DigunAweto 2020). Based on this result, Lagos residents are not likely to participate in recycling as they perceive recycling to be primarily the responsibility of the local authorities (Abila 2018). Conversely, Lagos culture places a significant value on the community or a unit group while perceiving this cherished value as a single entity that needs protection (Ighovojah and Okumagba 2000). Meaning their social interaction towards a common goal is guided by these communal values, as the interpersonal bonds go beyond biological affinity within a community. Therefore, Lagos residents perceive communalism as a material and supersensible system through caring for one another and sharing mutually and interdependent, which explains the importance of their community leaders (Udensi et al., 2012; Arisukwu 2017). In Lagos, community leaders have contributed to and influenced successful community projects and programmes (Olaniyan et al., 2021), Mainly due to the trust between the community leaders and the Lagos residents. Therefore, this thesis provides policymakers and institutions with practical insights into an effective strategy to promote recycling in Lagos by involving community leaders in establishing and executing regulations and policies toward recycling.
- In this thesis, the inconvenience was not found to be a statistically significant determinant of the intentions of the Lagos residents to recycle (β = -0.095, p<3.121), meaning Lagos

residents are less willing to participate in recycling when they perceive the behaviour to be inconvenient. Studies, e.g. (Ewing 2001; Pinto et al., 2004; Kelly et al., 2006; Saphores et al., 2012; Thi Thu Nguyen et al., 2018) have posited that the more inconvenience recycling is to partake in, the greater the improbability of them not willing to exhibit the corresponding behaviour. Consequently, the findings from this thesis link with the current situation of recycling in Lagos, as seen by the lack of adequate recycling schemes within Lagos (Kofoworola 2007; Idowu et al., 2011; Dawodu et al., 2021). For example, recycling drop-off centres at convenient locations within the community, adequate facilities, and handling of recyclable materials for easy separation toward overcoming the associated barriers with recycling inconvenience.

• Word-of-mouth was shown to directly impact the recycling intentions of Lagos residents (β=0.524), making word-of-mouth a comprehensive tool for Lagos residents' judgment towards recycling by making their recycling decision easier. Studies such as (Ogunmokun and Timur 2019; Al-Gasawneh and Al-Adamat 2020; Hameed et al., 2021; Rezaei and Ho 2021) have successfully incorporated word-of-mouth in achieving pro-environmental behaviour by incorporating positive word-of-mouth in terms of information and messages from fellow individuals. Therefore, this thesis shows that word-of-mouth can play a promising role in influencing recycling participation in Lagos. Thus, the Lagos government agencies and institutions seeking to promote and encourage recycling should consider implementing communication campaigns advocating recycling in Lagos with Lagos residents expressing their experiences about recycling. This thesis views word-of-mouth as reliable information or communication between Lagos residents that convey pleasant or unpleasant experiences, complaints or rumours regarding recycling. Chen et al. (2014) suggest that word-of-mouth is the extent to which individuals inform their relatives,

communities and friends about the positive messages on pro-environmental behaviour such as recycling. Hence, including word-of-mouth in the proposed framework helps strengthen the Lagos residents' recycling intention. Additionally, this can be used as the basis for marketing communication campaigns towards advocating for recycling participation.

8.5 Discussion Chapter Conclusion

A structured research pathway was taken to expand the planned behaviour theory on recycling behaviours in Lagos. To address the issue of implementing recycling management based on Lagos characteristics by expanding the theory of planned behaviour to create a new framework for establishing environmental sustainability through recycling in Lagos, Nigeria.

This aim has been investigated, producing answers to many areas of interest. This chapter consists of these findings and their interpretation. Contribution to the theoretical work criterion includes extending the theory of planned behaviour by adding constructs such as trust, inconvenience, word of mouth, and social norms. And additional insight into implementing recycling behaviour in Lagos. The Lagos characteristics significantly contribute to extending the theory of planned behaviour, with implications for practical contributions in policy formations.

This chapter evaluated the boundaries of these research findings and the study's limitations in interpreting and applying the findings to the theoretical and practical contributions

9 Conclusion

9.1 Introduction

The previous chapter evaluated the boundaries of these research findings and applied the findings to the theoretical and practical contributions. This chapter discusses the conclusion of this thesis by assembling the thesis rationale, implications and a summary of chapters mentioned earlier in this study. Additionally, it depicts the research limitations and further research areas.

This thesis found that attitude, perceived behavioural control, inconvenience, wordof-mouth, and intentions significantly predicted recycling behaviours in Lagos. This study was unique as it focused on the Lagos characteristics to create a new understanding of influencing recycling behaviours in Lagos. This holds great promise for developing effective behaviouralchanging interventions and campaigns in Lagos.

9.2 Research Objectives

This thesis is rationalised by identified objectives based on the literature review. The gap in the literature and area of this research were the main reasons that motivated this study. The main objectives which this thesis was established for are the following:

 To outline Lagos characteristics and how they differ from those of developed countries regarding engaging in recycling behaviour change in Lagos. This objective was met and is included in section 1.3.1.

- 2. Conduct a comprehensive review of the literature to uncover what is currently known about recycling and behavioural theories in relation to recycling in Lagos. The literature relating to the problem area was critically evaluated and reviewed in Chapter 2 of this thesis and was the baseline used in developing the model and research hypotheses.
- 3. Develop a definition of environmental sustainability as it relates to Lagos. The metaanalysis and working definition of sustainability for this thesis purpose were included in section 2.4.
- 4. To understand the impact of all characteristics and determine which have the most substantial impact on recycling behaviour in developing countries with the case of Lagos and how they work together to develop a culture that does not recycle. This objective was met and is included in section 2.9.2.
- 5. To produce an integrated logical model that can implement a positive recycling behaviour towards individuals in Lagos. This objective was met and is included in section 3.5

9.3 Thesis Review: Rationale and Content

This thesis aimed to provide a new perspective to the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents by focusing on the Lagos characteristics, this model; at the same time, adding to the current literature by providing new insight into the under-researched area of recycling behaviour in Lagos. This thesis reinforces the importance of utilising additional constructs based on the Lagos characteristics to expand the planned behaviour theory to predict recycling behaviours.

