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Understanding waste recycling behaviour in the UK: Home-Work Consistency

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A thesis submitted in partial fulfilment of the requirements of The Robert Gordon University for the degree of Doctor of Philosophy.

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Author's Declaration

I hereby declare that this thesis is entirely my own work, except where explicit acknowledgement is made to the contribution of others, and this thesis has not been submitted for any other degree at the Robert Gordon University or any other institution.

Adekunle Oke,

March 2018.

Acknowledgements

I give glory to my Lord Jesus Christ for giving me the wisdom and insight on the concept of zero waste (John 12: 35-36), and for giving me the wisdom, grace, and strength to survive this journey.

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Abstract

Despite the increasing attention being paid to waste recycling, there is a dearth of both empirical evidence on recycling at work and examination of any spillover effects of recycling behaviour from home to work. Situated at the confluence of three social science debates (the study of recycling set within the waste management literature; the examination of spillover in the social psychology literature, and the work on pro-environmental behaviour at work in the organisational behaviour literature), this research seeks to understand recycling at work and the relationship between recycling behaviour at home and recycling at work using a sequential mixed methods approach.

Due to the complexity of human behaviours including the heterogeneity of the factors underpinning recycling, this research adopts a sequential mixed methods approach with its pragmatic philosophical assumptions to examine recycling at work. Initially, semi-structured interviews with 15 key informants from different organisations including environmental/waste organisations in the UK were conducted. The findings from the interviews were used along with the evidence from the literature to develop the conceptual model and the research hypotheses. The quantitative data were collected, using a web-based questionnaire survey, from 367 respondents representing 43 different organisations across the UK. The collected quantitative data were analysed using SPSS for windows and IBM AMOS for path and causal analyses.

Based on the findings, this research demonstrates that contextual factors such as organisational support are better determinants of recycling at work than personality/psychological factors such as attitudes that have dominated empirical and theoretical studies on pro-environmental behaviours for decades. Also, the findings of this research suggest that the concept of spillover of recycling from home to work is complex and inconsistent. Whilst there is a tendency for spillover of recycling behaviour, there is a significant difference between recycling at home and at work with regards to the volume of

materials, the range of materials, and frequency of recycling. Nonetheless, the PROCESS macro allows the identification of various conditions that are likely to facilitate spillover of recycling from home to work. As a result, factors that are likely to determine recycling at work including the possible spillover of recycling from home to work are classified into personal/psychological and situational factors.

These findings contribute to the existing bodies of knowledge on recycling behaviour, spillover effects, and organisational citizenship behaviour for the environment (OCBE). Also, the findings could assist businesses in finding proactive measures to increase recycling within their organisations. This would consequently reduce the total amount of resources being disposed of in the UK landfill sites.

Keywords: OCBE, Organisational support, Pro-environmental behaviours, PROCESS macro, Psychological factors, Recycling behaviour, SEM, Situational factors, Spillover, Waste.

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Chapter 1 Introduction to the Research

1.0 Introduction

Global waste generation has been identified as one of the major issues confronting waste management stakeholders (Hoornweg & Bhada-Tata, 2012; Tudor, Robinson, Riley, Guilbert, & Barr, 2011) around the world including academics and policy makers (Oke, 2015).

Although the actual data on global waste production is challenging to estimate and often inconsistent, waste generation is understood to be increasing in proportion to the population increase (Hoornweg & Bhada-Tata, 2012; Wilson et al., 2015). This is likely to be influenced by an increase in countries' gross national income per capital, which is a measure of growth in a national economy (Ekström, 2014; Wilson et al., 2015). That is, as a country grows economically with increasing average national income, consumers tend to alter their buying behaviours to modes of consumerism that promote higher levels of consumption of goods even when it is avoidable. As a result, the total global waste generation (including households, commerce, industry and construction) has been estimated at about 10 billion tonnes per annum (Wilson et al., 2015).

With this vast amount of waste, the effective management of waste is not only considered to be a basic human need (Hoornweg & Bhada-Tata, 2012) but is also being conceived as a fundamental human right (Wilson et al., 2015). Waste management is now perceived (Hoornweg & Bhada-Tata, 2012; Wilson et al., 2015) as a basic and essential service or utility that any government around the world should offer its citizens. Nevertheless, about 3 billion people around the world are still lacking access to solid waste collection services (Wilson et al., 2015).

Whilst waste management is not new in the UK, the current unprecedented rate of resource consumption, mainly influenced by the present linear economic model, is posing a new challenge and should be addressed proactively. The current economic ("take-make-consume-dispose") model (Reichel, De Schoenmakere, & Gillabel, 2016) that encourages

mass-production of goods, coupled with a throw-away consumer culture (Oke, Pedersen, & McDonald, 2017; Reichel et al., 2016) is contributing to the rate of waste generation. For example, "buy one get one free" (BOGOF) has been linked to the burgeoning food waste in the UK (Quested, Ingle, & Parry, 2013).

As a result, the on-going efforts, such as recycling, at global, national, and local levels are targeted at decoupling the current economic growth from waste production (Scottish Government, 2010; Wilson et al., 2015). Nevertheless, public participation in recycling is required for the success of any recycling scheme (Perrin & Barton, 2001; McDonald & Oates, 2003; Vicente & Reis, 2008) to ensure effective management of waste and to promote the efficient utilisation of resources.

Consequently, the understanding of the thought process and actions that result in waste production (Oke & Kruijsen, 2016) including the knowledge of motivational dynamics (Ones & Dilchert, 2012a; Steg, Lindenberg, & Keizer, 2016) of recycling is required to provide solutions to the waste issues. In order to address the issue of waste generation in the UK, different national policy measures (such as landfill tax) and local government schemes (including kerbside commingle and source segregation) have been introduced. These interventions were primarily designed to encourage recycling while diverting recyclable and/or recoverable materials (including the organic components) away from landfill sites.

While various interventions have been introduced, theoretical and empirical evidence suggests that behavioural and lifestyle change is required to address the current problems of waste production (Ekström, 2014; Oskamp, 2002; Stern, 2000) as technology is insufficient in addressing waste problems unlike other activities such as energy and water use. This understanding may have informed the government decision to focus more on policies that emphasise behavioural solutions rather than technological approaches. Although other pro-environmental actions, such as water and energy conservation, could be addressed by technological means, recycling remains the only activity that requires human participation.

As a result, many studies (for instance Babaei et al., 2015; Clay, 2005; Ebreo & Vining, 2001; Knussen & Yule, 2008; Price & Pitt, 2012) have been designed to identify factors that are likely to influence recycling behaviour.

On the one hand, findings of these studies suggest that factors influencing recycling behaviour are diverse, complex, and dissimilar from person to person and from context to context. On the other hand, recyclers and non-recyclers (De Young, 1988; McDonald & Oates, 2003) have been shown to differ on their recycling motivations (Ebreo & Vining, 2001). Nonetheless, past research and governance are observed (see Barr, Shaw, Coles, & Prillwitz, 2010; Oke, 2015; McDonald, 2011) to focus more on household recycling compared to other waste generation contexts such as workplace.

Despite the paucity of research on workplace recycling behaviour (see McDonald, 2011; Oke, 2015 for a review), this research is designed to investigate a relationship between recycling at home and recycling behaviour at work using a sequential mixed methods approach (Creswell, 2013; Johnson & Onwuegbuzie, 2004). This is contrary to other studies (such as Dolnicar & Grün, 2009; Manika, Wells, Gregory-Smith, & Gentry, 2015; Ones & Dilchert, 2012b; Wells, Taheri, Gregory-Smith, & Manika, 2016) that combined recycling with other pro-environmental behaviours such as energy use and traveling behaviour without been cognisant of differences for their motivations. This is like combining "apples and oranges" considering that different pro-environmental behaviours have different antecedents and/or motivations. For instance, there is a financial benefit (such as cost savings) for engaging in other pro-environmental behaviours, such as energy use, unlike recycling where the benefit is mainly altruistic.

To achieve the goal of this research, this research involves the collection of qualitative and quantitative data which provides a basis to explore and confirm (Tashakkori & Teddlie, 2010) why, what, and how people recycle at home and at work including the relationship(s) between the two contexts. This contextualises the present research within the pragmatic

philosophical assumptions underpinning mixed methods research (Creswell, 2013, 2014). The decision for this pragmatic approach is influenced by the overarching goal of this research including its objectives. This approach provides a robust information (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2010) on recycling at work including how its influenced by recycling at home.

It is therefore pertinent to extend the understanding of recycling by addressing waste from other waste generation contexts to assist the UK government in achieving its statutory recycling and landfill targets and enhance the efficient use of resources within the UK. It is anticipated that the findings will contribute to the existing body of knowledge within the social and behavioural sciences on recycling behaviour and extend them to a consideration of the possible relationship between recycling at home and work.

1.1 Research Background

This research is instigated and motivated by the evidence that the existing waste management approach has extensively focused on recycling at home (Barr, 2007; Barr et al., 2010) despite the exploratory work suggesting discrepancies between recycling at home and at work (McDonald, 2011). According to McDonald (2011), those who have an established routine of recycling at home do not necessarily translate that pattern into action in other contexts. While the study was based on a small sample size, a lack of correspondence between recycling at home and at work for the same respondents was reported. In addition, Barr et al. (2010) argued that householders are less likely to recycle their waste when away from home, especially on holiday.

On the contrary, Lee, De Young and Marans (1995) demonstrated a similarity between home and office waste recycling behaviour when measured at the same level of specificity. They found that recycling of paper at home is likely to predict the recycling of only paper at work. While these studies suggest that recycling at home is not likely to spillover to workplace

contexts, Andersson, Eriksson and Borgstede (2012) demonstrated that recycling at work is a determinant of recycling at home.

Notwithstanding, these studies (such as Lee et al., 1995; McDonald, 2011) suggest that waste recycling behaviour is not always guaranteed to spillover (Thøgersen & Ölander, 2003) from one context to another (Barr et al., 2010) and there is no understanding of why recycling behaviour is different from one context to another. While previous studies have established a lack of correspondence between recycling at home and at work, no empirical study had investigated reasons for these disparities (Oke, 2015). As a result, the knowledge of why recycling behaviour is not consistent across multiple contexts (especially between home and work) for the same people is still elusive.

In addition, the recent waste audit in the UK (see Department for Environment, Food and Rural Affairs [DEFRA], 2016) raised serious concerns about the level of waste recycling in the UK. The statistics show that household waste recycling rates in the UK have remained unchanged and may start to decline if no measures are taken to address the observed trends. This current development in household recycling performance is likely to exert detrimental effects on recycling at work considering that waste management at home is more common than workplace waste management efforts (see Oke, 2015). Nonetheless, the pertinent question is whether recycling behaviour is contextually constrained to a specific context, given that the existing knowledge about recycling behaviour and its underlying factors are context specific. Also, the policy instruments guiding recycling are different for home and work contexts although similar materials can be produced and collected for recycling in both contexts.

Whilst recycling at home has been studied in-depth, recycling at work has been considered by researchers to a much lesser extent, and comparisons between home and work are rare. On this basis, this research is the first known study that specifically designed to understand recycling behaviour at home and at work including the relationships between

them rather than combining "apples and oranges" (such as energy use and recycling) as the case in previous studies. Therefore, various organisations across the UK are selected for this research and each employee within the identified workplace is a unit of analysis rather than the organisations. Although this research investigates the level of organisational support/commitment that may facilitate recycling at work, the analysis of organisational behaviour is beyond the scope of this research.

1.2 Problem Statement

There seems to be a consensus among scientists and behaviourists (such as Oskamp, 2002; Stern, 2000) on the effect of human behaviours on the environment. Although changing the existing behaviours has been recognised as the first step in addressing environmental problems (Dietz, Gardner, Gilligan, Stern, & Vandenbergh, 2009; Oskamp, 2002), the present knowledge of why and how people should act pro-environmentally is insufficient and often inaccurate, given that human behaviours are complex and sometimes unpredictable.

As a result, different factors influencing recycling behaviour can be found in the literature based on the existing theories and/or models (such as Ajzen, 1991; Schwartz, 1977). Based on these theories, previous studies on recycling have extensively focused on psychological factors or personality traits, especially attitudes and socio-demographics (Ekström, 2014; Ones & Dilchert, 2012a). However, there is no evidence to suggest that recycling behaviour is only a function of people's psychological state without the contributions of the waste generation context(s).

In addition, many of the extant studies (for example Abbott, Nandeibam, & O'Shea, 2011; Babaei et al., 2015; Fielding et al., 2016; Lakhan, 2016) on recycling behaviour were carried out within domestic (household) contexts. Only a few recycling studies (for instance Barr, 2007; Chan & Bishop, 2013) have addressed non-domestic waste generation contexts (see Oke 2015 for an extensive review). Among the existing studies, limited research (for

example Barr, Gilg, & Ford, 2005; McDonald, 2011; Robinson & Read, 2005; Tonglet, Phillips, & Read, 2004; Tudor, Barr, & Gilg 2007a) was undertaken in the UK.

The observed trend is not peculiar to recycling alone, given that studies (such as Katzeff, Broms, Jönsson, Westholm, & Räsänen, 2013; Ones & Dilchert, 2012a; Paillé & Boiral, 2013; Ture & Ganesh, 2014; Wells et al., 2016) have reported similar trends in other pro-environmental behaviours. As a result, there is limited empirical research investigating pro-environmental behaviours at work (Robertson & Barling, 2013), particularly with regards to employees' pro-environmental action (Ones & Dilchert, 2012a; Wells et al., 2016). These suggest that little is known about waste recycling and other pro-environmental behaviours (such as energy conservation) at work, relative to the body of work relating to the same behaviour in domestic contexts.

Besides, findings from the literature (for example Marans & Lee, 1993; Parker, 2011; Zibarras & Ballinger, 2011) indicate a lack of consensus on the motivations for recycling behaviour. Also, there is insufficient evidence to suggest that people who engage in one pro-environmental behaviour, such as recycling, at home would engage in a similar behaviour in other contexts, such as work. This phenomenon, often called positive "spillover" (Thøgersen, 1999), occurs when the participation in one pro-environmental behaviour leads to the adoption of other pro-environmental behaviours (Thøgersen & Crompton, 2009) within the same or in another context (Berger, 1997). It is empirically challenging to associate recycling behaviour at work to the extent of participation in recycling at home based on the existing knowledge. It is also more problematic to ascertain with confidence that recycling at home is a predictor of recycling at work without understanding factors underpinning recycling behaviour. This may result in a misconception about the spillover effect of recycling behaviour from home to work. Considering that *"what goes on at work goes on at work and what goes at home goes at home; they are two separate things and the two do not mix"* as suggested by one of the participants (Par_006) in the qualitative phase of this research.

It is therefore entirely possible that the determinants of an individual's recycling behaviour at work could be different for the same individual at home. Whilst the recent efforts are concentrating on a single context (Ones & Dilchert, 2012a; Paillé & Boiral, 2013), the consistency of human behaviours across multiple behavioural domains and/or contexts could inform the design of holistic intervention strategies. For policy makers and planners to design a holistic waste management strategy that could facilitate recycling behaviour across contexts, especially home-work contexts, there needs to be a sufficient understanding of recycling at work as well as strong evidence to suggest whether recycling behaviour at home is likely to spillover to work settings. Considering that recycling efforts are focusing on recycling at home, the understanding of behavioural spillover is expected to have theoretical implications and also inform policy formulation and/or intervention strategy that will enhance recycling and other pro-environmental behaviours at work.

As a result, this research is required to elicit factors that are likely to influence recycling behaviour especially in a workplace context using a holistic approach and involves a broader view of workplace in general using different sectors, as multiple waste streams (key recyclables) can be analysed. This is to identify antecedents of recycling at work and to establish if there is any "behavioural spillover" from recycling at home to recycling at work to enhance the present knowledge about the motivations and barriers to recycling at work. This would assist stakeholders (including policy makers and waste planners) in designing a holistic waste management strategy which would eventually contribute to the on-going efforts in enhancing recycling.

After a critical review of various recycling behaviour studies, including the UK government efforts, the following research questions are identified and investigated in this research:

1. What factors are underpinning recycling behaviour at home and at work including their differences/similarities?

2. Is there any relationship between waste recycling behaviour at home and recycling behaviour at work?
3. To what extent can recycling experience at home predict or explain recycling behaviour at work for the same individual?
4. How can we understand and explain with some degree of certainty why people recycle or do not recycle their waste when at work?

1.3 Research aims and Objectives

1.3.1 Research Aim

Following the discussion in sub-sections 1.1 and 1.2 above, this research attempted to explore, identify, and establish a relationship between recycling at home and at work using a sequential mixed methods design. Using semi-structured interviews to collect qualitative data and an online quantitative survey to collect quantitative data, this research examines recycling behaviour at work and recycling at home for the same individual. Specifically, the qualitative component of this research attempts to inform and guide the development of a conceptual framework including its underpinning hypotheses, leading to the development of the quantitative survey instrument.

To identify the association, recycling behaviour with regards to materials that can be found at home and at work are investigated and critically analysed. As a result, the overall aim of this research is *to understand the extent to which recycling behaviour at home translates into recycling behaviour at work*. The primary intention was to understand the spillover effects of waste recycling behaviour from home to work including how any effects can be transmitted.

Moving forward from personality traits and/or psychological factors that have dominated social and behavioural sciences research for years, this research further explores the contribution of situational (and/or organisation) variables that may interact with personal-psychological factors in influencing recycling behaviour at work. Rather than organisations, individuals at work are the unit of analysis in this research. This research aims

to balance a view of individuals and how they recycle across two different contexts to add a new perspective to a literature largely devoted to studying recycling at home.

1.3.2 Research Objectives

To achieve the goal of this research (see sub-section 1.3.1) while providing answers to the research questions (see section 1.2), the following sets of objectives are further addressed in this study:

1. To review relevant academic and business literature that can provide further insights on recycling behaviour to further clarify the existing gaps in research and practices;
2. To explore different factors that can influence recycling at home and at work including how recycling at work can be enhanced;
3. To explain individual employee's recycling behaviour/participation at work, and identify reasons for such behaviour;
4. To develop a conceptual model in order to identify differences/similarities between recycling behaviour at home and at work;
5. To design and calibrate an SEM model of recycling behaviour based on the relationship between recycling behaviour at home and at work using the factors identified (objectives 3, 4, and 5) to be influencing recycling behaviour;
6. To confirm the determinants of recycling behaviour at work including their relative significance; and
7. To propose and recommend the most appropriate and practical waste management framework that could be adopted to enhance waste recycling behaviour at work.

1.4 Research Context

The research is conducted in the United Kingdom and the unit of analysis is recycling behaviour of randomly selected people at work. Rather than the organisation as a unit of analysis (McDonald, Oates, & Alevizou, 2016), individuals were drawn from different organisations in the UK. Organisations were selected for this research due to the lack of attention given to recycling and other pro-environmental practices at work as previously documented in Section 1.2.

Also, the United Kingdom was selected because waste recycling (treatment) in the UK has not attained a similar status as it has in many other European countries such as Germany, France, and Italy. For instance, about 48 million tonnes of waste were produced by commercial and industrial economic activities in the UK alone (DEFRA, 2016) while countries such as Estonia, Finland, and Slovenia are ranked as top performers in waste separation in Europe (Priestley, 2016; Seyring et al., 2015). This is corroborated by the comments from the qualitative phase of this research, for example, ". . . *certain definite improvements are to be made, we (UK) are behind some other countries in particular in Europe*" (Par_004).

Further, the House of Commons briefing reports on recycling (Priestley, 2016) showed that the rates of household waste recycling in the UK are gradually declining. The current trend of recycling rates at home may have detrimental effects on recycling at work if recycling at work is driven by the extent to which people recycle at home. In addition, this research focuses on recycling based on the knowledge that recycling is the only pro-environmental behaviour, especially at work, currently being governed by legislation/regulation and further remains the only activity that businesses must entirely rely on their employees' participation without any technological influence. Given that it is now mandatory (as from January 1, 2015) for businesses across the UK to prepare their waste for separate collection, there is a need to understand motivations and barriers to recycling at work.

In line with this thought, this research is not only contributing to waste recycling knowledge but will also assist policy makers, planners and other stakeholders to design effective waste recycling scheme(s), especially at work. It is anticipated that this research would instigate further studies not only on recycling at work but also on other pro-environmental behaviours (such as energy conservation) at work.

1.5 Originality and Contribution to Knowledge

The review of relevant studies on pro-environmental behaviours (such as Barr et al., 2010; Inoue & Alfaro-Barrantes, 2015; Ones & Dilchert, 2012a, b; Paillé & Boiral, 2013) and particularly on recycling behaviour (such as McDonald, 2011; Oke, 2015; Tudor et al., 2007a) suggests that domestic context is attracting more attention than any other behavioural contexts (for example, workplace). It is also observed (see Oke, 2015 for a review) that workplace recycling behaviour is under researched not only in the UK but globally.

Further, studies have revealed differences (such as Barr et al., 2010; Berger, 1997; Biswas, Licata, McKee, Pullig, & Daughtridge, 2000; Wells et al., 2016) as well as similarities (for instance, Dolnicar & Grün, 2009; Lee et al., 1995; Manika et al., 2015) in people's pro-environmental behaviour across different contexts. For example, pilot work by McDonald (2011) confirms that workplace waste recycling was less common than home-based recycling even for the same individual while Lee et al. (1995) reported a positive relationship between recycling behaviour at home and at work for a specific material. The reason for this discrepancy in waste recycling behaviour across contexts is still unknown and no empirical study has been conducted to investigate this inconsistency.

In addition, there is a lack of sufficient knowledge about the factors that could invoke spillover of pro-environmental (and particularly recycling) behaviours from home to work and vice-versa. While Lee et al. (1995) demonstrated a positive association between home and work, their studies only observed a relationship between paper recycling at home and at work. It is not known whether those who recycle one material (such as paper) at home would

recycle a different material (such as food) at work and vice-versa. Moreover, previous studies on workplace recycling have relied on behavioural theories (such as the Theory of Planned Behaviour and Value-Belief-Norm), fixating on psychological/personality traits, focused on a single waste stream (for example paper) and been conducted with respect to a specific recycling scheme (McDonald, 2011; Oke, 2015).

This present study is therefore the first empirical study that attempts to investigate reasons for the inconsistency between recycling at home and at work using multiple waste streams across multiple organisations. Rather than relying on behavioural theories and personal-psychological factors alone to explain recycling at work, this research further examines the possible effects of contextual factors on recycling at work including its relationship to recycling at home.

The findings of this research could inform strategy design that may enhance workplace recycling behaviour and allow businesses to meet their statutory recycling obligations in the UK. The findings would also assist the UK government in enhancing its landfill obligations by designing intervention strategies that could attract participation in recycling at work by incorporating elements of contextual facilitators. According to the findings, this research contributes significantly to the body of knowledge on workplace pro-environmental behaviour and specifically to recycling behaviour at work by extending the debate beyond the influence of psychological/personality traits to the possible effects of contextual factors. This knowledge is crucial in enhancing pro-environmental behaviours (such as energy conservation) at work (Ruepert, Keizer, & Steg, 2015) considering that recycling has been suggested as the gate-way to the adoption of other pro-environmental behaviours (Berger, 1997; Ramayah & Rahbar, 2013).

1.6 Thesis Structure

The rest of the thesis is structured into ten different chapters starting from an outline of the waste management approach in the UK to the discussion of the research findings.

Chapter two provides an overview of how waste management evolved in the UK, this includes an historical overview of waste management in the UK. The Chapter highlights the waste management options in the UK including the available instruments in enhancing waste management, particularly recycling. The purpose of that chapter is to put recycling in perspective as the preferred waste treatment option not only in the UK but also within the EU based on the waste hierarchy as highlighted in the EU Waste Framework Directive.

In Chapter three, empirical and theoretical literatures that are relevant and can contribute to the current research on recycling behaviour are reviewed. The Chapter is sub-divided into two strands reflecting the major dominant research contexts in pro-environmental studies and representing the current approaches in recycling behaviour. One strand is empirical evidence on recycling behaviour at home while the second strand is addressing the empirical evidence on recycling at work. However, the chapter describes a possible spillover effect from recycling at home to recycling at work using the existing knowledge of many pro-environmental behaviours as presented in the literature.

As a result, the Chapter presents a detailed discussion on recycling at home and recycling at work including their motivations and barriers. Following a detailed discussion, different factors influencing recycling behaviour are identified for home and for work. These factors are sub-categorised into socio-demographics, personal, psychological, and situational. The intention is to discuss the gaps in the literature and to provide a basis for the development of the conceptual model including the questionnaire questions.

Chapter four discusses the research methodology including the philosophical assumptions underpinning the present research. The Chapter makes a strong case for the adopted mixed methods research while providing further insights into the qualitative and quantitative approaches used in this research. Also, the research design process with regards to the selected sequential mixed methods approach is presented. This involves an overview

of data collection processes and the sampling approaches used including the justifications for the approach used in this research.

Chapter five describes the qualitative data collection and data analysis process. Following the presentation of the research questions and objectives that are specific to the qualitative phase, the data collection process including the sampling approach are presented. The issue of sample size within the remit of qualitative research is presented. In addition, the data collection and the data analysis instruments used in the qualitative phase are presented.

Having discussed the data collection and analysis procedures, the empirical findings are presented and discussed. Also presented, is the demographics of participants regarding their age, employment status, gender, highest qualifications, and personal annual income. The Chapter is concluded by drawing comparisons between recycling at home and recycling at work based on the perceptions of the participants.

Chapter six is focusing on the development of conceptual framework including its underpinning hypotheses. The findings of Chapter 3 and that of Chapter 5 are central to the development of the conceptual framework and the research hypotheses. Therefore, this Chapter presents the direct and indirect (moderation and mediation) hypotheses in relation to the hypothesised model with regards to the variables identified from the literature review.

Chapter seven explains the procedures for the quantitative data collection and the specific instrument used in this research having assessed different instruments often used in empirical research. Also presented is the approach, including piloting, adopted in this research to assess the reliability and validity of the data collection instrument. In addition, the sampling design and survey distribution approach are discussed. Following the discussion on the survey distribution method, the issue of response rate and challenges encountered especially in recruiting respondents are discussed.

Following the collection of the required data in Chapter seven, the procedure used in analysing the data is presented in Chapter eight. This includes data screening and cleaning to

present the data in a useable format and to ensure that the statistical assumptions are not violated. Also discussed is the approach used to ensure that the collected data are reliable and valid including the test for the evidence of common method variance prior to the actual data analyses. Having discussed the approach of data cleaning and screening including the tests for multivariate assumptions, an overview of the structural equation modeling in AMOS is presented to provide an insight to the analytical steps used in this research.

Chapter nine presents an overview of the data with regards to the respondents' socio-demographics and recycling behaviour including the findings of bivariate analyses conducted to identify relationships between socio-demographics and recycling behaviour. Also discussed in this Chapter is the bivariate relationship(s) between recycling at home and recycling at work.

In Chapter 10, the empirical findings from the SEM analysis in assessing the direct and indirect hypotheses are presented. Also presented are the findings from mediated-moderation analyses using the PROCESS macro to provide further explanation to the causal relationship between recycling at home and recycling at work. In addition, the comments from the "free text box" of the questionnaire instrument are analysed and presented in this chapter to support the statistical findings.

Chapter eleven, the final chapter, discusses the findings in relation to the research questions and the hypotheses. Also, it addresses the key contributions of the research, such as the effect of contextual factors, with respect to the extant academic literature including its implications. It further highlights the limitations of the research and offers recommendations for future research.

1.7 Chapter Summary

This Chapter described the background of this research and presented a general synopsis of the research. As a result, the Chapter emphasised the need for this research by

drawing evidence from the findings of empirical and policy documents on waste, recycling, and other pro-environmental behaviours.

While many studies have been conducted to investigate recycling behaviour, this Chapter argued that much of the existing efforts are focused on home settings and studies comparing the two contexts are uncommon. Therefore, the purpose, aim, and objectives including the methodological approach in answering the identified research questions were discussed.

The Chapter was concluded by providing an overview of the research process, making it easier to navigate to any specific area of interest. The next Chapter will address the waste management options in the UK to provide a context for the review of literature in Chapter 3.

Chapter 2 Waste Management in the UK

2.0 Introduction

From the end of the Second World War, global waste generation has drastically increased as previously explained in Chapter 1, partly due to economic reasons coupled with the consumer-based behaviours or lifestyles. With the consideration that recycling rates are falling in the UK (DEFRA, 2016), tougher policies or further behavioural change will be required to address the issue of waste generation in the UK. As a result, different legal- and market-based instruments such as Landfill tax have been introduced. Although there are no financial charges for household waste collection in the UK based on the provisions of the Environment Protection Act 1990, many local councils have incorporated a waste collection charge into their Council tax.

As a result, householders are indirectly paying for the waste management services in the UK. Also, some local authorities in the UK (such as Wokingham Borough Council) have introduced a monetary incentive scheme and reward-based system to encourage recycling in their localities (Local Government Association [LGA], 2013; Shaw & Maynard, 2008; Timlett & Williams, 2008). In addition, a 5p charge on carrier bags has been introduced in the UK with the intention of reducing the environmental consequences of carrier bags especially plastic bags (Oke et al., 2017).

These market-based instruments have proven to be effective in reducing waste generation and contributing positively to waste recycling efforts. Nevertheless, the sustenance and/or long-term effects of these schemes is a fundamental question that needs to be addressed. Accordingly, monetary incentives or rewards may not be durable in influencing or changing recycling behaviour and behaviour could plateau or return to the baseline (Lakhan, 2016; Timlett & Williams, 2008) when withdrawn (see Miafodzyeva & Brandt, 2013). Although waste management is improving in the UK, whether the current trend would achieve a similar level and consistency like other countries, such as Austria and

Germany, in Europe is a question of consumers' behaviour (LGA, 2013) both at home and at work.

While the current efforts are focusing on household waste (Barr et al., 2010; McDonald, 2011), the management of waste would be more effective if the efforts incorporate waste from business or commercial sector (LGA, 2013). On this basis, the present chapter discusses the waste management approach in the UK including a brief historical overview of waste management, practices, and policies in the UK.

2.1 Historical Overview

Like many other countries of the world, waste management in the UK started predominantly using open dumping/fly-tipping and was championed by the City of London and South-East England in the 18th century (Jones & Tansey, 2015). However, the practice was characterised by an informal waste recycling/reuse sector but with a controlled residual waste management system (Jones & Tansey, 2015; Wilson, 2007). Although there was prevalence of diseases at the time, legislation and concerns about the public/environmental health played little role in driving the practice. According to Jones and Tansey (2015), revenue generation was considered as the major driver due to the understanding of waste as a valuable resource. Also, the presence of a structured market especially for 'residual waste' increased the public participation in the waste management scheme and contributed significantly to the then practice in achieving a near-zero-waste economy.

Nevertheless, the rate of urbanisation and industrialisation resulted in earth (natural) resources being stressed beyond their carrying capacity leading to land, air, and water pollution. This contributed to the drafting of the Alkali Act 1863 to regulate atmospheric and environmental emissions mainly from Hydrochloric Acid (Morag-Levine, 2011). As a result, different statutory tools for example Victorian legislation (Jones & Tansey, 2015), Civic Amenities Act (Civic Amenities Act, 1967), and Control of Pollution Act 1974 were introduced. The Victorian legislation was intended to enhance the public health and incorporated The

Rivers Pollution Prevention Act 1876 and The Public Health Act 1875, the precursors to The Public Health Act 1936 and 1961 (Sunkin, Ong, & Wight, 2002).

The introduction of Civic Amenities Act in 1967 influenced the management of household waste in the UK, by encouraging "bulky" waste like mattresses, fridges, and furniture to be deposited (Coggins, 2002; Curran, Williams, & Heaven, 2007) via pre-designated Civic Amenity sites. These sites are now known as Household Waste Recycling Centres (HWRCs). The intention was to reduce fly-tipping and to facilitate waste removal especially those that present logistical issues to local authorities (and/or waste collection authorities).

In addition, legislation has been introduced in the UK within the last three decades for instance Environmental Protection Act 1990, that re-enacted the provisions in the Control of Pollution Act 1974 (Environmental Protection Act, 1990). Another legislation includes the Environmental Act 1995 as amended which established environmental regulators in the UK such as Environmental Agency and Scottish Environment Protection Agency (Environmental Act, 1995). Since their establishment, these agencies have been responsible for waste regulation functions and other activities that ensure a safe and healthy environment (see Environmental Act, 1995) in the UK. Taken together, all these legislative efforts have contributed significantly to the development of waste management options, particularly recycling, in the UK.

2.2 Waste Management Options in the UK

In the last two decades, the approach to the management of waste in the UK has changed drastically and is still evolving, mainly driven by the emergence of the waste hierarchy (see DEFRA, 2012). Although the approach to waste management is different across the UK, the main goal is to achieve maximum resource recovery from waste by advancing the management of waste from disposal to prevention through the waste hierarchy.

2.2.1 Emergence of the Waste Hierarchy

The principle of the waste hierarchy (Figure 1) as introduced by the EU Waste Framework Directive (European Parliament and the Council of the European Union [EPCEU], 2008) is central to the treatment of waste in the UK. Its primary objective is to move the management of waste up the hierarchy while diverting valuable resources often called "waste" away from landfill. Although EU member states and the USA are championing the principles of the waste hierarchy, its introduction can be traced back to Ontario's Pollution Probe in the 1970s (Hoornweg & Bhada-Tata, 2012). The Ontario's Pollution Probe of the 1970s utilised the 3Rs (Reduce, Re-use, and Recycling) of waste management (see Hoornweg & Bhada-Tata, 2012 for a review). However, Article 4 of the EU revised Waste Framework Directive adds 'other recovery' to these 3Rs and further expatiates on "re-use" to involve "preparing for re-use". The term "other recovery" often refers to heat or energy recovery operations from waste.

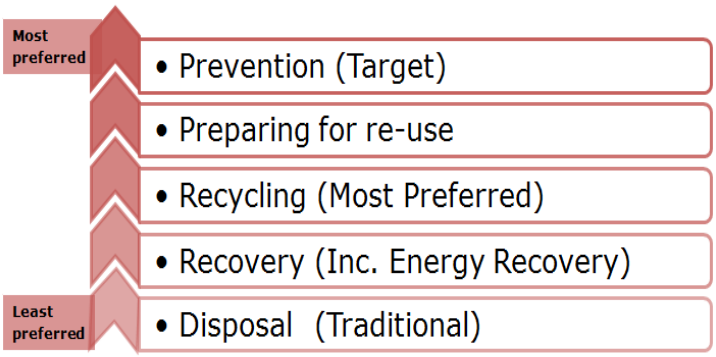


Fig.1: Waste Hierarchy (Adapted from EPCEU, 2008).

This hierarchy highlights how waste can be effectively controlled, utilised, and eventually disposed of with little or no negative effects on the environment or human health. These management options, summarised as the waste hierarchy, include waste prevention, re-use (or preparing for re-use), recycling, other recovery, and disposal. The main goal of the waste hierarchy is to divert waste, especially biodegradable waste, from landfill (DEFRA, 2012). Although its ultimate goal is to achieve the desired waste prevention option, recent

efforts have focused more on recycling compared to other waste management options in the hierarchy.

Nevertheless, the implementation of the waste hierarchy, especially waste prevention, may have detrimental effects on resource conservation as more virgin materials would be required for production or manufacturing processes. While waste prevention is obviously the best option in the hierarchy, recycling (including composting) offers a best practical approach in enhancing resource conservation efforts given that already discarded materials can be re-utilised as raw materials (or feedstocks). Therefore, local conditions, waste streams, and consumer buying behaviour including the contribution of each management option to the economies of scale should be taken into consideration when prioritising each element of the waste hierarchy for implementation.

2.3 The Development of the UK National Instruments

Aligned with the provisions of the EU Waste Directive, member states are required to transpose the Directive into their national legislation. As a result, the revised EU Waste Framework Directive (2008/98/EC) is transposed and implemented in England and Wales through the Waste (England and Wales) Regulations 2011 (DEFRA, 2012). In Northern Ireland, it is transposed and implemented through the Waste Regulations (Northern Ireland) 2011 (DEFRA, 2012) and in Scotland through the Waste (Scotland) Regulations 2011 and the Waste Management Licensing (Scotland) Regulations 2011 (Scottish Parliament, 2012). Also, the Directive encourages member states to set re-use and recycling targets based on their waste collection approach (EPCEU, 2008).

Although the 1875 Public Health Act allowed municipal waste management to be under the control of local councils (Davies, 2007) in the UK, waste management responsibility is devolved. Hence, waste management authority in England is split into a Waste Collection Authority (responsible for collection of municipal waste), a Waste Disposal Authority (responsible for disposal of municipal waste) and a Unitary Authority (responsible for

collection and disposal of municipal waste). However, waste management authority in Scotland, Wales, and Northern Ireland is mainly Unitary. The duties and roles of these authorities in collecting and disposing waste within their jurisdiction are documented in the Environmental Protection Act 1990.

However, the waste management instruments in the UK can be sub-divided into two major categories and these are further explained in the next sections.

2.3.1 Market-based Instruments

Instruments such as environmental taxes (including Landfill tax), the Emissions trading scheme, the Climate change levy, and Environmental charges (such as fines for fly-tipping) have been introduced in the UK to compensate for the environmental consequences of anthropogenic activities.

The main objective of these instruments is to internalise all the externalities associated with the environmental consequences of human activities. In addition, they are designed to influence or change consumer behaviour with less or no negative impacts on the environment and human well-being. For instance, plastic bag use was reduced by more than 90% and generated between €12 and €14 million revenues after the introduction of carrier bag (or plastic bag) tax ("plastax") in the Republic of Ireland (Convery, McDonnell, & Ferreira, 2007).

Nonetheless, the extent to which these instruments can influence people's decision-making including their behaviour over a long period of time remains unknown. Therefore, the effects of a market-based instrument are determined by how they are perceived (Thøgersen, 2003) although only a fraction of people may likely increase recycling when the instrument is perceived as a form of penalty (Shaw & Maynard, 2008). For instance, the imposition of landfill tax could encourage waste crimes such as fly-tipping and open burning.

In the UK, landfill tax is the major innovative instrument to prevent waste generation as well as to move the management of waste up the hierarchy. As a result, the discussion on the market-based instrument in this section is restricted to the Landfill tax system in the UK.

2.3.1.1 Landfill tax

Landfill tax was introduced in 1996 by the UK government through the Finance Act 1996 to allow the full costs of landfill to be accounted for in the waste disposal cost. The tax is paid on top of normal landfill fees if waste is disposed of to landfill sites by businesses. However, tax credits are allocated when waste is diverted from landfill through recycling, incineration or reuse. The approach is understood to be saving about 0.7million tonnes of CO_2 equivalent emission per annum (LGA, 2013). This tax was designed to recover valuable materials from waste, discourage waste disposal, and divert waste away from landfill (Morris & Read, 2001) while promoting waste minimisation through prevention and recycling.

As from April 2015, landfill tax was devolved to Scotland through the Scotland Act 2012 and it is now the responsibility of Revenue Scotland while SEPA oversees the delegated responsibility of its collection and administration. It was believed that the introduction of this tax and its management by this Scottish agency (Revenue Scotland) would effectively tackle illegal waste dumping including illegal landfill sites in Scotland.

Although its primary objective was to address the failure of the market to attach value to waste and to represent some of the externalities resulting from the production and consumption of goods and services, it has since become a means of revenue for the UK government. For instance, landfill tax was observed to be the highest contributor in 2014 by contributing around £1.1 billion in revenue, representing about 75.8% of all contributions from pollution and resources taxes (Office for National Statistics [ONS], 2015). From April 2015, the landfill tax was increased to £82.60 per tonne while it further increased to £84.40 per tonne with the Retail Price Index from April 2016. Also, £2.65 per tonne is charged on inactive (inert) waste being sent to landfill in the UK. Furthermore, the UK government

reiterated in its 2016 budget that the landfill tax will continue to increase based on the Retail Price Index from April 2017 and on or after April 2018 (see HM Treasury, 2016).

Although landfill tax may help the UK government to achieve its statutory waste recycling targets of 50% by 2020, more than £919m in revenue was generated in 2015/16 based on £80 per tonne. According to the current statistics, landfill tax and other policy measures have contributed over 50% to the reduction in the volume of waste sent to landfill while household recycling has increased by 70% (DEFRA, 2016). For example, the household recycling rate in the UK reached a record high of 44.9% in 2014 compared to 40.4% in 2010. This reduction suggests the positive contribution of a fiscal instrument to effective waste management especially in diverting waste away from landfill sites.

However, the introduction of fiscal instruments may likely instigate unethical behaviour such as illegal dumping to evade the payments of tax or levy. For instance, several incidents of tax invasion are reported in the UK which prompted HMRC to launch a Landfill Tax Compliance Strategy in July 2016 to complement a joint DEFRA and Environment Agency Waste Crime Action Plan. The objective is to address waste crime such as illegal disposal, deliberate burning, and illegal exports of waste in the UK. Based on the current statistics of fly-tipping, the UK government is spending a significant amount of effort (labour and financial costs) in addressing illegal dumping of waste or fly-tipping in the UK. For instance, about 900,000 incidents of fly-tipping were reported in England in 2014/15 costing local authorities about £50 million for clearing with commercial (business) waste considered to be the second largest contributor to fly-tipping in England (DCLG, 2015). In Scotland, Scottish local authorities are spending about £2.5 million annually on fly-tipping translated into the total direct costs of about £11 million of taxpayers' money annually for clearance, disposal and enforcement activities (Zero Waste Scotland, 2013).

2.3.2 Policy-based Instruments

As previously mentioned, the national waste laws and policy statements emanate from the EU Waste Framework and Daughter Directives. In addition, international treaties and agreements (such as the International Waste Shipments and Climate Change) have been influential in the development of waste law in the UK. For instance, the Waste Framework Directive through Article 28 requires all the EU member states to develop a waste management plan and strategy that would provide an opportunity to implement the waste hierarchy. As a result, Waste Strategy 2000 was developed for England and Wales with a subsequent Waste Strategy 2007 designed for England while a similar strategy termed National Waste Strategy 1999 was developed for Scotland. In addition, the Northern Ireland Waste Management Strategy 2006 – 2020 was introduced in Northern Ireland.

To ensure that the legislation and management approach are up-to-date and fit for purpose, each devolved administration in the UK has revised its waste management strategy and produced national waste management plans according to their local contexts. As a result, legal-based instruments as they are applicable in the UK are designed to facilitate the implementation of market-based instruments. However, the most relevant policy-based instrument is a separate collection of waste for businesses in the UK, as effective from 1 January 201.

The act of source separation of waste has been introduced in the UK through various policy-based instruments (such as the Waste (Scotland) Regulations 2012; the Waste (England and Wales) (Amendment) Regulations 2012) for businesses including the public sector. Therefore, businesses in the UK have a legal obligation to prepare their waste for separate collections although there is little or no enforcement or monitoring for its implementation. Businesses may choose not to adhere to the regulative requirements that introduce the source separation of waste in the UK when its implementation accrues no immediate business benefits. Therefore, many organisations in the UK are not fully compliant

with the legislative requirements probably as it is perceived not to be "technically, environmentally, and economically practicable" to prepare materials for separate collections.

Nevertheless, all organisations and businesses in the UK are required under the regulations as from 1 January 2015 to take reasonable steps and informed decisions to apply the waste hierarchy in their products, services, and operations. Although the regulations require all businesses in Scotland to segregate key recyclables for separate collection as from January 1, 2014 (Scottish Parliament, 2012), the regulations became effective in England and Wales from January 1, 2015 (https://www.gov.uk/guidance/separate-collection-of-waste-paper-plastic-metal-and-glass). The overarching intention is to produce high quality recyclables when technically, environmentally, and/or economically viable to do so (EPCEU, 2008).

Considering the amount of influence of EU waste management policy on UK legislation, the future and directions of the UK waste management remain unclear and it will be interesting to see how this picture evolves following Brexit. However, the UK government including the devolved administrations have to decide on how the existing environmental laws would be addressed when the UK finally has the mandate to set an independent waste management agenda.