Lagos state is one of the thirty-six states in Nigeria. In contrast to other states in Nigeria that depend on revenues generated from the oil sectors: Lagos has a diversified economy from

transport, service, manufacturing, retail and wholesale (Lincoln, 2012; Adebisi et al., 2015). According to The Economist (2022), Lagos state is reported to generate ninety billion dollars in goods and services annually. Hence, Lagos is described as the economic hub of Nigeria and Africa. Lagos is a large and fast-growing economy, with rapid urbanisation and a large and fast-growing population in Nigeria. Unfortunately, Nigeria has no prominent formulated environmental protection policies to address and coordinate the consequences of waste management, such as recycling, as Nigeria is not known for its sustainable effort (Adelagan 2004; Walling et al. 2004; Kofoworola 2007; Alade 2020). However, the Lagos governments have improved their attitudes towards environmental sustainability despite the volume of waste generated as an obvious consequence of rapid urbanisation (Nelson and Namtira 2017). This was evident in the sustainable initiatives being emphasised through NGOs and other government bodies, such as the implantation of the Regional Sustainable Energy Centre of Excellence (RSECE), a consortium of the government that can monitor and evaluate the situation that needs to meet the sustainable development goal deliberated by the United Nations, and the Lagos Waste Management Authority (LAWMA) a Lagos State agency responsible for tackling waste generated (Idowu et al. 2021).

However, these policies have not been considered within policy changes attributable to the country's level and pace of development (Jiboye 2011; Aliyu and Amadu 2017). Due to the poorly enforcement of policies and legislation based on factors such as lack of environmental consideration (Matagi 2001; Daramola 2010; Adejumo and Adejumo 2014), lack of community participation, particularly in the metro areas (Walter et al. 2005; Aliyu and Amadu 2017), lack of formulated policies (Adelagan 2004; Daramola 2010), and lastly poverty and lack of knowledge (Walling et al. 2004; Jiboye 2011; Aliyu and Amadu 2017).

Nevertheless, recycling in Lagos state is at a very primitive stage (Aliyu and Amadu 2017), even though different governments have tried developing their waste management plans (Idowu et al. 2021). The author added that this could be attributed to the government's lack of attention, will, and corruption toward practical efforts to practice and regulate these policies. In addition, Lagos state focuses on the top-down model, as the government does not recognise the public's importance in decision-making (Yuan et al., 2003; ODPM 2004; HMG 2005). Hence, the lack of individual attitude and felt need and lack of technical resources and training at a local level to tackle recycling in Nigeria (Otitoju 2014).

Even though Lagos state is its own body, it is still within the country of Nigeria. Therefore, most of the state government's action depends on the federal government for support and some legislation. Thus, in 2004 the Nigerian government established the federal environmental protection agency (FEPA), which is responsible for designing, enforcing, and regulating ecological issues such as recycling (NESREA.gov 2020). However, this agency was replaced in 2007 by the National Environmental Standards and Regulations Enforcement Agency (NESREA) due to its lack of articulated responsibilities (Ogwueleka 2009). NESREA was established to focus on the regulatory work of organisations and individuals whose activities threaten the environment. While researchers have criticised the agency due to its lack of focus on oil and gas companies and lack of actual compliance monitoring and enforcement in general (Ogwueleka 2009; Hopewell et al. 2009; Duru et al. 2019). This has resulted in a massive gap between management and the output of the NESREA, mainly due to the corrupt governing as the operators tend to be appointed based on political affiliations rather than experience or qualifications (Duru et al. 2019).

Despite the government's long-standing apathy toward waste management through recycling, studies have estimated that more than four million tonnes of waste are produced annually in Lagos, with only 5% in rural areas and 50% in urban of waste are efficiently collected through informal recycling programs (Kolawole 2000; Kofoworola 2007; Elias and Omojola 2015; Kandissounon et al. 2018). Hence waste is being disposed of in ways that are not sustainable. For example, reckless burning of waste, throwing of waste in inappropriate places such as farmlands and drains, and often forced within poor urban areas to partake in scavenging waste dumps to try to earn a livelihood by recovering and recycling the materials for reuse (Roberts et al. 2009; Otitoju 2014; Benson 2020).

Many multilateral organizations have advocated for the need for sustainable environmental strategies such as recycling in developing countries due to recognising peculiarities within those developing countries (Bass and Dalal-Clayton 2012). As mentioned earlier, Lagos is one of the largest and fastest-growing economies, with rapid urbanisation and a large and fast-growing population. Even with the wealth and environmental agencies, for example, NESREA and LAWMA, Lagos still lacks an efficient recycling presence based on characteristics such as lack of community participation, particularly in the rural areas, lack of knowledge towards recycling and effective recycling technologies and methods (Jiboye 2011; Aliyu and Amadu 2017). Although environmental problems have been acknowledged by studies such as (Matagi 2001; Walter et al. 2005; Daramola 2010), little attention has been given to the implication of recycling techniques and principles in Lagos.

Studies such as (Marshall and Farahbakhsh 2013; Gandy 2014; Jambeck et al. 2015; Charter 2017) have suggested that neglecting critical environmental issues result in a negative environmental impact. Therefore, developing states such as Lagos should achieve green

success through a social and economic impact on the environment (Adejumo and Adejumo 2014). However, many of these states and countries face severe economic, social, and environmental threats from energy and climate change (Charter 2017), making it necessary to create an approach that considers the environment's finite resources (Elgaaied-Gambier et al. 2018).

Hence, implementing recycling techniques to influence behaviours related to the environment has lacked consideration by governments and organisations in developing cities such as Lagos (Adejumo and Adejumo 2014). The author further posited that profit maximisation is at the forefront, even at the expense of the community's well-being. This contrasts with the obligation of recycling methods and techniques that meet the socioeconomic needs and interests of the consumers while significantly reducing the impact that threatens the natural resources and environment. Therefore, Individuals' behaviour is complex due to diverse factors, such as needs and desires, values, institutions and infrastructural context, and political and economic factors (Mont and Power 2013). Policymakers need to gain insights from behavioural economics (Ajzen 1991) to understand better factors that help influence behavioural changes to develop effective and efficient recycling policies. Thaler and Sunstein (2008) succeeded in popularising the findings from behavioural science in their application to policy making by exploring the role of choice architecture and nudging to shape the desired behaviour.

To better understand the determinants of recycling behaviours, it is essential to focus on the behavioural choices associated with recycling engagement (Singh et al. 2014). Since its early beginning, experimental psychology has concentrated on cognitive mechanisms to understand the representation and acquisition of knowledge, which seems to be the logical

step needed to explain individual behaviour (Khalil et al. 2017). Once individuals perceive environments and their ability to produce and judge desired effects, predicting and explaining their behavior will be easy. However, the relationship between behaviour and cognition is not as reliable as expected, as individuals tend not to perform consistently with their values, beliefs, intentions, or attitudes.

The theory of planned behaviour was chosen for this thesis based on the need for psychological models to understand the recycling behaviour in Lagos and the factors which underpin these choices, e.g., Lagos's characteristics. The theory of planned behaviour has emerged as the most widely used model within behavioural research, predominantly in proenvironmental studies and has been widely utilised to investigate pro-environmental behaviours in previous studies (Davis and Morgan 2008; Chen and Tung 2010; Nigbur et al. 2010; Ramayah et al. 2012; Chen and Bishop 2013). However, few studies show the theory of planned behaviour being used in Africa, especially in Lagos (Khalil et al. 2017).

This thesis focuses on expanding the theory of planned behaviour by offering a new model and perspective on how behavioural change with specific and general context to recycling in Lagos by identifying and adding constructs that influence Lagos recycling, e.g., inconvenience and word-of-mouth to the theory of planned behaviour to create a new perspective on the theoretical development of behavioural change in influencing recycling behaviours towards Lagos residents. For example, internal ties within a community and the collective cohesiveness of a group (collectivism) lack adequate policies and attitudes towards recycling and government trust. According to Stern et al. (1993), individuals will participate in pro-environmental behaviour when their current situation activates their values. Hence, this

proposed model provides a suitable process to identify underlying mechanisms that motivate an individual in Lagos to recycle.

9.4 Summary Of The Findings

The findings of this thesis were primarily rooted in the hypotheses proposed and tested for this thesis³⁴. The relationships were found to predict the model, with the null hypothesis rejected and the relationship proved. The model's goodness-of-fit was measured by applying the construct reliability and validity and discriminant validity through factor loading, Cronbach's Alpha, composite reliability, AVE, Rho_A, Fornell-Larcker criterion and crossloading. In all the cases, the reliability and validity of each measurement model were found to be satisfactory.

Following the successful measurement model validation, the next appropriate step was to test the structural model. Based on the R² and Q² values, an individual's intention and behaviour to recycle were adequately demonstrated in the model. Five of the seven hypotheses were fully supported at the aggregate data level, with most of the path coefficients all positive at a significant level of 0.01. The mediating effect was also examined and partially responsible for the direct relationship between intention and behaviour.

Hypothesis 1 posited that attitude has a positive relationship with intention. The hypothesis was tested by examining the path coefficient between the construct's attitude and intention. As seen in Table 7.20, the path coefficient from the perceived credibility to attitude was positive and significant (p<0.000); therefore, hypothesis1 was supported.

³⁴ Refer to Chapter 3 for the research hypotheses.

Hypothesis 2 proposed that there was a positive relationship between Perceived Behavioural Control (PBC) and Behaviour. The hypothesis was tested by examining the path coefficient between the exogenous construct PBC and the endogenous construct Behavioural outcome. The path coefficient from PBC to Behavioural outcome was positive and highly significant (P<0.000). Therefore, this hypothesis was supported.

Hypothesis 3 posited that social norms positively influence the intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct's social norms and intention. This direct relationship between social norms and intention was positive but not statistically significant (P<0.326). Therefore hypothesis 3 was not supported.

Hypothesis 4 proposed that inconvenience is positively related to intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct inconvenience and the construct intention. The path coefficient was positive and highly significant (p<0.002); thus, hypothesis 4 was supported.

Hypothesis 5 posited a positive relation between trust influencing intention to recycle, and the hypothesis was tested by evaluating the path coefficient between the construct trust and intention to recycle. The direct relationship between trust and intention was not statistically significant (P< 0.479); thus, hypothesis 5 was not supported.

Hypothesis 6 specified that word of mouth positively influences intention to recycle. The hypothesis was tested by evaluating the path coefficient between the construct word of mouth and intention. The path coefficient was positive and highly significant (P<0.000); this hypothesis was supported.

Lastly, hypothesis 7 postulated that intention positively affects the behavioural outcome. The hypothesis was tested by examining the path coefficient between the construct's intention and behaviour. Resulting in a positive and highly significant (P<0.000); thus, this hypothesis was supported.

9.5 Thesis Implications

This thesis contributes to the literature by providing evidence on enhancing recycling behaviour in developing cities focusing on Lagos. Most studies on recycling behaviours tend to focus on developed cities and, particularly in the U.S.A., the U.K., and economically stable Asian countries, such as China, Japan, Malaysia, where recycling is heavily industrialised through formal sectors, with frameworks tailed to those specific areas (Williams 2005; Adhikari 2018; Kamble and Bahadure 2019; Ferronato 2020; Wang et al., 2020).