2.4 Chapter Summary

The historical overview of waste management practices in the UK was presented in this Chapter. Like many other countries in the world, waste management in the UK started in a primitive way using open dumping as the best approach although the practice has since been revolutionised. This is mainly influenced by the EU Framework Directive with the introduction of the waste management hierarchy. Whilst its intention is to advance the management of waste efforts from disposal to prevention, recycling remains the preferred approach to other waste treatment options in the hierarchy.

Therefore, different legal- and fiscal-based instruments have been introduced with the objective of diverting waste away from landfill sites while enhancing material recovery. As legislative and fiscal requirements (such as landfill tax) are becoming more stringent, the rate of fly-tipping and its associated clearing costs are increasing in the UK. As a result, this chapter argued that these instruments (legal- and fiscal-based) are not enough in their own right, rather behavioural change may be required. Nonetheless, these instruments have been pivotal in the management of waste in the UK especially in enhancing waste recycling as well as material recovery.

Chapter 3 Recycling Behaviour: Approach from the Literature

3.0 Introduction

In Chapter 2, a historical overview of waste management including waste management options in the UK was presented. The main objective of the previous two chapters was to provide a basis for this chapter and to put the current research into perspective, so that this chapter can identify gaps in the literature.

As a result, this chapter builds on the previous chapters by reviewing some relevant literature within the context of waste management and particularly recycling. However, this Chapter seeks to achieve Objective 1 of this research (see Chapter 1), that is to review relevant studies on recycling (and other pro-environmental) behaviour. Given that previous studies have focused more on home contexts compared to other contexts such as workplaces for recycling, relevant literature from other pro-environmental behaviours are also reviewed.

In addition, this chapter in conjunction with the findings of the qualitative phase forms the basis for the design of the conceptual model and the research hypotheses that underpin this research.

3.1 Waste Recycling Behaviour

This section examines recycling behaviour including various factors influencing people's behaviour. In addition, theories and models often applied to understand recycling behaviour are briefly outlined and discussed. Nevertheless, previous studies on recycling behaviour have focused on two major strands representing recycling practices at home (such as Hage, Söderholm, & Berglund, 2009; Saphores & Nixon, 2014) and recycling at work (for example Andrews, Gregoire, Rasmussen, & Witowich, 2013; Largo-Wight, Johnston, & Wight, 2013).

Although studies have focused on these two strands, the available evidence (for instance Barr, Shaw, & Coles, 2011; Lo, Peters, & Kok, 2012; McDonald, 2011) suggests that

people with strong pro-environmental behaviour (such as recycling) at home will not automatically engage in a similar behaviour outside their home settings. Building on this knowledge, this section is sub-divided into home and work contexts to present evidence that is unique to each context from the literature and to allow comparison about what is already known about recycling behaviour in both contexts. This is necessary for clarifications on behavioural in/consistency from one context to another.

3.2 Recycling at Home

Similar to municipal solid waste, household waste can be described as waste being generated in and collected from households (private residential homes) by and/or on behalf of Local Councils. It includes household collection rounds, bulky waste collections, and waste deposited by householders to facilities such as Household Waste Recycling Centres (HWRCs) and recycling points/bring banks (see https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/reporting-definitions-and-terms/).

3.2.1 Factors Influencing Recycling at Home

Factors influencing recycling behaviour are observed to be diverse and complex (see Miafodzyeva & Brandt, 2013), likely to be different from person to person, and mostly dynamic in terms of behavioural contexts (Barr et al., 2010; Klöckner & Oppedal, 2011). However, recycling behaviour at home has been shown to be influenced by psychological factors (such as attitudes, awareness, beliefs, knowledge (or understanding) of the scheme, willingness/intention to perform recycling) and situational (for instance scheme design) conditions that are external to householders.

Unarguably, the degree to which these factors facilitate/inhibit recycling at home is not constant and can be complex although research has predominantly focused on psychological factors (Thomas & Sharp, 2013). Nevertheless, these factors can be classified into internal and external facilitators where internal facilitators (particularly knowledge and commitment) are considered as the best predictors of recycling behaviour (see Hornik

Cherian, Madansky, & Narayana, 1995). In other words, a householder is more likely to participate in recycling when there is a sufficient knowledge on what, where, and how to recycle (see Oke & Kruijsen, 2016) although some level of commitment to recycle when at home is expected. On the contrary, factors (such as recycling facilities and distance to recycling points) that may increase the time cost of recycling are most likely to inhibit recycling at home (Ando & Gosselin, 2005; Barr, 2004, 2007; Ewing, 2001).

However, the most influencing factors observed to be affecting householders' recycling behaviours according to Miafodzyeva and Brandt's (2013) meta-analytical review are convenience, moral norms, information, and environmental concern. This was in support of Osbaldiston and Schott's (2012) earlier meta-analysis that argued that interventions that included cognitive dissonance, goal setting, social modeling, and prompts were more effective in enhancing pro-environmental behaviour at home.

In order to understand what facilitates or inhibits recycling behaviour at home, different factors that are likely to influence recycling behaviour and participation at home have been documented by different authors (such as Barr & Gilg, 2006; Kurz, Linden, & Sheehy, 2007); Knussen, Yule, MacKenzie, & Wells, 2004; Osbaldiston & Schott, 2012). These factors have been sub-classified into internal and external facilitators (Hornik et al., 1995); personal and situational factors (Schultz, Oskamp, & Mainieri, 1995); while Barr (2007) adopted environmental values, situational variables, and psychological variables when classifying those factors. Using the findings of different studies from 1990 to 2010, Miafodzyeva and Brandt (2013) classified factors influencing recycling at home into socio-psychological, technical-organisational, individual socio-demographic, and study-specific factors.

In this research, factors that are likely to affect recycling behaviour at home are broadly classified into psychological, personal, situational, and socio-demographics. Although these are structurally similar to Barr's (2007) sub-classification, socio-demographics are sub-

classified under situational variables in the Barr nomenclature. Also, environmental values are construed as behavioural attitudes in Barr's study whereas the construct is a sub-category of psychological factors in this research. In addition, socio-demographics are conceptualised as separate variables in this research rather than as part of other constructs.

The rationale for this sub-classification is to ensure consistency with the review of studies on recycling at work and also to allow a deeper understanding of factors underpinning recycling behaviour using non-technical terminologies. As a result, these factors are discussed in the next section starting with socio-demographics.

3.2.1.1 Socio-Demographic Variables

Demographics or socio-demographic variables such as age, education, gender, income, and dwelling type are observed to be the most commonly investigated facilitators of recycling behaviour (Hornik et al., 1995; Miafodzyeva & Brandt, 2013). As a result, a number of studies (such as Abbott, Nandeibam, & O'Shea, 2013; Ando & Gosselin, 2005; Arbués & Villanúa, 2016; Babaei et al., 2015; Ewing, 2001; Garcés, Lafuente, Pedraja, & Rivera, 2002; Hage et al., 2009; Knussen & Yule, 2008; Knussen et al., 2004; Iyer & Kashyap, 2007; Vicente & Reis, 2008) have attempted to attribute the participation in recycling at home to the influence of socio-demographics. On the contrary, studies (such as Botetzagias, Dima & Malesios, 2015) observed that the influence of demographics on recycling intention is statistically non-significant while Diamantopoulos, Schlegelmilch, Sinkovics, and Bohlen (2003) argued that socio-demographics are limited in their utility in explaining environmentally conscious behaviours.

Socio-demographics can predict recycling behaviour at home (Arbués & Villanúa, 2016; Babaei et al., 2015; Sidique, Lupi, & Joshi, 2010) although findings from the existing studies are inconsistent and mostly inconclusive. For example, studies (see Garcés et al., 2002; Hage et al., 2009; Knussen & Yule, 2008; McDonald & Ball, 1998) have shown that age is a predictor of recycling at home. On the contrary, studies (such as Barr et al., 2001a; Berglund,

2006; Hage & Söderholm, 2008) observed no significant relationships between age and recycling behaviour at home. Nevertheless, it can be concluded from these studies that older people are more likely to recycle at home. This has been confirmed in other pro-environmental behaviours for example Gilg and Barr (2006) who reported that older people are more likely to conserve water compared to younger ones.

Similarly, income/social economic status (Garcés et al., 2002; Hage et al., 2009; Nixon & Saphores, 2009); education (Nixon & Saphores, 2009) and household composition i.e. presence of children (Oates & McDonald, 2006; Vicente & Reis, 2008) have been reported to have no statistically significant influence on household recycling behaviour. Although not significant, Vicente and Reis (2008) observed that the presence of children in households is more likely to increase recycling participation due to the effects of media campaigns on children.

In addition, other studies (such as Berglund, 2006; Fiorillo, 2013; Hage et al., 2009; Iyer & Kashyap, 2007; Knussen et al., 2004; Oates & McDonald, 2006) have attempted to explain recycling at home in terms of gender. The influence was observed for both single and multiple households; and suggest that female residents are more likely to recycle than their male counterparts (Iyer & Kashyap, 2007; Knussen et al., 2004; Oates & McDonald, 2006). While gender may not completely explain recycling (Hage et al., 2009) at home, findings on the influence of gender may be due to the cultural differences concerning the roles or influence of women within the households. Nevertheless, the initiator of recycling in a household is more likely to engage effectively and sustain recycling at home although it is less likely that there is a single recycler in a household (Oates & McDonald, 2006).

Studies (Ando & Gosselin, 2005; Oates & McDonald, 2006) have also attempted to associate recycling at home to family size/household composition. According to these studies, households with fewer members (for example only two adults) recycle more than those with a large family. However, the results can be attributed to the issue of ownership and

responsibility, suggesting that there may be absence of initiator (and/or joint initiator) of recycling in a large family due to the lack of shared responsibilities among the family members. On the contrary, there may likely be other barriers, like a lack of storage space and perceived inconvenience, preventing a large family from engaging in recycling.

Furthermore, previous studies (such as Ando & Gosselin, 2005; Berglund, 2006) have observed correlations between housing type and household recycling behaviour. Based on Ando and Gosselin's (2005) findings, the occupants of single-family dwellings (SFDs) are more likely to recycle compared to those in multiple-family dwellings (MFDs). On the one hand, this suggests the negative effects of convenience (time cost and storage space) on recycling. It shows the influence of storage space on recycling, given that SFDs may offer more adequate space for storing recyclables. This suggests that recycling behaviour at home is a function of housing type which may be moderated by storage space and other logistical reasons. On the other hand, the type of housing can be influenced by socio-economic status (in terms of personal and/or household income) of householders and consequently determine the possibility of engaging in recycling.

This was supported by the observation that residents of apartments are more willing to pay for others to sort and transport their household waste (Berglund, 2006). That is, those who perceive the lack of space as a barrier are less willing to recycle whereas they are most likely to show the willingness to pay for their recycling services (Berglund, 2006; Zen & Siwar, 2015). This is less likely to be the case in the UK given that the financial costs of waste management are incorporated into the mandatory council tax payable by householders.

Accordingly, a general stereotypic view from these studies suggests that affluent, educated, female, and old householders are more likely to recycle (see Grønhøj & Thøgersen, 2012; Oates & McDonald, 2006). While demographic variables such as age, gender, income, level of education, and family composition can be useful in profiling people in terms of how they recycle at home, there is a lack of clarity on the characteristics of (non) recyclers (Oke &

Kruijsen, 2016; Oates & McDonald, 2006). Using other waste generation contexts, attributes of waste recyclers and non-recyclers require further investigations to identify and understand what informs recycling behaviour in other contexts.

3.2.1.2 Psychological Factors

In addition to the influence of demographic factors as described above, previous efforts have increasingly focused on psychological factors (Ruepert et al., 2015) to explain and predict pro-environmental behaviour and particularly recycling at home. Although psychological factors are not sufficient in their own right to determine pro-environmental behaviours (Thøgersen, 2005), studies (such as Barr, 2004; Carrus, Passafaro, & Bonnes, 2008; Knussen & Yule, 2008; Mannetti, Pierro, & Livi, 2004; Nigbur, Lyons, & Uzzell, 2010; White & Hyde, 2012) have demonstrated a relationship between some psychological factors and recycling at home.

As a result, recycling at home has been attributed to psychological factors such as attitudes (Ando & Gosselin, 2005; Barr, 2004; Schwab, Harton, & Cullum, 2014), desires (Carrus et al., 2008), habits (Knussen et al., 2004; Knussen & Yule, 2008), and intentions (Corraliza & Berenguer, 2000; Tabernero & Hernández, 2011). Similarly, factors such as social norms (Botetzagias et al., 2015; Fornara, Carrus, Passafaro, & Bonnes, 2011), moral norms (Hage et al., 2009; Mee, Clewes, Phillips, & Read, 2004; Thøgersen, 1996), and perceived behavioural control (Nigbur et al., 2010; White, Smith, Terry, Greenslade, & McKimmie, 2009) are other predictors of recycling at home.

Most of these studies either adopted or modified one existing theory or another, particularly the Theory of Planned Behaviour (Ajzen, 1991, 2002), where intentions are conceptualised as a proxy for recycling behaviour at home. In addition, different measures (such as beliefs and concerns which are sub-classified under personal factors in this research) have been operationalised as behavioural attitudes in many studies (such as Bamberg, 2003; Do Valle, Rebelo, Reis, & Menezes, 2005; Kurz et al., 2007; Sidique et al., 2010). Nonetheless,

studies (such as Best & Kneip, 2011; Vicente & Reis, 2008) have shown a positive effect of attitudes on recycling behaviour while Do Valle et al. (2005) suggest that people's attitude has no direct effect on their recycling behaviour.

Although recycling behaviour at home may not completely be a function of attitudes, the intention to recycle is likely to be underpinned by attitudes, descriptive (or social) norms, and perceived behavioural control (Barr, 2004; Nigbur et al., 2010; White et al., 2009). The behavioural intentions, when properly formed, are immediate antecedent of self-reported recycling behaviour (Knussen et al., 2004; Nigbur et al., 2010; White & Hyde, 2012). Using the tenets of the Theory of Planned Behaviour (TPB), these studies have shown that recycling attitudes and social norms, unlike perceived control, are indirect predictors of recycling at home through the intention (or willingness) to recycle.

However, Carrus et al. (2008) observed no correspondence between attitudes and intentions, their model was later modified with the inclusion of desires. Based on their findings, attitudes have no significant influence on desires to recycle whereas desires increase the intention to recycle at home. Their findings suggest that a positive attitude towards recycling at home is sufficient to determine whether the householder is likely to recycle or not even when s/he has no desire or intention to recycle. One obvious explanation is the presence of other factors (such as beliefs, personal norms, and values) that reinforce the initial attitudes when there is an opportunity (situation) to recycle at home.

On the one hand, other factors such as situational factors may serve as a cue for the activation of attitudes and motivate the householder to recycle whether there is an intention/desire to recycle or not. Equally, people may recycle at home when they have a positive disposition to recycle and/or feel concerned in terms of their personal norms (that is, moral obligations) about the negative consequences of waste production and disposal (Thøgersen, 2006; Vicente & Reis, 2008) based on the Schwartz's (1977) Norm-Activation-Model.

Conversely, there is a need for clarity about the distinctions between behavioural desires and intentions. According to Perugini and Bagozzi (2004), desires and intentions are different with regards to perceived performability, action-connectedness, and temporal framing. In their study, Perugini and Bagozzi argued that desires are less performable, less connected to action, and conceived over a long period of time compared to intentions. Although desires are conceptualised as a distant predictor of behaviour, the construct represents the initial stage of the decision-making process that may result in the intentions to act. Therefore, it can be suggested that intention to engage in recycling is predicated on the formation of recycling desire. Nonetheless, the process is likely to involve many motivational factors (such as intrinsic and/or extrinsic) that can induce the willingness to engage in recycling.

Similarly, social norms are another factor that have been associated with intentions and recycling behaviour at home. However, studies have suggested that intentions (Ebreo & Vining, 2001; Carrus et al., 2008; Nigbur et al., 2010) and/or recycling behaviour (Hage et al., 2009; Perrin & Barton, 2001; Tonglet, Phillips, & Bates, 2004) cannot be determined by the influence of significant others alone. This is probably due to the failure of norms within the framework of TPB to capture the important aspects of social influence (Armitage & Conner, 2001) considering that most of these studies relied on TPB.

This suggests that recycling intentions are not likely to be developed (or enhanced) from the recycling activities of friends, neighbours, or families (significant others). On the contrary, studies (such as Abbott et al., 2013; Shaw & Maynard, 2008; Vicente & Reis, 2008) observed a positive influence of social norms (neighbours or friends) on self-reported recycling behaviour. Also, Barr (2004) reported a positive association between social norms and behavioural intentions among the residents of Exeter, UK while Huffman, Van Der Werff, Henning, & Watrous-Rodriguez (2014) observed a moderation effect of social influence on the recycling attitude-behaviour relationship.

One possible explanation for these inconsistencies is that these studies were conducted in different countries with different cultural and social inclinations. For example, studies (such as Abbott et al., 2013; Barr, 2004) have shown that kerbside recycling scheme can motivate neighbours to engage in recycling depending on the housing type and arrangements. As a result, cultural values, community sense, and neighbourhood interaction (social cohesion) may play significant roles on how social norms affect individuals' recycling intentions and/or behaviour at home. According to Kurz et al. (2007), people are more likely to develop recycling attitudes as well as participate in recycling when they feel a sense of community. In other words, the sense of community is not only contributing to recycling attitudes but also enhancing recycling participation based on the samples of residents in Belfast, Northern Ireland.

In addition to the contributions of social norms, perceived control is another factor often investigated to explain recycling behaviour at home. Accordingly, people may perceive a sense of control in terms of distance, time, and space (Berglund, 2006; Garcés et al., 2002), self-efficacy (Thøgersen, 2003), and the level of information (Hage et al., 2009; Nixon & Saphores, 2009) about recycling and/or scheme. Nevertheless, perceived behavioural control (PBC) was observed to have no influence on either recycling intention or self-reported recycling behaviour at home (Carrus et al., 2008; White & Hyde, 2012). According to Ajzen (1991), the predictive value of PBC is likely to diminish when behavioural attitude is strong depending on the type of behaviour being investigated. For instance, some people are likely to recycle due to their positive attitudes towards recycling despite the absence of adequate recycling facilities at home. Also, Carrus et al. (2008) observed that PBC has no influence on intentions while Mannetti et al. (2004) reported a strong positive effect of PBC on recycling intentions. Nonetheless, people that feel a sense of control (in terms of accessibility, knowledge, and other situational factors) over recycling are more likely to recycle at home.

Similarly, antecedent behaviour has been reported to have a causal relationship to recycling intentions and behaviour. Studies (such as Bagozzi & Dabholkar, 1994; White &

Hyde, 2012) showed that past-behaviour is an antecedent of self-reported waste recycling behaviour. In addition, Knussen and Yule (2008) observed that those who have recycled at least one material at home in the past are most likely to develop the intentions to recycle again compared to people who have not recycled. Whilst past and self-reported behaviours were investigated within the same context (household), White and Hyde (2012) demonstrated that past-behaviour could independently enhance recycling intentions and self-reported recycling behaviour. This suggests that past-behaviour in terms of behavioural frequency and its currency may offer a better explanation or prediction for future recycling behaviour with or without the influence of intentions.

On the contrary, Davies, Foxall and Pallister (2002) observed that the measure of recycling experience of residents of Cotswold District Council was insignificant to their recycling behaviour but showed a moderate link with their behavioural intentions. This may suggest that their past-behaviour is not habitual (Knussen & Yule, 2008), is inconsistent or not measured on the same level of specificity as their present recycling behaviour. Nonetheless, the fact that the participants' behavioural intentions were influenced by past-behaviour signified an existence of other factors preventing the householders from replicating the past recycling experience. This is likely to be influenced by the effects of some external factors such as lack of waste facilities and improper scheme design that could prevent past-behaviour being repeated.

This assumption supports the observation by Davis, Phillips, Read, & Iida (2006) that convenience and scheme design independently mediate the relationship between past-behaviour and recycling intentions. According to Davis et al. (2006), the observed difference between Brixworth and West Oxfordshire with respect to the effects of their past-behaviour on their recycling intentions was due to the convenient recycling services experienced by residents of Brixworth.

However, findings from these studies suggest that predicting and predicted behaviours should be on the same level of specificity (such as context-to-context and material-to-material) to observe any correspondence. It is therefore difficult to establish from these studies if past-behaviour from one context can predict recycling behaviour in a different context especially from home to work.

While the relationship between past and future behaviours has been examined in the same context (at home), past recycling behaviour has been suggested (Wood & Neal, 2007; Verplanken, 2006) to build a tendency for habitual behaviour. Although Knussen et al. (2004) did not investigate past- and future-behaviour relationships; the study showed that past-behaviour was a predictor of recycling intentions. According to Knussen et al. (2004), those with no habit of recycling are less likely to have recycled in the past and will have no intentions to recycle in the future. This suggests that past behaviour should be internalised for it to be habitual which could increase the propensity of repeating the behaviour in the future.

However, there is a lack of clarity on the process of habit formation and the frequency of behaviour may not always indicate a habitual behaviour. According to Conner and Armitage (1998), the frequency of performing behaviour may facilitate control over that behaviour although it is implausible to assume habitual behaviour. As a result, past recycling behaviour is an insufficient measure of behavioural habit (Knussen & Yule, 2008; Verplanken, 2006). It is therefore more intuitive to conceptualise past behaviour as frequency of past behaviour rather than a measure of habit (Conner & Armitage, 1998), suggesting a need for more clarity between the frequency of behaviour and behavioural habit (Verplanken, 2006).

While the frequency of performing recycling is likely to enhance control over recycling at home, PBC in terms of situational constraints may exert little or no effects on habit-intention relationship (see Knussen & Yule, 2008). As a result, those lacking recycling habit may not have recycled in the past and are also likely to have no intentions to recycle in

the future. This may consequently prevent them from recycling whether they are in control of recycling at home or not. Nonetheless, those who have recycled in the past may have a deep understanding or knowledge of recycling which can facilitate their perceived control and determine the likelihood of them engaging in recycling. Nevertheless, the disparities of findings on the influence of PBC may be due to the subjective assessment of PBC in terms of ease of recycling or interference posed by the level of actual volitional control (Armitage & Conner, 2001).