Significantly, this thesis has made a theoretical contribution to knowledge in the theory of planned behaviour by generating a new perspective and insight into recycling behaviour in developing cities, specifically Lagos, through the extension of the theory of planned behaviour. Though studies have shown the theory of planned behaviour to provide a practical foundational base on its ability to explain recycling behaviours, its popularity in analysing recycling behaviours and the significant correlation between Ajzen's predictor constructs and the recycling behaviours (Sutton 2002; McEachan et al., 2011).

9.5.1 Word of Mouth and Intention

This research contributes to the theoretical development of recycling behaviours by demonstrating strong empirical evidence of a significant relationship between word-of-mouth and recycling intentions. This finding is essential as it provides new insight into the

mechanisms of recycling intention. However, word-of-mouth has been shown to impact an individual's judgment by allowing individuals to categorise and make their intention easier (Gupta and Harris 2010; Lovett et al. 2013; Cantallops and Salvi 2014; Jeong and Koo 2015). Most of these studies have been in the context of green practices such as greenwashing (Hameed et al. 2021) and green purchase intentions (Al-Gasawneh and Al-Adamat 2020), electronic waste disposal (Rezaei and Ho 2021), pro-environmental responsibility such as corporate and social responsibilities (CSR) (Ogunmokun and Timur 2019) and electronic waste management behaviours (Gilal et al. 2019). However, little to no research on word-of-mouth directly influencing recycling intention. Hence, the importance of this thesis showing a significant relationship between word-of-mouth and recycling intention to provide a new perspective towards behavioural change in recycling.

9.5.2 Inconvenience and Intention

This subsequent finding contributes to the theory of planned behaviour in a recycling context by confirming the significant relationship between inconvenience and recycling intentions. The finding provides a new insight from a Lagos point of view by validating the addition of the construct inconvenience to the theory of planned behaviour to predict behavioural intentions in recycling in an informal sector. This study confirms inconvenience as a predictive power towards Lagos residents' recycling intention. To the best of the author's knowledge and through searches in peer-reviewed databases, extensive research has not empirically explored the effects of inconvenience on recycling intention in Lagos.

9.5.3 Practical Contribution

This thesis contributes to practice by providing a new insight toward recycling behaviours in Lagos to assist academic researchers and practitioners (government and institution) in producing the best practice model that effectively encourages recycling participation in Lagos. In addition, the findings from this study have several implications that are tailored based on the characteristics of Lagos residents for the development and implementation of recycling schemes and the communication campaigns that advocate these schemes' use.

Therefore, this research's proposed and validated conceptual framework emphasised that the Lagos respondents are optimistic about their recycling intentions, especially when appropriately motivated. This thesis presents several 'practical implementations for policymakers which are as follows:

- In this thesis, the construct trust did not significantly impact the Lagos participant's recycling intention. In this respect, comprehensive research has shown a lack of trust between Lagos residents and the government or activities initiated by the government, which is an established Lagos characteristic (Lucrezi and DigunAweto 2020). Based on this result, Lagos residents are not likely to participate in recycling as they perceive recycling to be primarily the responsibility of the local authorities (Abila 2018). Therefore, this thesis provides policymakers and institutions with practical insights into an effective strategy to promote recycling in Lagos by involving community leaders in establishing and executing regulations and policies toward recycling.
- In this thesis, the inconvenience was not found to be a statistically significant determinant of the intentions of the Lagos residents to recycle, meaning Lagos residents are less willing

to participate in recycling when they perceive the behaviour to be inconvenient. Therefore, this thesis recommends that policymakers in Lagos consider convenience, for example, recycling drop-off centres at convenient locations within the community, adequate facilities, and handling of recyclable materials for easy separation toward overcoming the associated barriers with recycling inconvenience.

 Word-of-mouth was shown to directly impact the recycling intentions of Lagos residents, making word-of-mouth a comprehensive tool for Lagos residents' judgment towards recycling by making their recycling decision easier. Therefore, this thesis shows that wordof-mouth can play a promising role in influencing recycling participation in Lagos. Thus, the Lagos government agencies and institutions seeking to promote and encourage recycling should consider implementing communication campaigns advocating recycling in Lagos with Lagos residents expressing their experiences about recycling.

9.6 Limitations of the study

This research inquiry was based on the research aim, questions, and objectives highlighted in this thesis introduction chapter. It was essential to limit certain aspects of the investigations to ensure all the focus was on fulfilling the analysis of the subject. The research boundaries contained and constrained the applicability of the output based on the research design used to scope the research. Therefore, similar to other academic research, the limitations pertaining to this thesis are discussed in section 10.8.1.

9.6.1 Conceptual and Methodological Limitations

In this thesis, there were some sustaining conceptual limitations. This is a summary of the limitations:

- 1. In reference to model development, previous literature has highlighted how trust (Wynveen and Sutton 2015; Arli et al. 2019; Harring et al. 2019) and social norms (Manstead 2000; White et al. 2009; Cialdini and Goldstein 2004; Smith et al. 2012; Kinzig et al. 2013) might potentially be an essential determinant towards recycling intentions, and then the behaviour, and this was explained in chapter three of this thesis. However, the empirical and statistical evidence following the hypothesis testing outlined in the thesis, Table 8.10, showed that the inclusion of both social norms and trust in the model might not be significantly ideal.
- 2. The following limitation was related to the demographics, with this study being limited to the Lagos population. The results might have been more generalizable if the participants were also recruited from outside this area. As a reminder, both pilot and main studies were conducted within the Lagos population. Therefore, the results would be more generalizable with the application of a longitudinal study. However, a longer-term study was impossible based on the cost and time restrictions. Hence, a cross-sectional sample was used to test the research model.

9.7 Future Research Recommendations

To address the adaptation of a theory to explain a complex phenomenon, such as recycling behaviours, requires combining different factors to wholly and effectively understand the phenomenon. However, there are limitations on the number of elements a researcher can consider during their research based on disciplinary and methodology constraints, cost, time, and lack of the researcher's perfect understanding of the phenomenon before the investigation. Therefore, not the factors associated with a phenomenon can be studied: parsimony is the ultimate ideal. Therefore, this section focuses on the additional research factors ideal for extending the research scope and findings toward future research recommendations.

- 1. Due to this thesis's limitation in focusing on Lagos, this study should be replicated by having future research on recycling behaviours with the proposed model in other developing countries. Even though some developing countries may share similar characteristics, this is not always the case. For example, according to the UN, China and Nigeria are classified as developing countries (Unctadstat Classifications 2021). However, they share few similarities with each country's characteristics due to factors such as the country's level of development and the values held within the countries. For example, not all developing countries have to mistrust their government. Thus, this needs to be considered when generalising the constructs identified and added to this thesis's theory of planned behaviour to other countries.
- 2. Future studies should focus on the impact of demographic and external characteristics associated with the research as possible predictors of recycling intentions, especially how the respondents perceive recycling. As seen by the demographic result, which showed that 91.2 % of participants believe re-using is a form of recycling, while 6.2% do not think re-using is recycling
- 3. Since social norms had no impact on recycling intentions, it is recommended that future studies should focus on which specific social factors (e.g., family members, friends, social groups) are associated with recycling as a tool to understand the ways to make those influences salient. These factors may significantly impact individuals' participation in recycling programs while increasing the social pressure to recycle and eventually improving their attitudes towards recycling.

- 4. It is recommended that future studies focus on implementing, measuring, and designing effective interventions, policies, and campaigns based on the elements. These efforts are vital in developing countries where recycling facilities tend to be inadequate.
- 5. Finally, there needs to be qualitative research direction taken by future studies, as this study has successfully achieved a research programme that has enlightened the importance of expanding the theory of planned behaviour in formulating recycling behaviours in Lagos. However, this research has left some room to ask further questions about why and how these additional constructs improve the behavioural outcome.
- 6. There need to be resources explicitly earmarked for recycling, with the level of responsibility for plan adherence at the community leader.

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Appendices

Appendix 1

The Original Item Pool

Construct	Original measurement	Modified measurement	Sources
Attitude (A)	 I think that purchasing organic food is interesting. I think that purchasing organic 	 I think recycling is an interesting thing to do. A1 I think recycling is a good idea. A2 	Ajzen, 2002,
	food is a good idea. 3. I think that purchasing organic	3. I believe recycling is important. A3	Arvola et al., 2008
	 food is important. 4. I think that purchasing organic food is beneficial. 5. I think that purchasing organic 	 4. I believe recycling is beneficial to the health of the environment.A4 5. I think that recycling is a wise 	Sidique et al. (2010b)
	5. I think that purchasing organic food is wise.6. I think that purchasing organic food is favourable.	5. I think that recycling, is a wise thing to do.A56. I think that recycling is favourable to the	do Valle et al. (2005)
		environment.A6	
Social Norms (SN)	 In our society, recycling is the right thing to do. 	 In Lagos, recycling is considered the right thing to do. SN1 	Bezzina and Dimech (2011)
	2. The responsible authorities are doing their best to address the issue of waste management.	2. I believe that the authorities responsible for recycling, are doing their best to address the issue associated with recycling	Sidique et al. (2010)
	3. The general public is doing its part to address the issue of	SN2	Tonglet et al., 2004,
	recycling.	3. I believe that the general population in Lagos, are doing	

	4. In our society, individuals are encouraged to separate and	their part to address the issues associated with recycling. SN3	Valle et al., 2004
	recycle their waste.	4. In Lagos, individuals are encouraged to recycle their	
	relevant laws and regulations for the recovery of waste.	waste. 5114	
	6. The responsibility of recycling should be share by the general public	5. I believe that the Lagos population, understand the relevant laws and regulations	
	7. My family reacts positively when I recycle household materials.	on recycling of waste. SN5	
	8. I am willing to follow the strategy that the government employed to limit the use of disposable	 I believe that the responsibility of recycling should be shared by the general public SN6 	
	 I would carry reusable tableware because those who travel with me already carry it. 	7. There is a positive reaction from within my community, when I partake in recycling.	
	10. I would decide to use reusable tableware because of other people's criticism.	 SN7 8. I am willing to follow the strategies introduced by the Lagos government on 	
	11. I would be more willing to use reusable tableware if I were rewarded by the theme park	recycling.SN89. I will partake in recycling, if those within the community	
	12. People I know are concerned about issues related to the environment.	10. I will partake in recycling, in order to prevent other people	
	13. People I know recycle those items	criticising me.SN10 11. I would be more willing to recycle, if everyone around me recycled. SN11	
	that can be recycled.	12 I believe that the people around	
		me, are concerned about issues relating to the wellbeing of the environment. SN12	
Perceived	 If I wanted to, I could buy organic food instead of non-organic food. 	1. If I wanted to recycle, I believe I would be able to do so. PBC1	Ajzen, 2002,
Behavioural control	 I think it is easy for me to buy organic food. 	2. I believe it is easy for me to recycle when I want to. PBC2	Arvola et al., 2008
(PBC)	3. It is mostly up to me whether or not to buy organic food	3. It is mostly up to me whether or not I partake in recycling.PBC3	