As a result, the influence of psychological factors on recycling behaviour at home requires further investigations for a better understanding of how these constructs determine the occurrence of recycling behaviour. Likewise, the degree of interactions among these variables or how these variables may combine to influence the predictive power of intention is not well clarified in the literature. In addition, direct and independent influence of these constructs on recycling behaviour at home is not well established in previous studies. The present understanding of how behavioural intention and its antecedents can interact together to influence recycling behaviour at home is therefore limited.

On the other hand, attitude, which is often associated with an individual's behaviour, has been argued to be dynamic and mostly influenced by many factors including the behavioural situation. However, the influence of past attitude on the newly acquired attitude when confronted with the past situation is still unknown. This may be responsible for ambivalence (see Castro, Garrido, Reis, & Menezes, 2009) in the relationship between people's attitudes and behaviours. Although earlier studies have argued for the disappearance of old attitudes when the new attitudes are acquired, recent studies have proposed dual models of attitudes (Petty, Tormala, Brinol, & Jarvis, 2006; Wilson, Lindsey, & Schooler, 2000). While the newly formed attitude could override the old ones, it is less likely for the new attitudes to completely replace the old attitudes (Wilson et al., 2000). As a result, the two attitudinal traits could co-exist at the same time for a single individual while the

activation of a particular attitude is a function of the importance of attitudinal objects and/or behavioural situations that may facilitate the accessibility of those attitudes.

Findings from these studies suggest that attitudes and other psychological variables are unreliable constructs to explain and understand people's recycling behaviour at home. This is probably due to the influence of contextual factors as well as the specificity of recycling behaviour in terms of its measures. Nevertheless, people are more likely to engage in pro-environmental (and particularly recycling) behaviour when they are intrinsically motivated (Van der Werff, Steg, & Keizer, 2013) to prepare materials at home for recycling especially when the facilities are provided and easily accessible (Castro et al., 2009; Oke & Kruijsen, 2016). As a result, the importance of psychological traits may diminish when there are opportunities (in terms of facilities and materials) and incentives (motivations and prompts) to recycle at home.

3.2.1.3 Personal Factors

In addition to socio-demographic and psychological factors, personal factors (such as identity, scheme knowledge/information, awareness, past recycling behaviour, and environmental concern) are identified as determinants of recycling at home. However, identity in previous studies was sub-classified into personal identity (Mannetti et al., 2004) and group identity (White et al., 2009). For instance, studies (such as Mannetti et al., 2004; Nigbur et al., 2010; White & Hyde, 2012) observed a positive influence of self-identity on behavioural intentions. Although the intention may not translate into the actual recycling behaviour, a householder is more likely to develop the intention to recycle when the householder's identity endorses recycling behaviour. The contributions of self-identity may facilitate individuals' self-efficacy (or perceived control) which could be addressed from the endorsed personality (or disposition).

Also, self-efficacy (Bandura, 1984) is observed as a significant construct to further understand an individual's choice, effort, and perseverance (Fielding et al., 2016; Thøgersen,

2003) in performing recycling at home. These (choice, effort, and perseverance) could be directly associated to the outcome of individual's behaviour. For instance, the decisions to: recycle (choice), walk some distance to the recycling facilities, store, and separate waste (personal efforts) and ability to recycle even when facilities are inadequate (perseverance) could be associated to self-identity and/or self-efficacy. Therefore, self-identification either as a recycler (McDonald & Oates, 2003; White & Hyde, 2012) or green (Berglund, 2006) consumer may enhance the propensity of participating in recycling at home. That is, labelling oneself as a (non) recycler may interfere with other psychological variables and consequently exert a profound influence on recycling intention, desire, and behaviour. While Nigbur et al. (2010) observed a positive association between self-identity and recycling behaviour, White and Hyde (2012) observed no significant correlation. This suggests a lack of absolute recycler or non-recycler, indicating that individuals' recycling behaviour will be situated within a continuum with recycling and non-recycling behaviours at the opposite end of that continuum.

Further, several attempts (such as Barr, 2004; Ewing, 2001; Vicente & Reis, 2008) have been advanced to establish a link between recycling knowledge and recycling behaviour. For example, studies (Grodzińska-Jurczak, Tomal, Tarabuła-Fiertak, Nieszporek, & Read, 2006; Vicente & Reis, 2008) have reported that recycling knowledge has a positive effect on recycling behaviour at home. These studies demonstrated that people are more likely to recycle their household waste when they are equipped with adequate information or awareness of the existing recycling scheme. This awareness may be as a result of individuals' educational status or the presence of an educational campaign with respect to the current waste management issues including waste management schemes to address the issues. In their study, conducted in Bradford and Leeds, Perrin and Barton (2001) observed that adequate knowledge of recyclables through specific recycling information and provision of feedback has a positive significant influence on recycling at home. These (information and feedback) may probably differentiate perceived recyclers from non-recyclers (De Young,

1988; McDonald & Oates, 2003; Vining & Ebreo, 1990), as recyclers often possess adequate knowledge of waste, recycling, including schemes (Babaei et al., 2015; Oke & Kruijsen, 2016).

Studies (such as Barr, 2004; Best & Kneip, 2011) have also demonstrated the influence of personal factors with reference to people's environmental concern on recycling at home. This concern is understood to be fundamental to individuals' perspectives toward the environment (Barr, 2004; Dunlap, 2008; Vining & Ebreo, 1990). Although general environmental concern has been found to predict recycling attitudes (Kurz et al., 2007) and behaviour (Corraliza & Berenguer, 2000; Vining & Ebreo, 1990) at home, there is a lack of clarity and consensus on the operational definition of environmental concern (see Bamberg, 2003; Schultz et al., 2005). However, it is not likely that recycling at home can be influenced by people's general environmental concern (Kurz et al., 2007) although it tends to moderate the effect of a recycling scheme (Best & Kneip, 2011). This could be associated with an individual's environmental values and beliefs (Corraliza & Berenguer, 2000) or the influence of altruism and egoism (Ewing, 2001) on an individual's waste recycling beliefs and values. In other words, concern for the environment is unlikely to translate into recycling behaviour when there is a lack of environmental values and/or a lack of beliefs that recycling can make a significant contribution to addressing environmental problems. Like attitudes, research should further explore the "concern-behaviour" relationship on the basis of specificity (that is, environmental concern vs. pro-environmental behaviour; concern towards recycling vs. recycling behaviour).

Nevertheless, personal factors such as knowledge exert little influence when situational constraints are strong (Kaiser & Fuhrer, 2003). As a result, psychological (such as attitudes) and personal (for example knowledge) factors are most likely to exert little or no influence on recycling behaviour when the effects of situational factors (such as access to recycling) are strong. In this regard, there is a need to create more opportunities for people to recycle by providing adequate facilities and/or increase the access to the provided facilities.

3.2.1.4 Situational Factors

In addition to the influence of the above-mentioned factors, situational variables have been shown to influence household recycling behaviour although many studies on recycling behaviour are more confined to the contribution of psychological factors. The restricted number of studies considering situational factors has limited the ability of researchers to uncover the possible influence of situational factors on recycling at home. To understand whether people will recycle at home, recycling schemes (such as kerbside) would need to be introduced and implemented (see Mee et al., 2004; Perrin & Barton, 2001).

While psychological factors are likely to predict recycling behaviour, the influence is attenuated when the effects of situational constraints are more prevalent (Kaiser & Fuhrer, 2003). This was in support of Guagnano, Stern and Dietz (1995) who found that the attitude-behaviour relationship is enhanced by external factors. In other words, recycling behaviour is a function of the interacting effect of internal (such as attitudes and concern) and external (such as access and scheme) factors. This is underpinned by Guagnano et al.'s (1995) A-B-C model that states that actions (behaviours) are influenced by attitudes and external conditions. According to the model, attitudes (A) fluctuate from time to time depending on the contextual factors (C), suggesting that people are less likely to recycle (B) at home when situations are not conducive. As a result, Stern (2000) argued that the propensity of social actors to recycle at home, for example, is a function of both personal and situational factors. According to Guagnano et al. (1995), behavioural outcome is a function of an interaction between attitudes (A) and conditions (C) rather than the independent influence of either A or C.

In addition, the type of waste streams used for investigations may affect recycling behaviour at home. For example, a householder may have no intention to recycle, and/or may not actually recycle plastic, if that householder is not producing plastic waste. This assumption was supported by Ando and Gosselin (2005) who observed a positive

relationship between recycling attitudes and behaviour toward paper recycling alone and no correlations for other types of waste. This was corroborated by McDonald and Oates (2003) who demonstrated the perceived generation of insufficient materials (for instance waste paper) as one of the barriers to the householders' participation in the blue bin recycling scheme in Sheffield. Moreover, if waste being produced at home has no or little economic value, it may reduce the Local Council or waste carriers' commitment to collecting that waste which may influence its logistics. This may limit the efforts of waste management authorities to provide recycling facilities that can influence householders' psychological traits (such as attitudes, desire, intention, and perceived control) and have a subsequent effect on their recycling behaviour.

Although Barr (2007) described and examined situational variables in terms of personal situation (such as behavioural context) and individual attributes (for instance socio-demographics), these are separated in this research for the purpose of clarity. However, studies (such as Barr, 2003; Barr & Gilg, 2005; Barr, Gilg, & Ford, 2001a, 2001b; Best & Kneip, 2011; Boldero, 1995; Timlett & Williams, 2008; Shaw & Maynard, 2008) have examined the influence of situational variables on recycling behaviour at home. According to Barr (2003), house size has a significant influence on recycling with those living in larger houses tending to recycle more. This may be due to the influence of storage space as well as access to adequate recycling facilities and schemes (such as kerbside). It indicates the influence of convenience (time cost and distance), suggesting that householders may be unable to prepare their waste for recycling when its time cost is high. In support of this hypothesis, findings (such as Hage et al., 2009; Perrin & Barton, 2011; Nixon & Saphores, 2009) have attributed the non-participation in recycling at home to the lack of storage facilities (such as space) and lack of sufficient material to justify recycling (McDonald & Oates, 2003; Robinson & Read, 2005).

Also, householders with sufficient access to recycling scheme (such as kerbside) and recycling facilities (for instance bins) have been reported to recycle more compared to those

without access (Barr, 2003; Best & Kneip, 2011; Fiorillo, 2013; Guagnano et al., 1995; Timlett & Williams, 2008). On the one hand, having a bin reduces the personal cost associated with recycling. On the other hand, having a bin is likely to serve as a prompt that may increase scheme (or recycling) awareness which may activate recycling behaviour. Regardless of people's psychological state, provision of facilities may nudge people towards recycling as well as enhancing their participation in recycling (Guagnano et al., 1995). On this basis, the introduction of kerbside recycling (such as kerbside commingle) including the knowledge of a local waste scheme can influence the propensity of participating in recycling behaviour (Abbott et al., 2011; Barr, 2004).

Similarly, studies (such as Evison & Read, 2001; Nixon & Saphores, 2009) have observed the positive influence that publicity and promotion has on household recycling behaviour. This suggests that waste recycling publicity, promotion or a well-designed communication strategy could be an effective tool to engage or enhance household recycling behaviour (Borgstede & Andersson, 2010; Mee et al., 2004; Oke & Kruijsen, 2016). However, the set-out rate of household waste may likely reduce if the campaign is discontinued and suggests that recycling behaviour is not internalised and cannot be sustained (Grodzińska-Jurczak et al., 2006) beyond the inducement period. This may be the case when recycling barriers are not identified and addressed prior to and during the campaign. On the other hand, the duration of interventions (such as campaign) when short is likely to be ineffective for making long-lasting impressions on peoples' attitudes toward waste recycling or having a consequent effect on recycling behaviour. However, local councils' environmental newspapers (Evison & Read, 2001), leaflets (Borgstede & Andersson, 2010; Mee et al., 2004), and word of mouth (Nixon & Saphores, 2009) can produce a durable effect on recycling at home. For instance, local council environmental newspapers or leaflets may offer specific recycling information and comparative feedback (such as recycling performances and recycling targets), location of local recycling facilities, and description of recyclables including the frequency (and times) of collections. This can be facilitated through a door-to-door

campaign (Timlett & Williams, 2008), social interactions (Abrahamse & Steg, 2013), or by the presence of block leaders (Bagozzi & Dabholkar, 1994).

Nonetheless, recycling adverts should be regularly updated in order to be more effective and engage with the current waste recycling issues. Consequently, multiple sources of recycling information may be considered when disseminating recycling information; this may be more productive than a single source of information (Nixon & Saphores, 2009). While information campaign is important in enhancing recycling, its relevance could diminish by introducing policy instruments and other external factors that may simplify recycling (Hage et al., 2009). These external factors may include monetary incentives, deposit refund schemes, and markets for used items especially key recyclables.

These factors are summarised in Table 1 below for a better understanding although this review has shown that some of the factors influencing recycling at home should not be addressed in isolation. It suggests a possible interaction between personal, psychological, and situational factors in the prediction of recycling at home.

Table 1: Factors influencing recycling behaviour at home

Themes	Factors	References
Socio-demographics	Gender	Ando & Gosselin (2005); Barr (2002); Ewing (2001); Hage et al. (2009); Oates & McDonald (2006).
	Age	Ando & Gosselin (2005); Ewing (2001); Garcés et al. (2002); Hage et al. (2009); Nixon & Saphores (2009).
	Education/Highest Qualification	Ando & Gosselin (2005); Ewing (2001); Hage et al. (2009); Nixon & Saphores (2009).
	Household Composition	Ando & Gosselin (2005); Oates & McDonald (2006); Vicente & Reis (2008).
	Income/Social Status	Garcés et al. (2002); Nixon & Saphores (2009).
Psychological	Attitudes	Barr (2004); Best & Kneip (2011); Carrus et al. (2008); Ewing (2001); Huffman et al. (2014); Knussen et al. (2004); Mee et al. (2004); Timlett & Williams (2008); Vicente & Reis (2008).
	Beliefs	Ewing (2001); Thøgersen (1994).
	Desire	Carrus et al. (2008);
	Habits	Carrus et al. (2008); Knussen & Yule (2008); Knussen et al. (2004).
	Intentions	Barr (2004); Carrus et al. (2008); Chen & Tung (2009); Knussen et al. (2004); Mannetti et al. (2004); Nigbur et al. (2010); White & Hyde (2012).

	Perceived Behavioural Control	Carrus et al. (2008); Chen & Tung (2009); Knussen et al. (2004); Mannetti, Pierro & Livi (2004); Nigbur et al. (2010); White & Hyde (2012.
	Social (descriptive and injunctive) norms	Carrus et al. (2008); Ewing (2001); Hage et al. (2009); Huffman et al. (2014); Mannetti et al. (2004); Nigbur et al. (2010); Nixon & Saphores (2009); Shaw & Maynard (2008).
Situational	Feedback	Evison & Read (2001); Perrin & Barton (2001); Timlett & Williams (2008).
	Housing Type	Ando & Gosselin (2005); Barr (2004); Hage, Söderholm & Berglund (2009); Nixon & Saphores (2009).
	Information/Signage	Barr (2004); Garcés et al. (2002); Grodzińska-Jurczak et al. (2006); Mee et al. (2004); Nixon & Saphores (2009); Shaw & Maynard (2008); Vicente & Reis (2008).
	Infrastructure (availability, adequacy, appearance)	Ando & Gosselin (2005); Chen & Tung (2009); Evison & Read (2001); Ewing (2001); Knussen et al. (2004); McDonald & Oates (2003).
	Prompts	Mee et al. (2004).
	Proximity	Ando & Gosselin (2005); Garcés et al. (2002);
	Scheme	Best & Kneip (2011); Evison & Read (2001); Grodzińska-Jurczak et al. (2006); Hage et al. (2009); Mee et al. (2004); Nixon & Saphores (2009).
Personal	Awareness	Barr (2004); Evison & Read (2001); Garcés et al. (2002); Grodzińska-Jurczak et al. (2006).
	Behaviour towards a specific material	Best & Kneip (2011); Hage et al. (2009); McDonald & Oates (2003).
	Convenience/Efforts	Ando & Gosselin (2005); Barr (2004); Berglund (2006); Hage et al. (2009); McDonald & Oates (2003); Mee et al. (2004); Nixon & Saphores (2009); Perrin & Barton (2001).
	Culture (individualism & collectivism)	Kurz et al. (2007); McCarty & Shrum (2001).
	Identity (Self and Group)	Mannetti et al. (2004); Nigbur et al. (2010); White & Hyde (2012); White et al. (2009).
	Incentives (Rewards & penalties)	Iyer & Kashyap (2007); Mee et al. (2004); Shaw & Maynard (2008); Thøgersen (1994); Timlett & Williams (2008); Vicente & Reis (2008).
	Knowledge	Barr (2004); Do Valle et al. (2005); Ewing (2001); Garcés et al. (2002); Grodzińska-Jurczak et al. (2006); McDonald & Oates (2003); Tonglet et al. (2004).
	Moral obligation/norms	Barr (2004); Berglund (2006); Chen & Tung (2009); Hage et al. (2009).
	Past behaviour	Barr et al. (2003); Tonglet et al. (2004); Knussen & Yule (2008); Knussen et al. (2004).
	Type/Amount of recyclables	Grodzińska-Jurczak et al. (2006); McDonald & Oates (2003); Perrin & Barton (2001).
Source: Author		

On the one hand, psychological factors and personal factors can be combined when attempting to influence recycling at home. For instance, the influence of neighbours or

community groups (descriptive and injunctive) can be used to indirectly enhance recycling at home through people's personal values (or norms). On the other hand, situational factors can be combined with other factors to make recycling easier to perform. Nevertheless, a lack of recycling scheme and inadequate facilities may diminish recycling at home (Hage et al., 2009) regardless of people's personality and/or psychological state.

3.3 Recycling at Work

Research on recycling at work is not a new endeavour although the progression is slow compared to other waste generation contexts, especially the home context. For example, a recent meta-analytical review of studies on recycling at work (Oke, 2015) reported that the first generation of research on recycling at work started in 1970s and was championed by researchers in the USA. As a result, many of the existing studies were conducted in the USA and mostly within academic institutions (see Oke, 2015).

However, earlier studies were instigated by the scarcity of landfill sites in the USA (Kalsher, Rodocker, Racicot, & Wogalter, 1993; Luyben, Warren, & Tallman, 1979) and to recover valuable materials (Hamad, Bettinger, Cooper, & Semb, 1980; Ludwig, Gray, & Rowell, 1998) from waste streams. This is evident in the development of the Dunlap and Van Liere's (1978) New Environmental Paradigm (NEP) as a competing and alternative worldview to the then Dominant Social Paradigm (DSP) in the USA. To reduce the amount of resources being buried in landfill, policy makers and planners should not only be aware of factors leading people to engage in recycling but people should also recycle consistently across different contexts (Schultz et al., 1995). Nonetheless, paper (and paper products) remains the most common material being studied in a work context (Lee et al., 1995; Oskamp et al., 1994; Tudor et al., 2007a).

Therefore, it is imperative to identify and establish what drives people to engage in recycling at work. To understand recycling behaviour and to identify factors underpinning

recycling practices at work, this section reviews and discusses findings of previous efforts on recycling at work.

3.3.1 Factors Influencing Recycling at Work

Different factors associated with recycling at work have been identified in many studies although previous studies focused more on a single waste stream (waste paper) and were conducted within office settings. Unlike studies on recycling at home, factors that were identified to be influencing recycling at work appeared to be unstructured and difficult to categorise. This is likely due to the rationale of the early studies in this realm – to recover materials for economic purposes rather than to understand factors influencing recycling.

According to Lee (1995), antecedents of pro-environmental behaviours including recycling at work are multi-dimensional, interrelated, and difficult to investigate. In addition, Andersson, Shivarajan and Blau (2005) argued that the determinants of pro-environmental behaviour at work are different from other behavioural contexts while Schultz et al. (1995) argued that recycling is multifaceted. Nevertheless, factors that reflect demographic (Chung & Poon, 1994; Kelly, Mason, Leiss, & Ganesh, 2006); situational (Austin, Hatfield, Grindle, & Bailey, 1993; Elfilthri, Ghee, Basri, & Zain, 2012; McDonald, 2011; Price & Pitt, 2012; Tudor et al., 2007a), personal (Hansen et al., 2008; Kaplowitz, Yeboah, Thorp, & Wilson, 2009; Largo-Wight, Bian, & Lange, 2012), and psychological (Chung & Leung, 2007; Tudor, Barr, & Gilg, 2007b; Humphrey, Bord, Hammond, & Mann, 1977) variables have been identified.

In addition, different factors that may possibly inhibit people's participation in recycling at work have been addressed by different authors (such as Corraliza & Berenguer, 2000; Hansen et al., 2008; Kelly et al., 2006). According to these studies, most of these factors can be attributed to the effects (as well as the interaction) of personal, psychological, and situational factors. This suggests that recycling schemes that involve a great deal of personal efforts with increasing behavioural costs may be unpopular and can also inhibit participation irrespective of people's beliefs system. As a result, any intervention approach in enhancing

recycling should be designed to remove/reduce recycling barriers in order to be effective. Notwithstanding, conflicts between personal and situational variables should be resolved through scheme design to reduce or completely eliminate recycling barriers.

Furthermore, past recycling behaviour has been linked (for example Lee et al., 1995; Marans & Lee, 1993; Tudor et al., 2007a) to recycling behaviour at work. Taken together, 30 different factors that are likely to be influencing recycling at work were previously identified and were further sub-classified into demographics, psychological, situational, and personal factors (see Table 2 below).