	4.	There are plenty of opportunities for me to engage in recycling at the University of Twente.	4.	I believe there are plenty of opportunities for me to recycle. PBC4	
	5.	It will be easy for me to engage in recycling on campus during the next month.	5.	If I wanted to recycle, it would be easy for me to do. PBC5	
	6. 7.	Recycling is easy. The University of Twente provides satisfactory resources for recycling.	7.	I believe that the resources I need to recycle are available to	
	8.	I know where to take my waste for recycling at the University of Twente.	8.	me. PBC7 I know where to take my waste to be recycled. PBC8	
Trust	1.	I feel very confident about [the trustee's] skills.	1.	I feel very confident about Lagos's government recycling policies T1	(Mayer and Davis.
(T)	2.	[The trustee] has much knowledge about the work that needs done	2.	I believe that the Lagos state government has enough knowledge on the work that	1999; (Jarvenpaa
	3.	[The trustee] is very concerned with the welfare of the environment		needs done, toward encouraging individuals to	et al. 1998)
	4.	I am never doubtful about whether the other team members will do what they promised.	3.	I believe that the formal recycling sectors in Lagos, are very concerned with the	
		(Jaivenpaa et al. 1998).	4.	weifare of the environment. 13 I am never doubtful about whether the Lagos government, will do what they promised to do. T4	
Motivation (M)	1.	Because I feel good when doing this activity	1.	I recycle, because I like the feeling I get when I do things that benefit the environment.	(Ryan and Connell,
(111)	2. 3. 4.	A way I've chosen to contribute Other people will be upset if I	2.	I think recycling is a sensible thing to do. MOT2	(Pelletier et
	5.	There may be good reasons to do this activity, but personally I	3.	as to prevent my peers from viewing me in a negative	(Guay et al. 2000)
		don t see any	4.	way.MOT3 There may be many reasons to recycle, but personally I do not see any.MOT4	2000)
			5.	I will recycle, if monetary incentives are attached to doing so. MOT5	

		6. I will recycle, if it is made	
		compulsory. MOT6	
Collectivism (C)	 Working hard for the goals of a group even if it doesn't result in personal recognition. Being a cooperative participant in group activities. Readily helping others in need of help. Doing what is good for most of the people in the group, even if it means that the individual will receive less. 	 Even if I do not gain personal recognition, I will partake in recycling because it would benefit others. COL1 I would recycle, in order to participate in group activities. COL2 I will partake in recycling, in an effort to help others. COL3 I will partake in recycling, because it is what is best for the society. COL4 	Latif and Omar (2011).
Situational factors Inconvenienc e (INC)	 I don't have time to recycle Recycling at the University of Twente is inconvenient Recycling at the University of Twente is too complicated Recycling at the University of Twente is too much trouble It is convenient for me to recycle at the University of Twente Recycling takes up too much space at home 	 I do not have time to recycle. INC1 I find recycling to be inconvenient task to partake. INC2 I believe recycling is too complicated. INC3 I believe that it is convenient for me to recycle, whenever I want to do so. INC4 Recycling takes up too much of my time. INC5 I am familiar with the recycling facilities in my area. INC6 	Barr (2007). Robison and Read (2005). Martin et al. (2006).
Situational factors Knowledge (K)	 I would recycle more waste if I had more information on recycling waste More information about how to recycle waste should be available at the University of Twente I know how to recycle my waste If I knew what was happening to the recyclables after I dispose them, I would recycle more often. There is little information of recycling at the University of Twente 	 I would partake in recycling, if there were more information available on recycling and ways to recycle. K1 I would recycle, if the means to recycle are provided. K2 I know how to recycle my waste. K3 If I know what happens to the recyclable items, I would recycle more often. K4 I believe that there is little information on means to recycle in Lagos.K5 I do not know where to go to recycle. K6 	Ramayah et al. (2012). Barr (2007). Robison and Read (2005).
Intention (IN)	 I am willing to contribute in the costs involved in waste management systems. If a group in the community goes house by house picking up plastic, 	 I am willing to participate in information campaigns aimed at improving recycling behaviours. IN1 In the future when dealing with my waste, I would like to 	Echegaray and Hansstein (2016).

	paper, metal and glass, I would give them these items.			contact professional recycling agencies. IN2	Nguyen et al. (2015).
	3.	I am willing to participate in information campaigns aimed at improving awareness about recycling.	3.	I am willing, to get more information on effective ways to recycle. IN3	
	4.	In the future when dealing with e- waste, I would like to try to contact the factory or professional	4.	In the future, I will actively participate in recycling.IN4	
	5.	recycling agencies. In the future, I will actively participate in e-waste recycling	5.	I am willing to speak to my friends and family, on effective ways to recycle. IN5	
		and tell surrounding people about the recovery experience.		07	
Behaviour	1.	I usually separate and dispose all recyclable materials.	1.	I usually separate and dispose all my recyclable materials.B1	Ramayah et al. (2012).
(D)	2.	I have high involvement in recycling activities.	2.	I am highly involved in recycling activities. B2	
	3	L have high adherence level to	3.	I always separate my	Tonglet et al. (2004).
	5.	separation and disposable of recyclable materials	4.	I intend to recycle my	Wang et al
	4.	I tend to buy electronic products which promise recycling more in the future.		recyclable items within the next month. B4	(2011).
	5.	I will use the Internet recycling platform for future electronic waste disposal.	5.	I will recycle my recyclable items, every time it is ready for disposal. B5	
	6.	Dealing with e-waste in the future, I am willing to contact voluntarily professional recycling organizations or manufacturers.	6.	I am willing to participate in the recycling scheme in the future. B6	
Word-Of- Mouth	1.	In social situations, I often speak favourably about Arnett et al. (2003)	1.	I will encourage my friends and relatives to recycle WOM1	Arnett et al. (2003)
(WOM)	2.	I bring up in a positive way in conversations I	2.	I try to say positive things about recycling. WOM2	Goyette et al., 2010)
		have with friends and acquaintances. Arnett et al. (2003)	3.	I will speak favourably about recycling to others. WOM3	

3. I "talk up" to people I know. Arnett et al. (2003).	4. I am glad to recommend ways to recycle to others .WOM4	
 4. I spoke of this company to many individuals. (Goyette et al., 2010) 5. I strongly recommend people buy products online from this company. (Goyette et al., 2010) 	5. I usually try to recommend ways to recycle, to my friends and family. WOM5	

Appendix II

The Main Questionnaire

Investigating Recycling Behaviours in Lagos Nigeria: An Augmented Theory of Planned Behaviour (TPB)

Start of Block: DATA QUALITY CHECK - PLEASE DO NOT REMOVE

JS

RelevantID

RelevantID Timing First Click (1) Last Click (2) Page Submit (3) Click Count (4)