Table 2: Factors influencing workplace recycling behaviour

Themes	Factors	References
Demographics	Gender	Davis et al. (2009); Chung & Poon (1994); Ehrampoush & Moghadam (2005); Goldenhar & Connell (1993); Kelly et al. (2006); Witmer & Geller (1976)
	Age	Davis et al. (2009); Kelly et al. (2006); Tudor et al. (2007a)
	Education	Kelly et al. (2006); Wan et al. (2012)
	Income	Kelly et al. (2006)
Psychological	Attitudes	Chung & Leung (2007); Elfithri et al. (2012); Goldenhar & Connell (1991; 1993); Hansen et al. (2008); Humphrey et al. (1977); Kaplowitz et al. (2009); Prestin & Pearce (2010); Tudor et al. (2007a & b); Wan et al. (2012)
	Beliefs	Clay (2005); Goldenhar & Connell (1991)
	Intentions	Tudor et al. (2007b); Cheung et al. (1999); Wan et al. (2012); Goldenhar & Connell (1991; 1993); Jones (1989); Largo-Wight et al. (2012); Park et al. (1998)
	Perceived Behavioural Control	Largo-Wight et al. (2012); Wan et al. (2012)
	Social (descriptive) norms	Wan et al. (2012); Goldenhar & Connell (1991); Jones (1989); Largo-Wight et al. (2012); Park et al. (1998)
	Social (subjective) norms	
Situational	Environmental benefits	Kelly et al. (2006); Price & Pitt (2012); Tudor et al. (2007a & b)
	Feedback	Goldenhar & Connell (1991); Katzev & Mishima (1992); McCaul & Kopp (1982)
	Goal Setting/personal commitment	Chung & Poon (1994); Hamad et al. (1980); McCaul & Kopp (1982)
	Information/Signage	Austin et al. (1993); Chung & Poon (1994); Elfithri et al. (2012); Hansen et al. (2008); Humphrey et al. (1977); Kaplowitz et al. (2009)
	Infrastructure (availability, adequacy, appearance)	Andrews et al. (2013); Largo-Wight et al. (2013); Williams (1991).
	Organisation commitment	Kalsher et al. (1993); Lee et al. (1995)

	Prompts	Austin et al. (1993); Ludwig et al. (1998); Price & Pitt (2012).
	Proximity	Austin et al. (1993); Brothers et al. (1994); Largo-Wight et al. (2013); Ludwig et al. (1998); Price & Pitt (2012).
Personal	Awareness	Catlin & Wang (2012); Elfithri et al. (2012); Wan et al. (2012).
	Behaviour towards a specific material	Lee et al. (1995); Tudor et al. (2007b).
	Convenience	Clay (2005); Price & Pitt (2012); Kalsher et al. (1993); Largo-Wight et al. (2013); Penpece & Celik (2011); Wan et al. (2012).
	Culture (individualism & collectivism)	Park et al. (1998).
	Identity (Self and Group)	Park et al. (1998).
	Incentives	Clay (2005); Hamad et al. (1980); Lee & De Young (1994); Marans & Lee (1993); Witmer & Geller (1976).
	Knowledge	Cheung et al. (1999); Chung & Poon (1994); Kaplowitz et al. (2009); Kolbe (2015).
	Moral obligation/norms	Largo-Wight et al. (2012); Lee (1995).
	Past behaviour	Hamad et al. (1977); Lee et al. (1995); McDonald (2011); Tudor et al. (2007a).
	Personal benefits	Tudor et al. (2007a); Humphrey et al. (1977).
	Type/Amount of recyclables	Chung & Leung (2007); Oskamp et al. (1994); Tudor et al. (2007b).
	Values	Park et al. (1998); Price & Pitt (2012).
Source: Adapted from Oke (2015)		

Unlike studies on household recycling behaviour however, factors influencing workplace recycling behaviour have not been established (Marans & Lee, 1993). This lack of understanding is probably due to the paucity of empirical research exacerbated by a lack of attention from policy makers to recycling at work. Nevertheless, attitudes (in terms of concerns and beliefs for example) appear to be the most reported factor underpinning recycling at work. While attitudes are generally associated with the frequency of recycling (Marans & Lee, 1993), those who are intrinsically motivated are likely to consider economic motivations or financial rewards to be unimportant to their recycling behaviour. As a result, recycling behaviour at work is not likely to be influenced by extrinsic motivations especially financial rewards. Factors (which can be personal and situational) other than financial rewards should be considered and adopted when promoting recycling at work.

3.3.1.1 Socio-demographics

Similar to recycling at home, recycling behaviour at work has been explained using socio-demographics such as age (Kelly et al., 2006), education (Wan, Cheung, & Qiping Shen, 2012), and gender (Chung & Poon, 1994; Witmer & Geller, 1976).

According to Kelly et al. (2006), age is a significant predictor of recycling at work although this finding should be interpreted cautiously, given that the study was conducted in a university environment where students were among the participants. Contrary to this finding, the contribution of age in explaining recycling at work has been found by others to be less likely to be important and not a significant determinant of recycling at work (Tudor et al., 2007a). The disparities in findings about recycling at work and age might be due to the contextual differences. While Kelly et al. (2006) conducted their research in a university where the population is mixed, Tudor et al. (2007a) studied a hospital staff's recycling behaviour where participants in their research were mostly adults. As a result, there would be clear a boundary between the age differences in Kelly et al.'s (2006) study compared to Tudor et al.'s (2007a) study where age differences might be less distinct. Based on these studies, interventions designed to increase recycling should target different age groups, meaning that what is applicable to younger people may not likely motivate the older people within a workplace.

In addition to the mixed findings on the association between recycling at work and age, the influence of gender on recycling at work is inconsistent. For instance, Kelly et al. (2006) observed no significant difference between males and females regarding their recycling behaviour. However, recycling attitudes, intentions, and behaviour were observed to be gender specific (Chung & Poon, 1994; Davis, O'Callaghan, & Knox, 2009; Goldenhar & Connell, 1993). According to these studies, females are more likely to engage in recycling at work compared to their male counterparts.

However, the effect of social-economic status has a less obvious contribution to recycling at work although Kelly et al. (2006) observed a weak relationship between socio-economic status in terms of income level and recycling at work. The finding is less reliable considering that many of their student participants may not have any source of personal income and instead reported their family income which might be inconsistent with the personal income as reported by staff.

Contrary to recycling at home, socio-demographics may not be a good indicator or determinant of recycling at work although the effects of socio-demographics are less reported in studies on recycling at work. On the one hand, the effects of socio-demographics may likely be attenuated by the influence of social norms coupled with the perception of equality that is prevalent in most of organisations especially in western countries. On the other hand, the contribution of socio-demographics can be insignificant due to the effects of oneness or collectivist culture in many organisations where superiors and subordinates are perceived as colleagues. As a result, socio-demographics may lack predictive capabilities whilst any attempts to explain recycling behaviour at work including its determinants should consider factors other than socio-demographics.

3.3.1.2 Psychological Factors

Depending on the worldviews of authors, studies have attempted to attribute recycling behaviour to the influence of psychological factors. For instance, Table 2 above illustrates that recycling at work has been associated with the influence of many psychological factors from different authors' perspectives.

Using the TPB, Cheung, Chan and Wong (1999) observed that attitudes and norms accounted for about 52.6% variance in behavioural intentions to recycle paper on university campus while perceived behavioural control was reported to influence behaviour rather than intentions. In a similar study, Largo-Wight et al. (2012) showed that 50% of variance in recycling intentions was accounted for by the constructs of the TPB. This suggests that

attitudes, subjective norms, and perceived behavioural control are strong predictors of recycling intentions while perceived control has the capability to predict behaviour without the mediation role of intentions. These findings are corroborated by Wan et al. (2012) who observed a strong influence of attitudes, subjective norms, and perceived behavioural control on behavioural intention. While attitudes and perceived behavioural control have been observed to be strong predictors of intention (Largo-Wight et al., 2012; Wan et al., 2012), intention is considered as a proximal antecedent of behaviour (Park, Levine, & Sharkey, 1998; Prestin & Pearce, 2010; Wan et al., 2012). These findings were consistent with Ajzen's (1991) TPB on the roles of attitudes, subjective norms, and perceived behavioural control.

However, people's positive attitudes and intentions to recycle at work can be negated by a lack of control and responsibility which may in turn diminish their recycling behaviour. For instance, recycling has been reported as being the least of people's priorities at work (Hansen et al., 2008) despite respondents declaring strong or positive recycling attitudes, intentions, and having recycled in the past (Marans, Lee, Guagnano, & De Young, 1992; Tudor et al., 2007b).

Although psychological variables are linked to recycling behaviour, studies (such as Chung & Leung, 2007; Chung & Poon, 1994; Tudor et al., 2007a) observed discrepancies between what people profess they do (in terms of their attitudes and verbal commitment) and what they are actually doing (in reference to the actual recycling behaviour). In support of these findings, Brooks, Foy, Purnell, Smith, and Wiggins (2011) revealed a gap between self-reported and actual recycling behaviour of university students in the USA. Equally, people's newly acquired attitudes may wear off while the old habit returns (Humphrey et al., 1977) which may consequently affect their recycling behaviour especially when situations are perceived to be problematic or difficult to recycle.

While studies (such as Wan et al., 2012; Kelly et al., 2006; Largo-Wight et al., 2012) have reported the influence of perceived control on recycling at work, Largo-Wight et al.

(2013) demonstrated how perceived control can be enhanced using external factors. According to Largo-Wight el al. (2013), provision of additional bins for recycling was reported to increase perceived control over recycling without any other interventions such as an educational campaign. This was supported by O'Connor, Lerman, Fritz and Hodde (2010) who observed that recycling bins located in proximity to consumption areas were more effective even without any additional information, signage, or prompt. However, these findings should be interpreted cautiously given that the level of awareness was high among the university community due to the presence of an existing recycling scheme prior to O'Connor et al.'s experiment. In addition, the introduction of new recycling bins may serve as a prompt/nudge towards recycling and activate recycling beliefs (including concerns and/or attitudes). Nevertheless, ease of recycling (proximity and convenience) may probably enhance recycling behaviour by increasing the perception of control over recycling as well as influencing other psychological traits such as attitudes, beliefs, and intentions.

In addition, recycling at work has been associated (see Prestin & Pearce, 2010; Price & Pitt, 2012; Tudor et al., 2007a) with people's beliefs in terms of environmental values and benefits. According to Price and Pitt (2012), people's belief system about the environmental benefits of recycling is a strong predictor of recycling at work. This may probably reflect the residual contribution of perceived control considering that pro-environmental (and recycling) attitudes can be so pervasive that social actors often fail to recognise their existence until they are activated by situational cues (such as recycling bins and prompts). However, beliefs about the importance of recycling may not necessarily translate to recycling at work (McCarty & Shrum, 1993). This is probably due to the residual effects of situational or personal factors that may impede the translation of beliefs to recycling at work. For instance, Price and Pitt (2012) have shown that the effect of convenience (such as bins location) rather than that of beliefs on recycling behaviour was stronger.

3.3.1.3 Personal Factors

In a similar vein, personal factors have been shown to predict and explain recycling behaviour at work although the effects of personal factors seem to be subjective. These factors include social status (Park et al., 1998), knowledge (Chung & Poon, 1994; Kaplowitz et al., 2009), monetary incentives (Clay, 2005; Luyben & Cummings, 1981), past behaviour (Cheung et al., 1999; Goldenhar & Connell, 1991) and type/volume of recyclables (McDonald, 2011; Tudor et al., 2007a).

On the one hand, people are likely to recycle at work when they feel satisfied with their jobs as well as their organisations which may intrinsically motivate people to support (eco-helping) their organisations' pro-environmental initiatives (see Paillé, Chen, Boiral, & Jin, 2014; Paillé, Boiral, & Chen, 2013). Although the influence of job satisfaction on recycling behaviour at work has not been empirically examined, the construct has been reported as an antecedent of organisational citizenship behaviour for the environment (see Boiral, Talbot, & Paillé, 2015; Paillé et al., 2014). For instance, a perception of job satisfaction has a significant influence on employees' eco-initiatives and eco-helping behaviour when at work (Paillé et al., 2014). This suggests that people that are satisfied with their job are more likely to set-up or champion a recycling scheme as well as assisting their colleagues when confused with the idea of recycling.

On the other hand, people may derive a sense of personal satisfaction or benefits when intrinsically motivated to recycle which could consequently enhance their recycling at work. According to Lee and De Young (1994), intrinsic satisfaction is not only a determinant of recycling but can also be derived from performing recycling at work. Also, Lee et al. (1995) argued that intrinsic satisfaction may diminish the predictive capabilities of financial incentives. In other words, people may derive satisfaction from recycling which may consequently reinforce their recycling at work although what initially instigated recycling behaviour at work may be unknown. As a result, it is empirically challenging to attribute

recycling behaviour at work to a sense of personal satisfaction although its contribution may be explained in terms of "warm-glow" (see Andreoni, 1990) and "ecocentric" (see Dunlap, Van Liere, Mertig, & Jones, 2000) effects. Whether people derive satisfaction from engaging in recycling or not, people may recycle when they are personally committed to recycling at work (Chung & Poon, 1994; Lee et al., 1995).

To stimulate recycling at work, incentive-based interventions have been adopted and investigated by different authors. According to these studies (such as Hamad, Cooper, & Semb, 1977; Luyben & Cummings, 1981), interventions (such as financial rewards and feedback) are effective in stimulating recycling behaviour. Also, Prestin and Pearce (2010) observed that incentives (individual and group) are one of the factors that can enhance recycling among school students. This is contrary to other studies (such as Lee et al., 1995; Marans & Lee, 1993) that observed a significant negative association between monetary rewards and personal commitment to recycling at work. Nevertheless, recycling behaviour is likely to return to the baseline after the reinforcements are discontinued (Chung & Poon, 1994; Largo-Wight et al., 2013; Witmer & Geller, 1976), meaning that incentives may lack the utility to sustain recycling behaviour.

In addition, the introduction of financial incentives may likely attenuate people's sense of moral obligation to recycle at work. Although past recycling experience is expected to predict future recycling behaviour, especially when environmental concern is high (Berger & Kanetkar, 1995), the introduction of monetary rewards within a workplace may discourage people from recycling. For example, studies (such as Clay, 2005; Lee et al., 1995; Marans & Lee, 1993) have shown that monetary rewards are not enough to encourage recycling at work. If introduced, monetary incentives may crowd-out the effects of moral obligation, personal commitment, and intrinsic satisfaction derive from engaging in recycling at work. This suggests that recycling at work is a purely altruistic and voluntary behaviour which may be rooted in how people at work perceive their organisations and their relationships with those organisations. Nevertheless, schemes can be incentivised using performance feedback

or personal recognition (Prestin & Pearce, 2010; Katzev & Mishima, 1992) as well as making donations to a selected charity on behalf of a best performer.

However, benefits (incentives) are not restricted to financial or monetary rewards alone and can be probably interpreted as intrinsic satisfaction for engaging in recycling at work (De Young, 1996; Lee et al., 1995). Although non-recyclers may be persuaded by monetary incentives (Prestin & Pearce, 2010), recycling at work goes beyond the extrinsic motivations such as personal rewards. Rather than using monetary rewards/penalties, other low-cost extrinsic incentives such as information, prompts, or signage that can increase scheme awareness and recycling knowledge should be adopted when designing a scheme.

3.3.1.4 Situational Factors

It can be seen in Table 2 above that different situational factors many of which are external to social actors when at work have been investigated and documented in the literature. These factors include environmental benefits (Kelly et al., 2006; Price & Pitt, 2012; Tudor et al., 2007a, 2007b), feedback (Goldenhar & Connell, 1991; McCaul & Kopp, 1982); goal setting (Hamad et al., 1980; McCaul & Kopp, 1982), and information/signage (Austin et al., 1993; Chung & Poon, 1994, Elfithri et al., 2012; Hansen et al., 2008; Humphrey et al., 1977; Kaplowitz et al., 2009).

In addition, infrastructure (Andrews et al., 2013; Williams, 1991), organisational commitment (Kalsher et al., 1993; Lee et al., 1995); prompts (Ludwig et al., 1998; Price & Pitt, 2012), and proximity (Austin et al. 1993; Brothers, Krantz, & McClannahan, 1994; Ludwig et al., 1998) have been reported to influence recycling at work.

Although the contribution of organisational commitment has been independently investigated (such as Humphrey et al., 1977; Lee et al., 1995), many situational factors illustrate the extent to which organisations are committed to recycling. For instance, installation of recycling scheme as well as provision of bins suggest that organisations are doing their bit to encourage recycling. As a result, the presence of recycling programs or

structured recycling schemes may likely have a profound effect on recycling behaviour at work. For example, workers in organisations with a structured scheme were reported to be more active in recycling compared to organisations without an established recycling initiative (Lee et al., 1995; Marans & Lee, 1993). According to Marans and Lee (1993), workers in private organisations with recycling programs are more likely to recycle compared to workers in the public sector with recycling schemes. One possible reason could be that people (or employees) in the private organisations are intrinsically motivated to set-up and sustain recycling practices compared to the public organisations where recycling schemes are the responsibility of management/executive.

Also, office layout (Lee et al., 1995; Marans & Lee, 1993) including the physical arrangement of recycling bins (Brothers et al., 1994; Marans & Lee, 1993; Humphrey et al., 1977) has been observed to contribute significantly to recycling behaviour at work. As a result, workers are more likely to recycle when they perceive that their work spaces facilitate recycling and may suggest the positive influence of convenience (or ease of recycling) on behaviour. On the one hand, office layout determines the location as well as the proximity of collection bins including their accessibility which can be perceived to be in/convenient.

Therefore, container proximity (Brothers et al., 1994; Penpece & Celik, 2011) as well as the availability, adequacy and appearance of those containers (Andrews et al., 2013; Witmer & Geller, 1976) has been attributed to increased recycling at work. While the appearance of the bins may be attractive, the proximity of the bins can reduce personal efforts (time and cost) which may consequently motivate infrequent recyclers (Price & Pitt, 2012) or non-recyclers (Lee et al., 1995) to engage in recycling. On the other hand, the arrangement of bins within an office environment is a function of available space and office layout. As observed from different experimental findings (such as Andrews et al., 2013; Brothers et al., 1994; Witmer & Geller, 1976), bin arrangement reduces the possibility of contaminants and/or cross-contamination. For example, Humphrey et al. (1977) observed that the quality of recyclables increased to about 90% when a two-bin (trash and recyclable) system was

introduced and situated side-by-side. This was corroborated by Kalsher et al. (1993) that observed an increase in the quantity and quality of materials when receptacles were set side-by-side.

Although the installation of recycling bins in proximity to consumption areas increases the quality and quantity of materials, behaviour may be attenuated following the termination of interventions (see Ludwig et al., 1998). On this basis, designing a scheme that is attractive as well as durable in sustaining recycling behaviour at work remains the biggest challenge for waste planners. Nevertheless, waste planners should ensure that containers are arranged in proximity to enhance the quality of recyclables especially when implementing a segregated collection scheme as supposed to be practised in UK workplaces (see Section 2.3.2).

In order to provide recycling cues/nudges, prompts and/or signage has been used in proximity to receptacles at work. The provision of signage is not only increasing awareness and knowledge of recycling, it serves as a reminder of what, where, and how to recycle (Austin et al., 1993; Price & Pitt, 2012). Accordingly, prompts may provide an impetus to recycling at work and its rate is likely to be further increased when prompts are on display in proximity to receptacles.

Also, prompts/signage provide additional motivation for people to engage in the scheme process, to disseminate information on the environmental benefits of recycling, to provide feedback on the organisation's recycling performance as well as demonstrating the organisation's commitments. Although no single communication strategy is more effective in its own right in influencing recycling at work (Kalsher et al., 1993; Kaplowitz et al., 2009), a combination of different approaches that is tailored to a specific recycling issue may suffice (Oke & Kruijsen, 2016). As a result, there is a likelihood that more people will engage in recycling at work when they are aware of what, where, and how to recycle (Prestin & Pearce, 2010; Price & Pitt, 2012).

Therefore, situational factors may result in a perception of control and can activate people's psychological traits which may in turn influence their recycling behaviour. For example, Duffy and Verges (2009) observed an increase in the quality and quantity of dry recyclables when bins were re-modelled by incorporating lids as well as changing the bins' appearance. This was contrary to Kelly et al. (2006) who observed no correlation between the type of recycling bins and recycling behaviour. Although these two studies were both conducted within academic environments, differences in countries and data collection methods may be responsible for the observed disparity in these findings.

3.4 Organisational Citizenship Behaviours for the Environment (OCBE)

The concept of organisational citizenship behaviour (OCB) which is construed as employees' voluntary and discretional action (Smith, Organ & Near, 1983; Organ, 1997) has been introduced (such as Boiral, Talbot & Paillé, 2013; Norton et al., 2015; Ones & Dilchert, 2012b) in explaining pro-environmental behaviours at work. Although findings of these studies suggest that the tenets of citizenship can enhance pro-environmental behaviours at work, different labels have been used by different authors in conceptualising what constitutes OCB regarding the environment. These include environmental organisational citizenship behaviours (Boiral, 2009); organisational citizenship behaviours for the environment (OCBE) (Paillé, Boiral & Chen, 2013); organisational citizenship behaviours toward the environment (Lamm, Tosti-Kharas & Williams, 2013); or employee green behaviours (EGB) (Norton et al., 2015; Ones & Dilchert, 2012b).

Contrary to OCB that is focusing on the organisation as an entity, OCBE is addressing only the organisation's environmental aspects (both direct and indirect). Accordingly, OCBE is construed as individual, voluntary, informal, and discretional pro-environmental initiatives without any formal reward or recognition (Boiral, Talbot & Paillé, 2013; Lamm, Tosti-Kharas & Williams, 2013). For example, initiating a car sharing scheme in an organisation by employees may be classified as an act of environmental citizenship.

Nonetheless, many initiatives, such as recycling, at work are informed by organisations and/or government's environmental policies which may motivate employees' decisions to set-up and engage in such behaviour. Although employees may decide to not/participate in the scheme, a fundamental question is whether behaviours that are underpinned by the organisations' policies and/or institutional requirements should be classified as voluntary/discretional. Therefore, contributions of OCBE in promoting pro-environmental behaviours such as recycling may be limited due to the existence of external factors such as legislation, institutional, and other stakeholders' requirements.

The fact that many organisations around the world are implementing environmental management systems to achieve competitive advantage (Daily & Huang, 2001) and other strategies in compliance with different environmental obligations, such as the IS0 14000 family, may undermine the contribution as well as the importance of voluntary/discretional initiatives at work. It is plausible to argue that not all pro-environmental initiatives, especially recycling at work, are discretional/voluntary in nature and not recognised by a formal reward system. For example, the introduction of Waste (Scotland) Regulations 2012 and Waste (England and Wales) Regulations 2011 as amended by the Waste (England and Wales) (Amendment) Regulations 2012 suggest that the preparation of individual item for separate collection is inevitable. The legislative requirements may be enforced by organisations in the UK which can attenuate the contribution of OCBE. Nonetheless, employees may perceive a lack of support and/or commitment to recycling from their organisations if the organisations fail to comply with the requirements.

In addition, organisations may introduce a reward system such as monetary incentives, recognition and/or awards for those who are participating in the scheme to encourage more participation and to comply with the regulation. Although the contribution of incentives (especially monetary incentives) in influencing behavioural changes is contentious as behaviours have been reported to return to baseline after the removal of incentives (see sub-section 3.3.1.3), incentives can potentially instigate recycling behaviour. Nevertheless,

organisations across the world engage in pro-environmental activities for different reasons and these may determine the extent to which such activities are facilitated at work. These include institutional and legislative requirements that are being imposed at local, national and international levels. Others may include stakeholders/shareholders' demand, market opportunity, financial gain, and ethical reasons.

There is a need to distinguish what constitutes voluntary employees' pro-environmental behaviours from institutional and/or organisational prescribed/imposed pro-environmental behaviours. This is a grey area in the literature as studies have completely ignored a detailed analysis regarding the distinction between voluntary and organisation-influenced behaviours (Boiral & Paillé, 2012). According to Bissing-Olson et al. (2013), voluntary employees' pro-environmental behaviours and organisations prescribed/imposed pro-environmental (task related) behaviours represent two distinct but related behaviours at work. These voluntary behaviours involve actions such as creating environmental awareness, sharing environmental knowledge and participating in personal development by attending environmental related training courses or conferences. Therefore, discretional and prescribed/imposed pro-environmental behaviours are likely to have different motivational roots as well as different barriers. Nonetheless, OCBE can be analysed at the institutional, organisational, leader, team, and employee (see Norton et al., 2015) levels for a better understanding of the factors that are perceived to be influencing OCBE.

3.4.1 Forms of OCBE at Work

Following its conceptualisation, 30 different forms of OCB are identified from the literature which are broadly classified into 7 different themes. According to Podsakoff et al. (2000), these include helping behaviour; sportsmanship; organisational loyalty; organisational compliance; individual initiative; civic virtue; and self-development. On the contrary, Ones and Dilchert (2012b) sub-classified employee green behaviours into five categories: avoiding harm; conserving; working sustainably; influencing others; and taking

initiative. While many authors have adopted different taxonomies to explain similar pro-environmental behaviours at work, the original dimensions (altruism and generalise compliance) previously identified by Smith, Organ and Near (1983) encompass all the recent classifications.

The disparities in the classifications of OCBE and/or employee green behaviours may lead to conceptual confusion and could be challenging to operationalise through empirical research. Nonetheless, OCB is observed to be directed towards and assessed at individual level (OCB-I) and/or at organisation level (OCB-O) (Williams & Anderson, 1991). While OCB-O is understood to benefit organisations, OCB-I is construed as a form of discretional behaviours that only benefit certain individuals and on aggregate contribute to organisational efficiency and effectiveness.

Considering that OCBE is modelled after OCB, it is logical to hypothesise that various forms of OCB qualify as automatic candidates of OCBE whilst the conceptual framework being adopted to examine OCB could be beneficial in understanding OCBE. On the contrary, empirical studies (such as Lamm, Tosti-Kharas & Williams, 2013; Paillé & Boiral, 2012) have distinguished OCBE from OCB suggesting that OCBE is not an integral/derivative of OCB but rather grounded in a similar framework as OCB (Paillé & Boiral, 2012). This is based on the perception that OCBE is more specific in comparison to OCB (Lamm, Tosti-Kharas & Williams, 2013) and may not be completely explained by OCB which is a broad construct (Paillé & Boiral, 2012).

Using the tenets of OCB, this research offers support to Boiral & Paillé's (2012) classification of employees' pro-environmental actions otherwise known as OCBE (Figure 2). This is based on the observation that these classifications encompass behaviours such as helping, sportsmanship, organisational loyalty, individual initiate and self-development which could provide a better understanding of pro-environmental, recycling, behaviour at work.

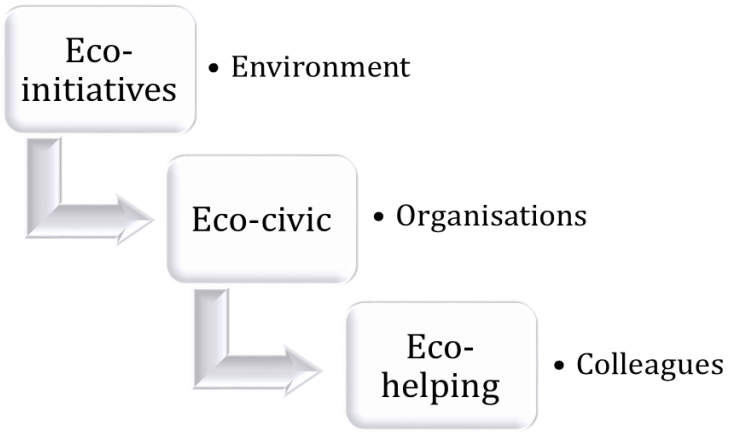


Fig. 2: Dimensions and the principal targets of OCBE (adapted from Boiral & Paillé, 2012)

Each of these behavioural dimensions is discussed in the next section to understand how they fit into the general spectrum of pro-environmental initiatives/behaviours at work.

3.4.1.1 Eco-initiatives

Eco-initiatives have been conceptualised as a form of voluntary behaviours that involve employee(s) driven actions directed towards and addressing environmental issues (see Figure 2), such as waste, to reduce organisations' environmental effects. Eco-initiatives include any form of environmental suggestion or idea that is beyond the formal contractual role of employees and not recognised by the formal reward system of an organisation (Boiral & Paillé, 2012; Paillé & Boiral, 2013). These involve employee's creativity and innovation towards the improvement of the environment and synonymous to what Podsakoff et al. (2000) labelled as individual initiative. For instance, eco-initiatives at work including suggestions such as double-sided printing, purchasing of water/energy efficient products, or a car sharing scheme are addressing organisations' environmental problems, eco-efficient product design, and environmental impacts. According to Ramus and Steger (2000), eco-initiatives are not dependent on organisation's size or employees' position, however, eco-initiatives may require a substantial amount of managerial and/or organisational support. In practice, eco-innovations are the outcomes of employees' competency, skills, training, experience and/or direct observation from other settings, such as recycling at home.

To empirically measure eco-initiatives, three different items (scales) have been developed and validated by Boiral and Paillé (2012). While these items have been validated (see Boiral & Paillé, 2012; Paillé & Boiral, 2013 for a review), it is unclear whether the measurement scale could be adapted to a more specific pro-environmental behaviour such as recycling. The scales are observed to be too broad, focus on general pro-environmental initiatives, and not sufficiently capture specific environmental issue(s) at work. However, organisational commitment including managerial support may enhance employees' self-efficacy that may contribute to employees' decision to eco-initiate.

Whatever the scale and scope of eco-initiatives at work, employees are more likely to exercise innovative ideas in terms of environmental behaviours when there is a certain degree of perceived control through organisational commitment and management support. While organisational commitment as well as managerial support suggests that employees' eco-initiatives are valued, more empirical studies on specific environmental initiatives are required to further validate the eco-initiatives scales.

3.4.1.2 Eco-civic engagement

Unlike eco-initiatives that focus on environmental concerns/issues, eco-civic engagement is directed toward organisations to improve their environmental performances. It encompasses the acts of protecting and defending (Podsakoff et al., 2000) the organisations' environmental culture, initiatives and/or interests. This involves employees' participation in different activities such as training, town-hall meetings, events and/or schemes that are pro-environmental. Eco-civic engagement is described as the employees' participation in company's organised activities (Lamm, Tosti-Kharas & Williams, 2013) that may involve personal cost (such as effort, time, and money) on the part of employees (Podsakoff et al., 2000). For eco-civic engagement to be activated, employees should be aware of different pro-environmental initiatives (eco-initiatives) within their organisations (Boiral & Paillé, 2012).

On the other hand, eco-civic engagement is analogous to civic-virtue which is a form of OCB that defines the willingness of employees in developing a macro-level interest and commitment to organisations by participating in organisations' activities including their governance process (Podsakoff et al. 2000). For example, an employee could demonstrate eco-civic behaviours by supporting an organisation's environmental management system in compliance with the ISO 14000 family of standards that provides practical tools and guidance for companies to effectively manage their environmental responsibilities.

While eco-initiatives instigate pro-environmental schemes, ideas, and/or suggestions, eco-civic engagement endorses voluntary/discretional participations in such eco-initiatives. As a result, employees' support/commitment is required through their eco-civic engagement in the organisations' environmental initiatives. This provides opportunities for employees to demonstrate their loyalty and commitment to organisational strategic goals in terms of the organisations' environmental practices and governance. The tendency of employees' participation in environmental initiatives at work is high when they are strongly committed (Daily, Bishop & Govindarajulu, 2009) and/or satisfied with their organisations (see sub-section 3.3.1.3). Therefore, a social system may be required in promoting shared understanding, norms and integration of people at work for an effective participation in environmental initiatives at work through eco-civic engagement. The existence of social norms, mutual understanding, collaboration, and support may serve as a lever in promoting pro-environmental behaviours, such as recycling, at work.

Nevertheless, the likelihood of employees' participation in eco-civic behaviours may be reduced when organisations failed to demonstrate their commitment/support to pro-environmental initiatives. The construct has been associated to affective commitment of employees to organisations (Paillé, 2010) and demonstrate emotional attachment or relationship to organisations. To measure the construct, statements such as "I actively participate in environmental events organized in and/or by my company; I stay informed of

my company's environmental initiatives" have been proposed (see Boiral & Paillé, 2012 for a review).

3.4.1.3 Eco-helping

Eco-helping is voluntary and discretional actions in assisting other employees in understanding and/or engaging in certain environmental practices, such as source-segregation of waste. The construct is synonymous to helping (Podsakoff et al., 2009) or interpersonal helping (Podsakoff et al., 2000) behaviour that is directed at preventing the occurrence of work related problems (Podsakoff et al., 2000; 2009). For example, an employee may assist a colleague in putting correct materials, such as paper waste, in their designated bins. As illustrated in Figure 2 above, the behaviours are directed toward colleagues at work with an intention of improving the organisations' eco-initiative, such as recycling, whilst enhancing eco-civic engagement in such initiatives at work.

On the aggregate, these combined efforts would eventually contribute to organisations' environmental performance and improvement. According to Boiral and Paillé (2012), eco-helping is an unsolicited willingness of an employee or a group of employees in encouraging or assisting colleagues to better engage in organisations' environmental initiatives. Such behaviours include assisting co-workers to understand what goes into what when recycling waste at work especially in the UK where it is mandatory for businesses to prepare waste for separate collections. This voluntary helping behaviour will assist co-workers in understanding how to prepare waste for recycling and prevent organisations in diverting valuable resources away from landfill sites.

As a result, eco-helping is a transactional (or exchange) process that is facilitated by situational factors and involves two or more parties (for instance, employee 1: with knowledge/skills; and employee 2: lack of knowledge/skills). This involves the willingness or acceptance of the responsibility by "group/employee 1" to assist co-workers. Also, there is a willingness of "group/employee 2" to accept the offer/opportunity of being helped. When

these conditions are achieved, eco-helping could be perceived as a voluntary, non-obligatory effort from the parties involved.

This may facilitate interpersonal relationships at work while contributing to overall environmental goals of the organisations by enhancing their pro-environmental performances. According to Podsakoff et al. (2009), eco-helping behaviours could enhance team cohesion and productive interpersonal relationship that could contribute to effective functioning of organisations. To empirically measure eco-helping, items such "I encourage my colleagues to adopt more environmentally conscious behavior; and I encourage my colleagues to express their ideas and opinions on environmental issues" were developed and validated (Boiral & Paillé, 2012). On this basis, eco-helping is a discretionary (Smith, Organ & Near, 1983) and voluntary (Podsakoff et al., 2000) behaviour rather than mandatory or coercive behaviour that could be detrimental to the success of the organisations' pro-environmental initiatives.

Having established different forms of OCBE, the fundamental challenge is to differentiate the constituents of voluntary-based pro-environmental behaviours at work from role-related pro-environmental behaviours at work. Also, it could be theoretically and empirically acceptable to determine when voluntary actions translate to role-related behaviours. This is a major concern considering that OCBE is still a theoretical construct that requires further empirical studies for its validation (Boiral, Talbot & Paillé, 2013). Nevertheless, the concept of OCBE is attracting increasing interest and is observed to be gaining acceptance from the research community although there is a dearth of research investigating the linkage between OCBE and a specific pro-environmental behaviour at work. An exception was a study conducted by Lamm, Tosti-Kharas and Williams (2013) that examined OCBE in relation to eight different pro-environmental behaviours. Although Lamm, Tosti-Kharas and Williams (2013) addressed OCBE towards specific pro-environmental behaviours, Boiral, Talbot and Paillé (2013) argued that the approach does not fully account for all the dimensions of OCBEs and not address the complexity of environmental issues. This research argues that the

operationalisation of OCBEs regarding specific pro-environmental practices, such as recycling, would be more potent compared to general pro-environmental initiatives.

3.5 Recycling Behaviour: The Spillover Effects

Having established what could influence recycling behaviour at home and at work (see Sections 3.2.1 and 3.3.1), it becomes imperative to identify the relationship(s) between the two contexts with regards to spillover of recycling from home to work. As observed from previous studies (such as Barr et al., 2011; Berger, 1997; Tudor et al., 2007a), there is a dearth of evidence concerning spillover of pro-environmental behaviour (Wells et al., 2016), especially recycling, from one context to another. As a result, the present knowledge about how behaviour is framed and performed in other settings, particularly at work is inadequate (Paillé & Boiral, 2013; Thøgersen & Crompton, 2009).

Nonetheless, studies (such as Barr et al., 2010; Berger, 1997; Thøgersen, 1999, 2004; Thøgersen & Ölander, 2003; Wells et al., 2016) have attempted to explain spillover effects although there seems to be a lack of consensus on how behaviour could translate from one context/domain to another. For example, Barr et al. (2010) reported negative spillover effects from home to holiday settings while Dolnicar and Grün (2009) observed both positive and negative spillover from home to vacation contexts. Also, Wells et al. (2016) observed non-significant effects of pro-environmental behaviours (water and energy) at home on similar behaviour at work. These studies suggest that pro-environmental behaviours are less likely to be performed when people are away from home, especially at work or on vacation.

The lack of consensus on the spillover effects may be associated with the different behavioural domains (such as waste recycling) and contexts (for instance home, workplace, parks and holiday destinations) that have been investigated by various authors. Also, it is observed that many of these studies examined the past-target behaviour link on different levels of specificity (De Young, 1990; Pickett et al., 1993). For instance, findings (such as Barr et al., 2005; Littleford, Ryley, & Firth, 2014; Poortinga, Whitmarsh, & Suffolk, 2013;

Thøgersen, 2004; Whitmarsh & O'Neill, 2010) suggest that spillover requires specificity in terms of similar taxonomic categories. This was supported by studies on recycling (such as Lee et al., 1995; Marans & Lee, 1993; Tudor et al., 2007a) that reported a positive spillover from home to work for a specific material (such as paper) that is common in both contexts. Also, a positive association (although insignificant) between materials been recycled at home and university was observed, however, it was observed that the research subjects recycled less on campus compared to their home context (Clay, 2005).

Also, the observed disparity in findings suggests that pro-environmental behaviours at work are different from home (see Andersson et al., 2005; Biswas et al., 2000; Lee, 1995) and one possible explanation lies in these contexts having different motivational roots (Thøgersen, 2004). While people may feel a sense of moral obligation to undertake pro-environmental behaviours (De Groot & Steg, 2009; Thøgersen, 2004) such as recycling at home, there may be no tendency for similar obligations outside the home settings, particularly at work. For instance, people at home experience the direct impacts of their actions unlike when they are away from home (Dolnicar & Grün, 2009) or at work (Wells et al., 2016). As a result, the direct cost of waste management at home is borne by householders unlike at work where it is considered to be the responsibility of their organisations. On the other hand, people may feel morally obliged to recycle at home, however, such moral obligation may not be activated when away at work due to the work setting (a new context) that can make old norms untenable (see Stern, 2000).

On the contrary, Andersson, Eriksson and Borgstede (2012) observed that the introduction of an environmental management system (EMS) has a positive effect on waste separation behaviour at home and at work, based on the evidence from two organisations in Sweden. While the study reported a positive spillover effect from work to home due to the introduction of an EMS at work, the evidence is less reliable given that the type of waste investigated in both contexts was not reported and Swedish Waste Management data indicated that about 98.6% of household waste is already recycled in Sweden (see Avfall

Sverige, 2010). This was supported by Miliute-Plepiene and Plepys (2015) who observed a positive correlation between food waste separation behaviour and the sorting of waste at home in Sweden suggesting that waste separation is a mundane and normalised activity in Sweden. Nonetheless, Andersson et al. (2012) claimed that the introduction of environmental management system (EMS) at work had a significant influence on waste separation behaviour at work and consequently influenced waste separation at home. According to Paillé and Raineri (2015), there is a positive predisposition for people at work to feel supported and consequently perform pro-environmental behaviours when there is an installation of an EMS in their organisations. In other words, the presence of an EMS may indicate that organisations are committed to pro-environmental initiatives, such as recycling, and this could be considered by employees to be a form of organisational support.

Also, studies (such as Tudor et al., 2007a; Lee et al., 1995) observed a positive spillover from home to work with regards to waste paper only although Tudor et al.'s (2007a) study focused on a single organisation. In addition, Ofstad, Tobolova, Nayum, & Klöckner (2017) observed that a waste separation habit is likely to remain stable from home to a university context. Although Ofstad et al.'s (2017) study is not addressing the spillover of waste separation behaviour, the study suggests that those who have the habit of waste separation at home are more likely to develop a similar habit in the university context. Therefore, the specificity of behaviour (Tudor et al., 2007a; Lee et al., 1995) coupled with organisational support, such as the introduction of EMS (Andersson et al., 2012), may be responsible for the observed spillover effects found in some studies.

Although findings on spillover effects are contradictory, target behaviour is more likely to be facilitated by the past-experience (Marans & Lee, 1993). Nevertheless, it is evident from the literature that spillover effects of pro-environmental behaviours across domains/contexts depend on how dis/similar the behaviours are perceived to be (Thøgersen, 1999; Thøgersen & Ölander, 2003). Although this proposition may be valid to a certain degree, it assumes a subjective construction of pro-environmental behaviours but overlooks

the influence of situational factors such as organisational support. As a result, people that persistently recycle at home may be less inclined to engage in a similar behaviour outside their home setting (Barr et al., 2011), particularly at work due to effects of situational factors or conflicting personal norms. Therefore, there is likelihood for personal norms and situational factors to have both direct and indirect effects on recycling at work.

3.6 Chapter Summary

The field of recycling has produced a plethora of studies although this review shows that efforts aimed at increasing recycling have been focused on a particular context. As a result, two strands of research are presented in this review. It demonstrated that research on recycling behaviour has focused extensively on home settings compared to other contexts especially on the workplace. Nonetheless, different factors that are likely to enhance recycling in both contexts are identified from different sources and presented separately in this review.

While there is little or no consensus among researchers on how recycling can be enhanced (see Miafodzyeva & Brandt, 2013; Oke, 2015; Osbaldiston & Schott, 2012), this review argues that recycling behaviour is influenced by socio-demographics, psychological, personal, and situational factors. This is consistent with the Young et al.'s (2015) review of experimental studies on pro-environmental behaviours at work, factors influencing behaviours at work including awareness, feedback, incentives, environmental infrastructure, and management support. These factors can each exert an independent influence on behaviour, however, their interaction effect may likely attenuate their independent effects on recycling behaviour. For instance, personal and psychological factors may interact with situational factors to the extent that the influence of personal or psychological factors is distorted.

As a result, the understanding of how situational factors can be manipulated may possibly enhance recycling irrespective of people's personality and psychological traits. The strategies that will improve recycling at work should address/focus more on combination of

personal and situational factors which may consequently influence an existing organisation's culture/norms on waste management. Rather than relying on the analysis of individual factors as has been done in the past, the resulting interdependent relationships could be depicted and better analysed in SEM (Arbuckle, 2016; Byrne, 2016) and Haye's (2013) PROCESS macros which has the capability to sub-categorise people into different clusters with regards to their scores on the personal/psychological and situational attributes.

As previously mentioned, this section is crucial to this present research as it provides a glimpse to recycling at home and its relationship to recycling at work including factors underpinning recycling in both settings. In the next chapter, the methodology and the design approach as well as the philosophical assumptions underpinning this research are discussed and presented to provide a basis for the data collection process.

Chapter 4 Research Methodology and Design

4.0 Introduction

This chapter describes plans and procedures starting from the research assumptions, research methodology and research designs employed to explore and explain recycling behaviour at home and at work including the relationships between them. As a result, an overview to pragmatist philosophical assumptions that underpin this research for a better understanding of recycling at work is presented.

The intention of this section is to provide a philosophical foundation and framework to guide the on-going research on workplace recycling behaviour. In addition, it seeks to explain the decision for the selection of the research methods (data collection and analysis). This decision is based on the purpose, objectives, and the research questions that this research seeks to address.

4.1 Assumptions Underpinning this Research: Pragmatism

Historically, scientific research is perceived to be rooted in a specific research philosophy that governs the practice of such research (Bryman, 2015; Creswell, 2013). As a result, research philosophy is widely embraced among the members of research communities to guide the ways in which social and behavioural sciences studies are conducted, analysed, and presented (Bryman, 2015; Creswell, 2014).