End of Block: DATA QUALITY CHECK - PLEASE DO NOT REMOVE

Start of Block: Default Question Block

Q2 Information Consent Form for Research Principal Investigator: George Eremionkhale Study Title: Investigating Recycling Behaviours in Lagos Nigeria: An Augmented Theory of Planned Behaviour (TPB) Institution: Coventry University The following information is provided to inform you about the research project and your participation in it. Please read this form carefully, as it provides the information of this study below. Purpose of the Study: The aim of this study is to address the issue of implementing recycling management based on the Nigerian characteristics, to establish environmental sustainability through recycling in Lagos Nigeria. **Description of procedure**, approximation of time and discomfort: You have been selected to take part in this questionnaire survey as you are able to comment on the routines and habits towards recycling in Lagos Nigeria. The survey should take approximately [7-10] minutes to complete. Your participation in the survey is entirely voluntary, and you can opt out at any stage by closing and exiting the browser. If you are happy to take part please answer the following questions relating to this research, as your answers will help us to collect data that adds to the academic research of recycling behaviours in Lagos Nigeria and formulate subsequent recommendations to policy that will support recycling behaviour in Lagos Nigeria. Description of Confidentiality: Your answers will be treated confidentially and the information you provide will be kept anonymous in any research outputs/publications. Your data will be held securely on the schools OneDrive network. All data will be deleted by 29th May 2023. The project has been reviewed and approved through the formal Research Ethics procedure at Coventry University. Contact Information: For further information, or if you have any queries, please contact the lead researcher George Eremionkhale, in the first instance (eremion3@coventry.ac.uk). If you still have concerns and wish to make a formal complaint about the conduct of the research, please write to: Associate Professor (Academic) Harjit Sekhon Coventry University Priory Street Coventry CV1 5FB Email: bsx209@coventry.ac.uk Thank you for taking the time to participate in this survey. Your help is very much appreciated. Statement by person agreeing to participate in this study | have read and understood the above information. | understand that, because my answers will be fully anonymised, it will not be possible to withdraw them from the study once I have completed the survey. I agree to take part in this questionnaire survey. I confirm that I am aged 18 or over. By completing this survey, have agreed to your affirmative declaration of informed consent.

Yes I Consent (1)

No I do not Consent (2)

Skip To: End of Block If Information Consent Form for Research Principal Investigator: George Eremionkhale Study Title: In... = No I do not Consent

Page Break

End of Block: Default Question Block

Start of Block: Block 1

Q27 Which city do you live in?

O Lagos (1)

 \bigcirc Other (2)

Q3 What is your Gender

 \bigcirc Male (1)

O Female (2)

 \bigcirc Other (3)

Q4 What is your Age Group

0 18 - 24 (1)

- O 25 34 (2)
- O 35 44 (3)
- 0 45 54 (4)
- 55 64 (5)
- 65 74 (6)
- 075-84 (7)
- \bigcirc 85 or older (8)

Q5 What is the highest degree or level of education you have completed

Less than secondary school (1)

Secondary school graduate (2)

 \bigcirc 2 year degree (3)

• 4 year degree (4)

Professional degree (5)

Q6 What is your monthly household income

○ Less than ₦25,000 (1)

N25,000 - N49,999 (2)

N50,000 - N79,999 (3)

○ ₩80,000 - ₩99,999 (4)

○ ₦100,000 - ₦199,999 (5)

○ ₦200,000 - ₦499,999 (6)

O More than ₦150,000 (7)

O Prefer not to say (8)

End of Block: Block 1

Start of Block: Block 2

Q11 Do you believe reusing is a form of recycling?

○ Yes (1)

O No (2)

 \bigcirc Do not know (3)

Q12 Have you ever recycled?

○ Yes (1)

🔿 No (2)

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Q13 How often do you recycle?

O Always (1)	
\bigcirc Usually (2)	
○ Sometimes	(3)

O Rarely (4)

 \bigcirc Never (5)

Q14 What type of items do you recycle? (Tick All Applicable)

Paper (e.g. Book, Newspaper, Magazine, Greeting card) (1)
Glass (e.g. Glass Bottle, Jar) (2)
Aluminium (e.g. Aerosol, Can, Foil) (3)
Plastic (e.g. Carrier bag, Bottle, snack pot) (4)
Textiles (e.g. Clothes, shoes) (5)
Electrical (e.g. Battery, Mobile phone, Computer) (6)
None of the above (7)

End of Block: Block 2

Start of Block: Block 3

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I separate and dispos e all my recyclable materials (1)	0	0	0	0	0
The responsibility of recycling should be shared by the general public (2)	0	0	\bigcirc	0	S
I know where to take my waste to be recycled (3)	0	\bigcirc	0	0,	0
I find recycling to be easy (4)	\bigcirc	\bigcirc		0	\bigcirc
I will recycle so as to prevent my peers from viewing me in a negative way (5)	0	 	Co	0	0
c					

Q15 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I try to recommend ways to recycle to my friends and family (1)	0	0	0	0	0
There may be many reasons to recycle but personally I do not see any (2)	0	0	\bigcirc	0	60
Recycling is beneficial to the health of the environment. (3)	\bigcirc	0		6	0
I will recycle if it is made compulsory (4)	\bigcirc	\bigcirc	0	0	\bigcirc
I will recycle because it is what is best for the society. (5)	0	8		0	0
	5				
\mathcal{C}					

Q17 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I will recycle my recyclable items every time they are ready for disposal. (1)	0	0	0	0	0
It is convenient for me to recycle whenever I want to do so. (2)	\bigcirc	\bigcirc	\bigcirc	0	50
I know how to recycle (3)	\bigcirc	\bigcirc	\bigcirc		0
I am willing to participate in information campaigns aimed at improving recycling behaviours (4)	\bigcirc	0	0	0	0
The formal recycling sectors in Lagos are very concerned with the welfare of the environment. (5)	0		0	\bigcirc	\bigcirc
Page Break		•			