While research is not completely driven by theory (Bryman, 2015) or theoretical frameworks (Creswell, 2014); theory may serve as a product of a research process (Creswell, 2014; Hennink, Hutter, & Bailey, 2011). This implies that research may be conducted abductively (when unanticipated trends/patterns emerge from the data), deductively (when theory guides research), or inductively (when theory is derived or generated from the data) as depicted in Figure 3.

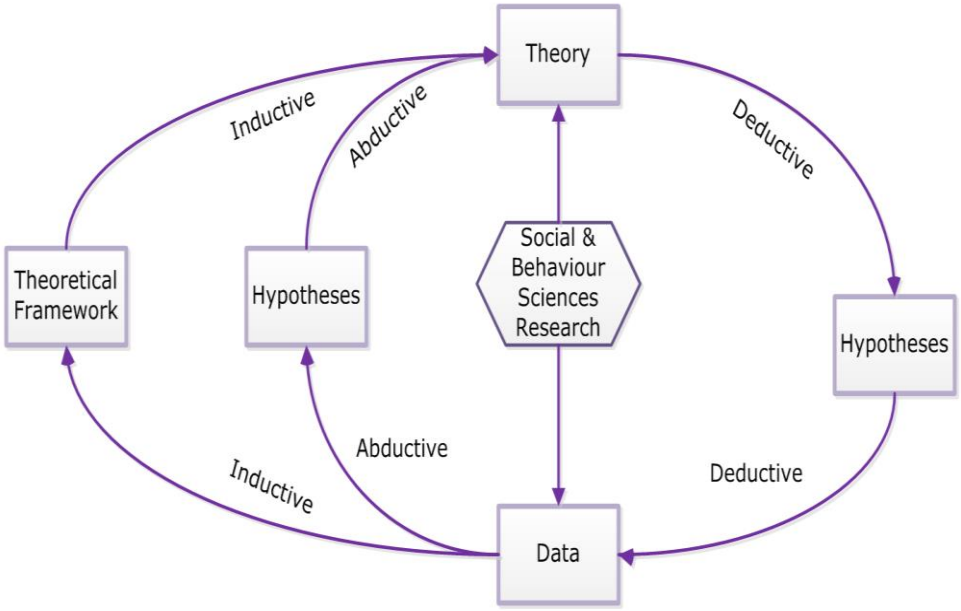


Fig.3: Social and behavioural Sciences Research Approach (Source: Author)

Therefore, theory (whether abductively, deductively, or inductively generated) is perceived to be enshrined within a research philosophy (Bryman, 2015; Teddlie & Tashakkori, 2003) and may be associated with the ways social and behavioural scientists envision and interpret social realities.

As a result, different terminologies such as Worldviews (Creswell, 2013, 2014) or Paradigms (Teddlie & Tashakkori, 2003; Johnson & Onwuegbuzie, 2004; Morgan, 2007) are used to describe research philosophy. These explain assumptions concerning a reality, knowledge of that reality, and specific perspectives of understanding that reality. In simple terms, they explain the nature of reality including the relationship(s) between the researcher and that researched; the relationship between the knower and the known (Creswell, 1998; 2014). These may be broadly defined through ontological, epistemological (Bryman, 2015; Johnson & Onwuegbuzie, 2004), and methodological (Denzin & Lincoln, 2011) positions of seeing and understanding social phenomena such as waste.

While ontology is concerned with the nature of reality and argues whether that reality is independent of human interpretations (or conceptualisation), epistemology is focused on how we know that reality and explain the basis of that knowledge (Bryman, 2015; Creswell,

2014). For example, what is known (ontology), how (epistemology), and the process (methodology) of knowing what we know about waste could explain our understanding of waste and how we investigate people's behaviour towards waste. This is different from person to person, making the behaviour objective or subjective depending on that individual's perspectives and process of knowing.

These interpretations (subjectivity and objectivity) are associated with the ways in which the existing main-stream research communities in social sciences observe social phenomena. The positions underpin the nature of reality, the researcher's relationship with research participants, the investigation's value-laden features, and the research process itself (see Creswell, 1998). Philosophical assumptions (Creswell, 2014) are therefore explain researchers' values and orientations which may inform the nature, conduct, and findings of their research.

Therefore, qualitative researchers operate under the ontological assumptions that reality is subjective to social actors (Bryman, 2015; Creswell, 2014). This is in contrary to the underlying beliefs of quantitative researchers that posit no subjectivity but absolute objectivity in understanding a social reality (Johnson & Onwuegbuzie, 2004). In other words, the ontological perspective of quantitative research assumes that there is only one truth about a social phenomenon; a reality that occurs without the interaction of social actors (Bryman, 2015; Teddlie & Tashakkori, 2009). As a result, pragmatism can be instrumental in integrating these competing views (such as objectivity and subjectivity) of waste and recycling behaviour. Rather than focusing on the research methods, pragmatism prioritises the research questions and goals while adhering to the usage of multiple data collection methods (Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004). As a result, the abductive, deductive and inductive thinking are combined to understand the complexities and multiple perspectives of recycling and recycling behaviour at work.

To better understand the available philosophical assumptions in social sciences and to inform the decisions about philosophical assumptions, the competing views of a social reality are presented in Table 3, While the lists in Table 3 below are not all-inclusive, it illustrates that the number of philosophical assumptions that may guide the research process is extensive. However, positivism – the view that research can be conducted and interpreted in an absolute objective (Bryman, 2015) and value-free (Hennink et al., 2011) context is rejected in this research for its rigidity (see Teddlie & Tashakkori, 2009). This informed the decision to exclude positivism from Table 3 below. Nevertheless, this research considers the views of post-positivism which address positivism's shortcomings and reject the traditional notion of absolute truth (Hennink et al., 2011). Although positivism/post-positivism is understood to be more associated with quantitative research, its underlying principles may include some elements of theory validation (deductive) approach and theory derivation (inductive) strategy (Bryman, 2015).

Table 3: Contrasting views of research philosophical assumptions

Contrasting Factors	Post-positivism	Constructivism	Pragmatism	Transformative
Ontology	Singular reality, critical realism	Multiple, constructed realities (relativism)	Diverse: singular &/or multiple realities	Diverse: singular &/or multiple realities
Epistemology	Objective (modified dualist), critical community	Subjective (transactional), interpreted findings	Mixed: Objective + Subjective	Collaborative but guided by social justice
Methods	Quantitative, manipulative	Qualitative, manipulative critical multiplism	Mixed: QUAN + QUAL	Mixed: QUAN + QUAL
Axiology	Value-bound but controlled	Value-bound	Multiple dimensions	All aspects informed by social justice
Logic	Hypothetico-deductive: theory verification	Inductive: theory formulation	Mixed: hypothetico-deductive & inductive	Mixed: hypothetico-deductive & inductive
Causal linkages	Deterministic approach: causes influence effects	Causes are not discernible from effects	Causal effects: transitory & difficult to identify	Causal effects: through social justice structure

Rhetoric	Formal	Informal/casual	Mixed: Formal + Informal	Mixed: Formal + Informal
Generalisation	Refined nomothetic statements; emphasis on external validity	Ideographic statements; emphasis on transferability	Ideographic statements; emphasis on both external validity & transferability	Ideographic statements: focus on issues of social justice
Adapted from Creswell (2014); Teddlie & Tashakkori (2009); Guba & Lincoln (1994)				

In contrast to the positivist positions, post-positivists subscribe to the objective existence of social realities but acknowledge a value-laden research; they assume that researchers' values are important in research process. According to Bryman (2015), positivism/ post-positivism views are based on epistemological assumptions that the natural science approach should be applied when studying a social reality such as recycling. The logical question that may challenge this position is whether recycling behaviour can be assessed in the same manner as behaviours of elements, molecules, particles or electrons that exhibit specific patterns or orientations in accordance with natural laws of science. This may raise moral and ethical questions since humans are perceived to be rational thinkers who constantly evaluate, respond, and adjust to their natural environments.

In addition, pragmatism with its 'what works' concept emerged lately to challenge the incompatibility thesis and conceives that worldview elements can be integrated together in a single study especially when they possess similar axiomatic elements (Morgan, 2007; Teddlie & Tashakkori, 2009). This suggests that lines dividing worldview elements are blurred (Johnson, Onwuegbuzie, & Turner, 2007) which offers an opportunity for researchers to go back and forth seamlessly (Onwuegbuzie & Teddlie, 2003) during an investigation. Although different philosophical models are associated with social and behavioural science research, transformative (Mertens, 2010; Teddlie & Tashakkori, 2009) and pragmatic (Creswell, 2014; Howe, 1988; Johnson et al., 2007) philosophical assumptions are directly linked to mixed methods research. The Transformative paradigmatic stance focuses on the issues of social justice and human rights (Mertens, 2007; 2010) while pragmatic stance advocates "what

works" (Howe, 1988) as the truth regarding social realities (Tashakkori & Teddlie, 2010). According to Teddlie and Tashakkori (2009), the major distinction between pragmatism and the transformative paradigm is that the former focuses on the researchers' values while the latter uses social justice in constructing realities. Like pragmatic mixed methods research, no specific method is associated with transformative mixed methods research. Consequently, it consistently advocates for the involvement of a community (participants) throughout the research process (Mertens, 2010).

According to Mertens (2007, 2010), the transformative paradigm seeks to address issues of inequalities, social injustice, and violation of human rights but respect the existence of cultural norms. When situated within the context of workplace waste recycling behaviour, transformative paradigm may enhance the validity of a study by observing and acknowledging the presence of organisation norms in the research process. This allowed organisations under study to be part of the research process. Considering the nature of this research, a pragmatic approach is adopted although transformative lens is considered to address the effects of organisation citizenship, personal factors, organisation norms, and regulatory framework on waste recycling behaviour. The approach integrates both interpretivist and post-positivist paradigms (Johnson et al., 2007) as its epistemological position (Bryman, 2015). The rationale is to use multiple approaches to provide reliable answers to the research questions in order to produce stronger inferences (Denzin, 2010).

Although recycling behaviour can be objective such as either someone recycles or not, the investigator recognises that recycling behaviour can be subjective to different interpretation. For instance, donations of clothes to charity organisations may be classified by social actors as recycling, the researcher may conceptualise it as a re-use behaviour. As a result, the primary concern of this research is to understand how people subjectively perceived waste and recycling while using these subjective views of reality to inform the design of the objective measures of recycling behaviour at home and at work including their relationships. To coherently and logically answer the research questions, the investigator

subscribes to (and conducts this research within) the tenets of pragmatic philosophical assumptions based on the beliefs, inclinations, and practices within the mixed methods research community. The researcher believes that recycling knowledge and behaviour are shaped by the reality of the world where people experience and work (Johnson & Onwuegbuzie, 2004). Although an affiliation to a philosophical position may be a conscious or sub-conscious decision, research purpose and methodological preferences are considered when selecting this worldview. To justify the selection of pragmatic worldviews that fit the present research's purpose, questions, and methodological preferences, the contrasting elements of worldviews (Creswell, 2014) or paradigms (Teddlie & Tashakkori, 2009) are summarised and presented in Table 3 above.

Therefore, different assumptions in mixed methods research (especially that qualitative and quantitative methods can be combined in a single study (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005) serve as a frame of reference for this research. Also, the experience (such as training and membership of professional associations), thoughts, values, and research context are pivotal to the selection of pragmatisms philosophical assumptions and guide the entire research process. As a result, the main thrust of the epistemological lens of this research is its practicality while the researcher collects the required data by "what works" through a multi-stance approach that can address the research problem.

4.2 Research Methodology in Social and Behavioural Sciences

In social and behavioural sciences, research methodology defines the overall research process and is predominantly classified into qualitative and quantitative research methods. The dominance of these two research communities has resulted in a series of debates and disputes about supremacy that have lasted for more than a century (Johnson & Onwuegbuzie, 2004). The debate is understood to be philosophical in nature rather than methodological (Teddlie & Tashakkori, 2009; Krauss, 2005). This can be attributable to the influence and

implication of researchers' philosophical lenses (or assumptions) that is guiding their research processes (Bryman, 2015; Sale, Lohfeld, & Brazil, 2002).

As a result, mixed methods research emerged as an alternative to the dichotomies of these two traditional research methods (Teddlie & Tashakkori, 2009). However, qualitative and quantitative research methods should not be perceived as rigid dual oppositions (Creswell, 2014) but as a representation of dissimilar ends on a continuum (Johnson & Onwuegbuzie, 2004), where mixed methods research is construed to be situated somewhere in the middle of that continuum (Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2009).

In order not to confuse the logic of justification with research methods (Onwuegbuzie & Teddlie ,2003), it is not the intention of this section to reignite or engage in any paradigm debate but to provide a plausible premise for the mixed methods research as adopted in this research. As explained in Chapter 1, the main aim of this research is to explain the in/consistency between home and work regarding recycling behaviour. As a result, the decision to select a mixed methods approach for this research is informed by the researcher's background coupled with the nature of this research including the research problem, aim, and its objectives. These further resulted in the selection of pragmatic philosophical assumption guiding mixed methods research that can ensure the in-depth (depth and breadth) investigation of recycling behaviour in UK workplaces.

4.2.1 Qualitative Research

In contrast to quantitative research, qualitative research often adopts a narrative, interpretive, descriptive, and/or naturalistic (Denzin & Lincoln, 2011) approach to understanding social realities. Qualitative research is associated with inductive (Bryman, 2015) or abductive (Teddlie & Tashakkori, 2009) reasoning whereby data rather than existing theory or models dictate the entire research process. This is the approach adopted in this phase of the research where data rather than a theory guides the research process although existing theories are considered when developing the research's conceptual

framework. The rationale is to generate a theory or theoretical model (inductive logic) and/or hypotheses (abductive logic) that can be verified through the quantitative phase of this research. This provides an opportunity to develop a proximal relationship with the research data (see Sandelowski, 2000) by immersing deeply into the research contexts. In other words, the researcher steps into the research participants' natural world (workplace) to understand or make meaning out of their lived experiences (waste recycling).

In support of the pragmatic assumptions underpinning this research, the approach in this phase allows an in-depth investigation of recycling behaviour through the interpretation of research participants' views (see Creswell, 2014). That is, the investigator gathers specific data about recycling and constructed its meanings using the research participants' perspectives. Therefore, emergent rather than pre-determined (Bryman, 2015) questions that are generic and involve detailed descriptions of recycling are adopted to guide this process of inquiry (Morgan, 2007). Consequently, the intention of this qualitative phase is to achieve quality (depth) rather than quantity (breadth) of study. Therefore, the process is exploratory to gain an in-depth understanding and to make sense of people's subjective views of recycling behaviour (Bryman, 2015; Teddlie & Tashakkori, 2009) to inform the subsequent quantitative design.

4.2.2 Quantitative Research

Researchers within the quantitative research community primarily collect and analyse numeric data and are most likely to subscribe to a positivism/post-positivism worldview (Teddlie & Tashakkori, 2009).

Using quantitative research, different design options are available for a researcher and may include correlational research, survey research, experimental research, and quasi-experimental research (Teddlie & Tashakkori, 2009). These research options highlight the quantification of data collection and analysis that may involve a deductive approach (see Figure 3 above) and attempts to explain social phenomena using natural sciences' norms and

practices. Although data quantification is understood to be a major and unique attribute of quantitative research method, a deductive approach and objectivist position further differentiate the approach from other research methods (Bryman, 2015).

This approach allows researchers to use theoretical concept(s) or theory(s) to formulate hypotheses which are verified with empirical data collection and analysis (Hennink et al., 2011). However, testing for reliability, validity, generalisation or replication can be time consuming, ambiguous, difficult and may be less important in social settings compared to natural conditions (Bryman, 2015). On the other hand, selection of an appropriate research design can enhance the reliability and validity of this research by collecting and analysing high quality data.

Although quantitative research is receiving continuous criticism for its claims of objectivity, its strength lies in its ability to quantify research problems and generalise the findings to a wider population (Hennink et al., 2011). As a result, a large amount of data is expected using a web-based survey and analysed through statistical approaches in order to identify prevalence, relationships, and patterns in the sample data (Bryman, 2015). While a quantitative approach could trivialise, distort or ignore meaningful psychological or social phenomena; it may complement (such as generalisation of findings) an interpretive approach (for instance, perception of people on recycling behaviour) if appropriately deployed (Westerman & Yanchar, 2011).

This complementary approach is used in this research by designing a web-based questionnaire survey using the findings from the literature and that of the qualitative interviews to inform the quantitative phase.

4.2.3 Mixed Methods Research

So far, this research has clearly identified the distinction between qualitative and quantitative research in terms of philosophical assumptions and research methods. In practice, the division may be fuzzy, suggesting that ontology, epistemology, and methodology

assumptions may overlap (Bryman, 2015) across different methods in a study. In other words, a single study may incorporate several data collection approaches either within a research method (a large sample survey collecting narrative data) or across different methods (such as a study including both qualitative and quantitative elements).

Therefore, qualitising (which is a process of converting quantitative into qualitative data) and quantitising (which involves converting qualitative into quantitative data) analytical approaches can be adopted (Bryman, 2015; Teddlie & Tashakkori, 2009). In addition, social scientists can address a social problem using multiple or different methods (Denzin, 1970). Therefore, mixed methods research is a process of inquiry that employs intellectual and practical combinations of multiple strategies, different assumptions, and methods (Johnson et al., 2007) within a single study (Creswell, 2014). The process taken in this mixed methods research involves a deliberate integration of qualitative and quantitative procedures at every stage of a research process.

The process involves inductive, deductive, and abductive forms of knowledge (reasoning) that can allow the researcher to generalise the findings in terms of internal and external validity (Collins, Onwuegbuzie, & Jaio, 2007). In other words, the process allows the research to achieve inference quality and inference transferability (Teddlie & Tashakkori, 2009). The pragmatic assumption in this research rejects the incompatibility assertions but posits a compatibility or pluralistic approach (Creswell, 2014; Johnson & Onwuegbuzie, 2004). This is based on the school of thought that refuted the incompatibility thesis while supporting the idea that combining qualitative and quantitative methods in a single study is philosophically (epistemologically) coherent (see Howe, 1988).

As a result, different design strategies have been developed by the proponents of mixed methods research and include basic, sequential, concurrent, multilevel, and combination of mixed methods (Teddlie & Yu, 2007) strategies. Sequential and concurrent approaches have been observed to achieve a wider acceptance in social and behavioural

sciences (Teddlie & Tashakkori, 2009; Teddlie & Yu, 2007), a sequential approach is adopted in this research.

4.3 Research Design

As previously identified, research purpose, objectives, and questions are the major driving force when conducting this mixed methods research. Therefore, this section describes the approach in designing this research using this belief system. The process involves data collection and analysis techniques including the philosophical assumptions employed in answering the research questions as well as the ethical considerations. It provides a basis to innovatively combine qualitative-quantitative research to address the research questions.

The rationale is to eliminate the inherent bias in a single research strategy and to enhance the strengths while reducing the weaknesses of both qualitative and quantitative research (Johnson & Onwuegbuzie, 2004). Specifically, this section (see Figure 4) further discusses the philosophical stance, methodology, method(s), and the ethical issues related to this research.

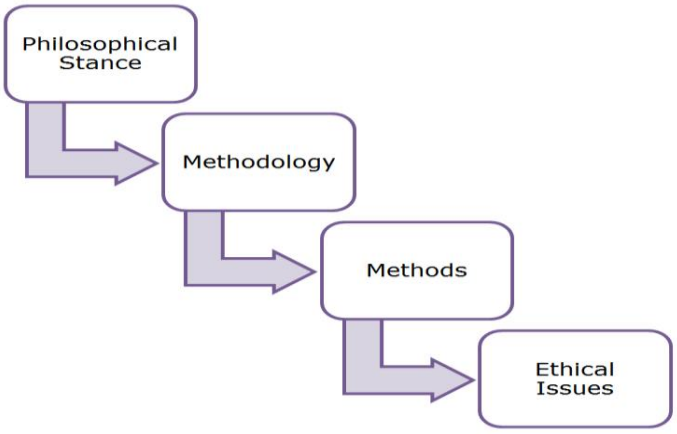


Fig. 4: Structure of research design for the study (Author)

4.3.1 Research Purpose, Objectives and Questions

Recall that the overall purpose of this research is to explore, confirm, and explain the extent to which household waste recycling behaviour translates into workplace recycling

behaviour (or vice-versa). The overarching rationale is to establish a relationship between recycling at home and at work and to investigate why people do (not) recycle waste at work as they recycle at home. This is based on the evidence (such as Barr et al., 2010; Lee et al., 1995; McDonald, 2011) that household waste recycling behaviour is not always translated into other contexts.

Therefore, the research objectives and the research questions (see Chapter 1) served as the basis for selecting pragmatic philosophical assumption for this present research.

4.4 Research Design Process

The design adopted a mixed methods approach that involves the combination of both quantitative and qualitative data collection techniques and analysis procedures (Tashakkori & Teddlie, 2010). The approach is to facilitate ease of data collection and analysis (Bryman & Bell, 2015) and involved exploratory and confirmatory questions (Teddlie & Tashakkori, 2009).

Using this approach, qualitative research is conducted sequentially (Creswell, 2014; Hanson et al., 2005; Teddlie & Tashakkori, 2009) with the quantitative method (see Figure 5) in this research. While each approach to mixed methods research has its merits and demerits, the rationale of selecting a sequential approach is to achieve depth (Teddlie & Yu, 2007) and breadth (Johnson & Turner, 2003) of knowledge on recycling behaviour in the UK. Also, the approach is adopted to ensure the questions in the survey are appropriate, comprehensive, and robust.

4.4.1 Sequential Mixed Methods Design

To design a sequential mixed methods study, the investigator decides on how to implement and prioritise the data collection stage (Hanson et al., 2005; Johnson & Onwuegbuzie, 2004). This determined whether the qualitative data collection should take precedence over the quantitative data collection or vice-versa. Using this approach, qualitative (or quantitative) data may be given higher priority over quantitative (or

qualitative) or both may assume a similar level of importance (Bryman, 2015; Collins et al., 2007; Teddlie & Tashakkori, 2009) during the data collection phase.

In this research, a sequential mixed methods approach, with qualitative data collection preceding the quantitative data collection (see Figure 5), is adopted.