Q18 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
It is easy for me to recycle when I want to. (1)	0	0	0	0	0
Recycling is a wise thing to do (2)	0	\bigcirc	\bigcirc	0	0
The authorities responsible for recycling are doing their best to				ċ	5
address the issue associated with recycling. (3)	\bigcirc	0			0
There are plenty of opportunities for me to recycle. (4)	0	0	0	0	0
I say positive things about recycling. (5)	0	0	0	\bigcirc	\bigcirc
S					

Q19 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I am familiar with the materials accepted for recycling by the recycling facilities in my area (1)	0	0	0	0	\bigcirc
I find recycling to be inconvenient task (2)	\bigcirc	\bigcirc	\bigcirc	0	5
Even if I do not gain personal recognition, I will recycle because it would benefit others (3)	0	0	0	6	0
l always separate my recyclable waste (4)	\bigcirc	0		\bigcirc	\bigcirc
Recycling is an interesting thing to do (5)	0	8	0	\bigcirc	\bigcirc
S	5				

Q20 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I would be willing to recycle if everyone around me recycled (1)	0	0	0	0	0
I am willing to follow the strategies introduced by the Lagos government on recycling. (2)	0	0	\bigcirc	2	S 0
In the future I will actively participate in recycling (3)	\bigcirc	\bigcirc	0		0
I do not know where to go to recycle (4)	\bigcirc	0	0	0	\bigcirc
I am glad to recommend ways to recycle to others (5)	0	0		\bigcirc	\bigcirc
	.				
	5				

Q21 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
In the future when dealing with my waste I am likely to contact professional recycling agencies. (1)	0	0	0	0	0
Recycling takes up too much of my time (2)	0	0	\bigcirc	0	50
l am involved in recycling activities. (3)	\bigcirc	\bigcirc	0		0
The Lagos population understands the relevant laws and regulations on recycling of waste. (4)	0	0	0	0	0
Recycling is a good idea (5)	0	0	0	\bigcirc	\bigcirc
Page Break —	2	X			
(2),	Ţ			

Q22 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
It is mostly up to me whether or I recycle (1)	0	0	0	0	\bigcirc
The Lagos state government has enough knowledge on the work that needs to be done toward encouraging individuals to recycle. (2)	\bigcirc	0	0		
I am willing to get more information on effective ways to recycle. (3)	\bigcirc	0		0	0
I do not have time to recycle (4)	\bigcirc	0	00	0	\bigcirc
There is little information on means to recycle in Lagos (5)	0	8	0	\bigcirc	\bigcirc
C	5				

Q23 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
l intend to recycle my recyclable items within the next month (1)	0	0	0	0	0
I will recycle if monetary incentives are attached to doing so (2)	0	0	0	0	0
Recycling is favourable to the environment (3)	0	0	0		0
I am never doubtful about whether the Lagos government will do what they promised to do (4)	0	0	0	0	0
In Lagos recycling is considered the right thing to do (5)	0		0	0	\bigcirc

Q24 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
Recycling is too complicated. (1)	0	0	0	0	0
l will speak favourably about recycling to others (2)	\bigcirc	0	\bigcirc	0	0
It is important to recycling (3)	\bigcirc	\bigcirc	\bigcirc	0	20
In Lagos individuals are encouraged to recycle their waste (4)	\bigcirc	0	0	6.	0
Recycling will help to reduce pollution of the environment (5)	\bigcirc	0	0	0	\bigcirc
Page Break —					
C	5				

Q25 Please rate how strongly you agree or disagree with the following statements

	Strongly agree (1)	Somewhat agree (2)	nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I would recycle in order to participate in group activities (1)	0	0	0	0	0
I will encourage my friends and relatives to recycle (2)	0	0	0	0	50
I would recycle if the means to recycle are provided (3)	0	0	0	0	0
I am familiar with the recycling facilities in my area (4)	0	0	0	0	\bigcirc
If I wanted to recycle I believe I would be able to do so (5)	0	0		0	\bigcirc
	5				

Q26 Please rate how strongly you agree or disagree with the following statements
References

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
I would recycle if there were more information available on recycling and ways to recycle (1)	0	0	0	0	0
I recycle because I like the feeling I get when I do things that benefits the environment. (2)	\bigcirc	0	0	6	
I feel very confident on the Lagos government recycling policies (3)	\bigcirc	0		0	0
If I wanted to recycle it would be easy for me to do (4)	0	0		\bigcirc	0
The general population in Lagos are doing their part to address the issues on recycling (5)	0	0	0	\bigcirc	0

Q27 Please rate how strongly you agree or disagree with the following statements

References

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
There is a positive reaction from within my community when I recycle. (1)	0	0	0	0	0
I am willing to speak to my friends and family on effective ways to recycle (2)	\bigcirc	\bigcirc	\bigcirc	0	50
The resources I need to recycle are available to me (3)	\bigcirc	\bigcirc	0	6	0
I will recycle in order to prevent others criticising me (4)	\bigcirc	0	0	0	0
I will recycle if those within the community believe recycling is the right thing to do (5)	0	8	0	0	\bigcirc
Page Break	2				

Q28 Please rate how strongly you agree or disagree with the following statements

References

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
The people around me are concerned about issues relating to the wellbeing of the environment (1)	0	0	0	0	0
Recycling is a sensible thing to do (2)	\bigcirc	\bigcirc	\bigcirc	0	0
I will recycle to help others (3)	\bigcirc	\bigcirc	0		0
If I know what happens to the recyclable items I will recycle more often (4)	\bigcirc	0	0	0	\bigcirc
I will participate in the recycling scheme in the future. (5)	0	C		0	\bigcirc

Q29 Please rate how strongly you agree or disagree with the following statements

Q30 Do you have anything else to add about your experience of recycling or reuse in Lagos?

End of Block: Block 3