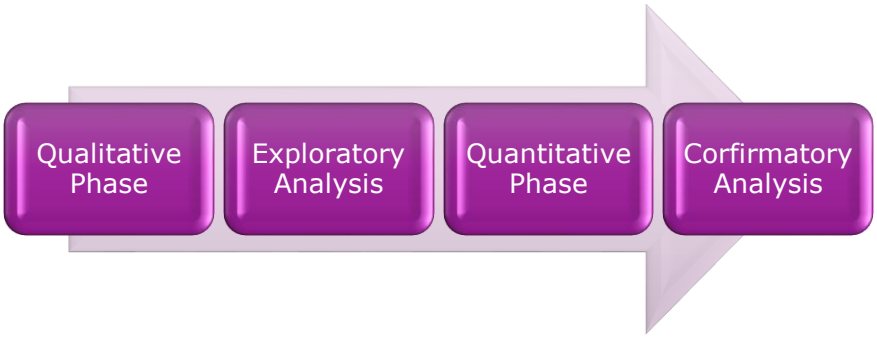


Fig. 5: Stages of Sequential Approach for this study (Source: Author)

Since the rationale for selecting a sequential mixed methods approach is to complement (augment) one method with another (Johnson & Onwuegbuzie, 2004), the qualitative phase serves as the foundation of the whole research. Nevertheless, the quantitative (data collection) method assumes a dominant role with respect to the available resources (time and money) (Teddlie & Yu, 2007) including the breadth of the collected information (data). The entire research process is implemented (see Figure 6) to adopt a procedure that can best address the research purpose while providing adequate answers to the research questions (Creswell & Plano Clark, 2011; Johnson & Onwuegbuzie, 2004).

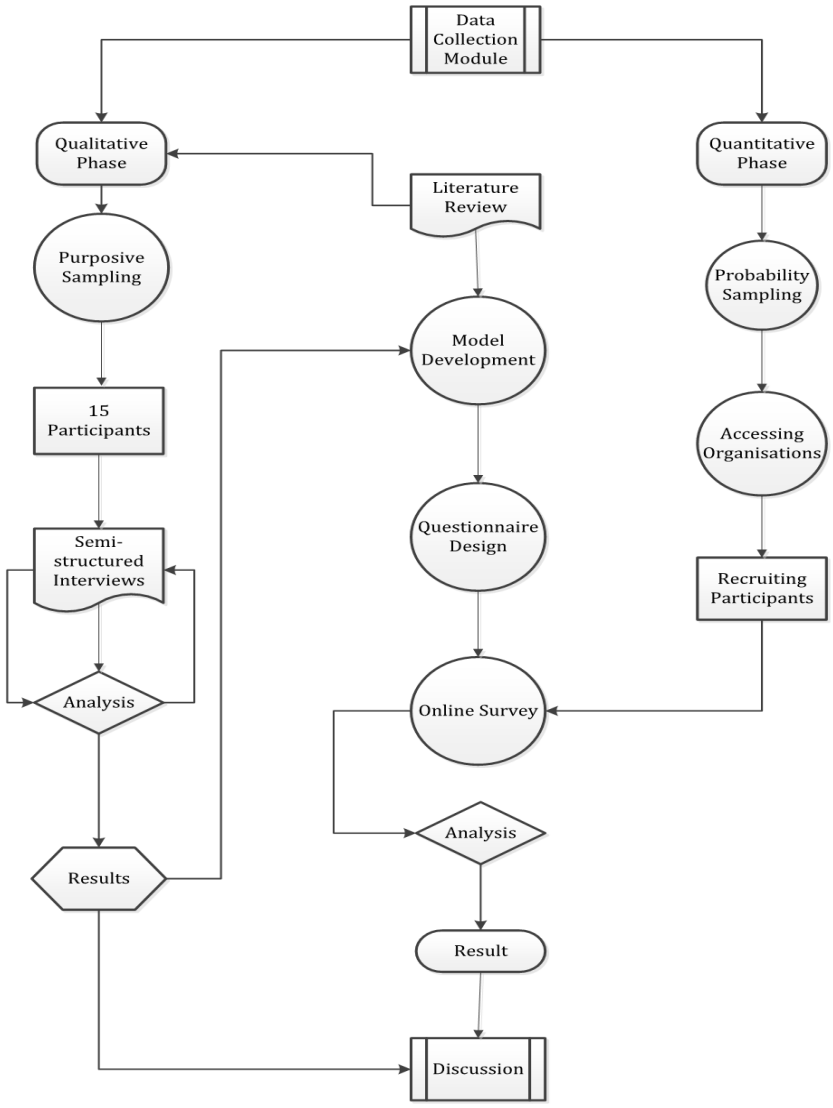


Fig. 6: Graphical Illustration of Mixed Methods Design (Source: Author)

4.5 Data Collection Process

As mentioned previously, this research utilised both qualitative and quantitative data in a sequential manner (Teddlie & Tashakkori, 2009; Teddlie & Yu, 2007) using semi-structured interviews and a web-based quantitative survey (see Figures 5 and 6).

This is informed by the purpose of this study, research questions, and by a thesis that qualitative and quantitative research methods should not be perceived as rigid dual oppositions (Creswell, 2014) but rather as a representation of ends on a continuum (Johnson & Onwuegbuzie, 2004). However, the data collection process unique to each phase is

discussed in Chapters 5 and 7 for clarity on the approach taken in this sequential mixed methods research.

4.5.1 Sampling Approach

Sampling is construed as a process of identifying and selecting a study's units of analysis in such a way that the research questions are adequately (correctly) answered (Tashakkori & Teddlie, 2010). In other words, the researcher selects cases or units (for example, people or organisations) on which conclusions or inferences of this study can be drawn. In other to achieve a representative sampling, four different sampling approaches were identified in the literature. According to Teddlie and Yu (2007), these sampling strategies include probability, purposive, convenience, and mixed methods sampling techniques.

In this study however, a sequential mixed methods sampling (Teddlie & Tashakkori, 2009) that involves a combination of qualitative phase and quantitative phase in a sequential manner is adopted. That is, findings from qualitative phase is used to refine and modify the design of quantitative phase (see Figure 6 above) and involved a multi-level approach (Collins et al., 2007). As a result, the sampling strategies of this research are further explained in the next chapters. For the purpose of clarity and in conformity with the tenets of a sequential mixed methods, each phase including its samples and sampling approach is presented differently starting with the qualitative phase.

4.6 Justification of the Research Approach

From the above discussions, this research argues that every method or approach to an investigation is associated with some strengths and flaws. However, the intention of selecting a sequential mixed methods approach, the sampling method, and the instrument used in this study was informed by the difficulty in understanding human behaviour due to its complexity and heterogeneity. The overarching rationale for the selection of various approaches in investigating recycling behaviour at work is presented in Table 4 below.

Table 4: Justification of the Research Approach		
Approach		**Justification**
Sequential Mixed Methods		Informed by the research purpose including the research questions
		Following the thesis that qualitative & quantitative research methods should not be perceived as rigid dual oppositions (Creswell, 2014)
		Observation that methodological pluralism may enhance research analysis & findings (Johnson & Onwuegbuzie, 2004)
Qualitative Phase	Purposive Sampling	To select participants from different organisations that could provide a greater depth of information (Teddlie & Tashakkori, 2009) about recycling at home and at work
		To ensure that participants are relevant to the research questions and the research purpose (Johnson & Turner, 2003)
		To uncover a wealth of information on the constructs of interest (Teddlie & Yu, 2007) that could inform the quantitative phase
	Expert Interviews	To provide aggregated & specific information that would validate evidences from the literature
Quantitative Phase	Probability Sampling	To access cases that could be representatives (Teddlie & Tashakkori, 2009) of people in work in the UK
		To ensure external validity (Johnson & Turner, 2003)
	Cluster Sampling	To achieve efficient samples in terms of the available resources (Teddlie & Tashakkori, 2009)
		To sample groups that occur naturally (Teddlie & Yu, 2007) in the UK
	Random Sampling	To provide each unit (organisation) within the sample stratum an equal opportunity of being selected (Bryman, 2015)
		To generalise the research findings within a reasonable margin error (Teddlie & Tashakkori, 2009)
	Questionnaire Survey	To provide a breadth of information (Bryman, 2015; Teddlie & Yu, 2007)
		To allow a wider coverage with regards to the sampling units
Source: Author		

4.7 Ethical Consideration

Researchers in social and behavioural sciences are often confronted with complex moral and ethical dilemmas during the investigation due to their interactions with human subjects. As a result, there is always an emphasis on the confidentiality and anonymity of the research participants through consent forms (Teddlie & Tashakkori, 2009). This position was taken into consideration before, during, and after the data collection.

Although there is a moral responsibility to report the truth about workplace waste recycling behaviour, participation in this research is voluntary, and confidentiality of the respondents was respected throughout the research process. In other words, the research respondents were not obliged (and could decline) to participate and/or withdraw their participation at any stage of the process.

However, considering the premise of this present research, no significant ethical issues were observed as waste recycling is still voluntary in the UK. Also, the data handling process complied with the UK Data Protection Act (1998) guidelines and conformed to the Robert Gordon University's (RGU) research ethics and data protection act having been assessed by the research degree (internal) review board. As a result, an introductory (covering) letter (see Appendix 1), outlining the research background including the research ethics was sent to the respondents in the UK through their organisations in order to reassure the respondents. In addition, organisations were promised that the collected data would be reported in aggregate to ensure the anonymity.

4.8 Chapter Summary

In this Chapter, roles of philosophical assumptions in social and behavioural sciences research were explored to make a solid case for this research. As a result, philosophical assumptions underpinning this research were identified, discussed, and presented having assessed different assumptions underpinning social and behavioural research. Based on the understanding of this extensive review, the present research is situated within pragmatic philosophical assumptions although a transformative lens is also considered. The decision is based on the mixed methods research design that is adopted in this research which in turn is influenced by the research aim and objectives including the research questions. Although different authors have argued and supported the incompatibility (or incommensurability as it is sometimes known) thesis, this research shares a similar worldview with the proponents of mixed methods research. Accordingly, this present research supports the worldview that

qualitative and quantitative methods are complementary rather than competing research approaches.

As a result, a sequential mixed methods research design is appropriate for this research and involved two different phases of data collection. In order to provide robust answers to the research questions and hypotheses, both quantitative and qualitative data are used in this research. While semi-structured interviews are used in the qualitative phase, a web-based questionnaire survey is adopted in the quantitative phase. These approaches including their findings are discussed and presented in the next chapters although each phase is presented independently and later triangulated for ease of understanding. In the next chapter (Chapter 5), the exploratory phase of this research is presented.

Chapter 5 Workplace Recycling Behaviour: Qualitative Data Collection and Analysis

5.0 Introduction

In Chapter 3, recycling behaviour including its variants were discussed to provide a basis for this qualitative stage. The review revealed two different strands of research relating to behavioural contexts that are often examined in the literature - home and work contexts. As stated in Chapter one specifically, recycling and other pro-environmental behaviours at work are under-researched and consequently resulted in a lack of robust measures to investigate recycling behaviour in workplace contexts. However, the available measures of workplace recycling can be adapted from previous studies (such as Ando & Gosselin, 2005; Best & Kneip, 2011; Thøgersen, 2009; Tudor et al., 2007a) that had investigated recycling behaviour at home and other (related) behavioural studies. This is based on the understanding that the previous research on the determinants of pro-environmental behaviours at home can offer further insights into the determinants of pro-environmental behaviour at work (Lo et al., 2012). Nevertheless, it should be considered that motivations for pro-environmental behaviours at home are considerably different than the motivations at work (Blok, Wesselink, Studynka, & Kemp, 2015; Gregory-Smith, Wells, Manika, & Graham, 2015).

On the contrary, many studies (such as Brothers et al., 1994; Catlin & Wang, 2012; Ludwig et al., 1998) on recycling at work (especially in Schools) adopted experimental methods rather than self-reports. As a result, it is challenging to replicate or adapt the instruments used in those studies to this current research. It is therefore incumbent on this research to critically examine recycling at work using peoples' subjective accounts and experience in recycling at home and at work.

When considering recycling (at home and/or work) as a social phenomenon (or reality), this initial exploratory investigation is situated within the interpretive and/or descriptive phenomenological (Bryman, 2015; Cohen & Ornery, 1994) research. According to

Cohen and Ornery (1994), descriptive phenomenology seeks to explain (or describe) people's experience (recycling behaviour) about a social phenomenon (such as recycling) from individuals' (people in work) worldviews/accounts. Consequently, the purpose of this qualitative phase is to understand recycling behaviour and its variants by describing the lived experience of individuals about recycling practices. Using a pragmatist perspective (Bryman, 2015; Creswell, 2014; Tashakkori & Teddlie, 2010) as earlier described in Chapter 4, this research illuminates people's lived experience and practices in relation to recycling in general including recycling at home and at work in particular.

As a result, this phase focuses on the in-depth investigation that is designed to unpack recycling practices at home and at work including their relationships. In order to achieve this, a research question and objectives specific to this qualitative investigation are defined and used to guide the entire process.

5.1 Research Question

Considering the present knowledge about recycling practices including the contradicting findings of previous quantitative studies and lack of research into workplace recycling, this qualitative phase is designed to answer this comprehensive research question:

How do people (social actors) at work describe (or explain) their recycling behaviour in terms of how (including what and how) they recycle at home and at work?

Using emic perspectives, this exploratory investigation is considered necessary to achieve the following objectives:

1. To understand people's perceptions about waste and waste management practices in the UK;
2. To understand people's recycling experience and its underpinning constituents using face-to-face semi-structured (in-depth) interviews;
3. To identify any relationship(s) between what people do at home and what they do at work in terms of recycling; and

4. To inform the quantitative phase by refining the conceptual framework and the battery of items (questions) generated from the reviewed literature.

As a result, this phase utilised semi-structured face-to-face interviews to further probe the participants' perceptions in an interactive manner. The rationale is to use the participants' responses to generate additional questions for a deeper exposition of the research participants' worldviews (Bryman, 2015) in relation to their recycling behaviour. Although this chapter addresses only the qualitative phase (see Figure 7), the findings from the two phases of this research are integrated together in the discussion chapter for a better understanding of recycling behaviour in both contexts.

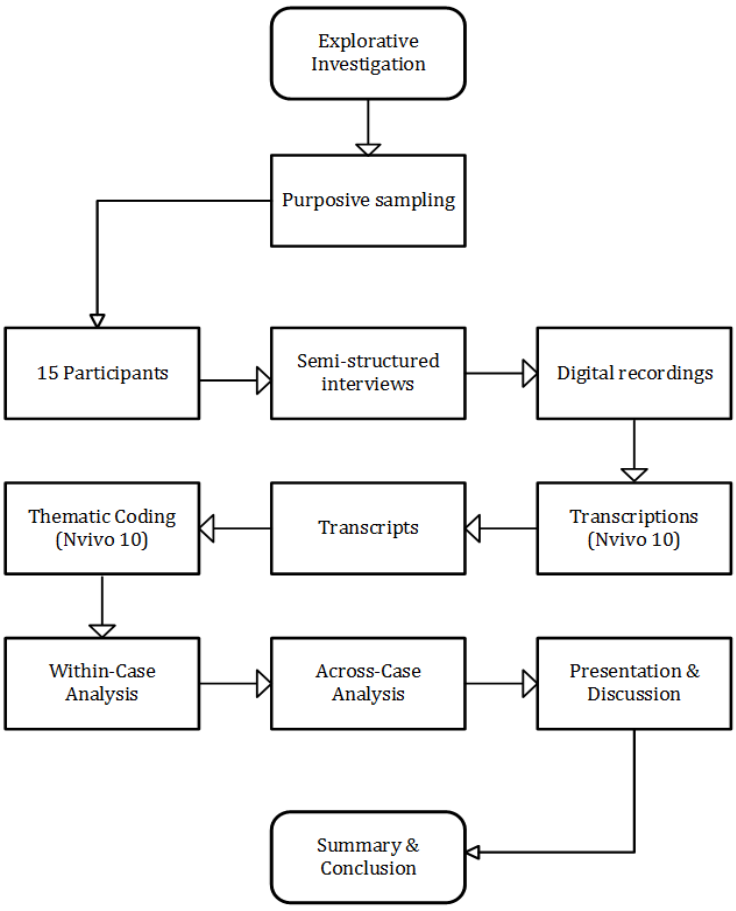


Fig. 7: Approach to Exploratory Expedition of Recycling Behaviour (Source: Author)

The first approach therefore involves in-depth qualitative interviews using the participants' subjective views to understand how recycling at work is framed (Creswell, 2014) in relation to recycling at home. However, this qualitative phase was conducted

without any theoretical framework or a pre-defined theory although an interview protocol (Appendix 3) was used to guide the entire interview process. That is, gathering specific data that are relevant to recycling activities and logically making-sense of the data using the participants' lived experiences without any theoretical lens.

5.2 Data Collection Process

5.2.1 Sampling Approach

Sampling in qualitative research can be complex (Coyne, 1997), however, non-probability sampling is considered as the appropriate approach when conducting a qualitative research (see Bryman, 2015; Creswell, 2014). Although different sampling methods in qualitative research (see Table 5) can be found in the literature (see Patton, 2002; Miles & Huberman, 1994), sampling in qualitative research is focused on the notion of a purposive sampling approach (Bryman, 2015; Gibbs, 2007).

Table 5: Sampling Methods in Qualitative Research

Sampling Approach	Features
Criterion based or purposive sampling	Selection of participants based on a particular purpose in terms of pre-specified criteria or based on particular features (or characteristics) of the cases (or units). For example: socio-demographic characteristics; particular experience, behaviours, roles; race; or beliefs.
Theoretical sampling	Sampling of units, cases, or events on the basis of their contributions to the improvement and testing of theoretical constructs, that is, on the basis of theoretical purpose and theoretical relevance. It is iterative in nature and involves an initial selection of a sample, followed by data analyses, and a further sample is later selected to modify the emerging themes and theories. The approach is mainly used for generating grounded theory and the iteration process continues until a point of theoretical saturation.
Opportunistic sampling and convenience sampling	Opportunistic sampling is a sampling approach where an investigator takes the advantage of opportunities, events, or situations to gather data while convenience sampling is adopted on the basis of accessibility to research participants.

Adapted from Patton (2002)

The approach is a non-probability method and involves a selection of cases that are significant or salient not only to research questions but also to research objectives. That is, the symbolic representation (Ritchie, Lewis, Nicholls, & Ormston, 2013) of recycling behaviour of people at work with reference to their recycling practices at home. According to Bryman (2015), purposive sampling is often adopted when generalisation is not germane, rather cases are selected based on their importance to research questions and goals. As a result, a purposive sampling approach was considered to be suitable for this research and cases (see Table 6) that were relevant in achieving research purpose, questions, and objectives were selected for the purpose of addressing the research intentions

In this research, the population of interest that is appropriate in achieving the research purpose is people at work in the UK. The purpose of this qualitative phase is to inform the quantitative phase using people's subjective accounts or experiences. As a result, participants are individuals or employees (such as full-time, part-time, contract) of different sectors (for instance private, government, and voluntary) across the UK who are working away from home. The rationale of this criterion is to put two separate behavioural contexts into the frame of analysis, given that only one context would be assessable if people that are using their private residence (home) as office or workplace were considered. As no specific database of employees' contacts in the UK as a sample frame where participants could be selected was available at the time of this research, purposive sampling, initially through referral, was adopted to provide plausible answers to the research question.

Having identified potential participants, a participant information sheet including the research consent form (see Appendix 2) was sent by email to the participants prior to the interview sessions. This was followed by telephone contacts to schedule an appropriate time and location for the interviews. Where the contact emails and/or phone numbers were not available, the participant information sheet and consent form were given to the participants during the interview sessions. This was the case for 4 of the 15 participants in this research. For example, two interviews were conducted during one of the Europe's largest waste and

energy shows in Birmingham, UK, in September 2015; one interview at the host university, and one interview at a Chartered Institution of Wastes Management's event in Aberdeen. These four interviews were arranged and conducted without any prior formal negotiations and/or appointments, an approach that Patton (2002) referred to as opportunistic sampling (see Table 5 Above). According to Patton (2002), opportunistic sampling is a sampling approach that involves the use of available opportunities, events, or situations for data collection processes in contrast to convenience sampling that is often adopted on the basis of accessibility to research participants.

Although only two participants were from organisations that are based in England, there is no clear distinction across the UK countries in terms of how recycling is expected to be practiced at work considering the legislative requirements underpinning recycling at work in the UK (see section 2.3.2) at the time of the data collection process for this research.

5.2.2 Qualitative Sample Size

It is impractical in qualitative research and especially when using purposive sampling to estimate a desired sample size prior to a data collection process. Rather than a pre-specified or prescriptive exercise, samples in this qualitative study evolved during the data collection process (Miles & Huberman, 1994). There is no agreed method among qualitative researchers on appropriate sample size for qualitative studies (see Bryman, 2015; Onwuegbuzie & Leech, 2007 for a review) and on how to estimate it. To address this shortcoming, the concept of saturation (Charmaz, 2006; Strauss & Corbin, 1998) is being used as a primer (or a rule of thumb) for estimating sample size in qualitative studies, and various types of saturation can be found in the literature (see O'Reilly & Parker, 2013 for a review).

Saturation is conceived of as a stage where there is no further information to gather about a study/case (O'Reilly & Parker, 2013) from the research participants. While the concept of saturation is widely adopted in qualitative research, its meaning and/or how it is

achieved remain obscured (Bowen, 2008) prior and/or during the data collection process (Guest, Bunce, & Johnson, 2006) in many qualitative studies.

Nonetheless, theoretical saturation (Strauss & Corbin, 1998) has been broadly accepted to determine sample sizes as well as sampling adequacy during the data collection processes (O'Reilly & Parker, 2013). Contrary to theoretical saturation which occurs when theoretical categories/themes are fully developed including their relationships, data saturation involves a stage in the data collection where no new findings are generated (Bowen, 2008; O'Reilly & Parker, 2013).

Besides the concept of saturation point, the sample size and sampling adequacy for this research were informed by the research purpose and its objectives (Charmaz, 2006; Onwuegbuzie & Collins, 2007; Miles & Huberman, 1994). Having set the data collection boundaries (such as individuals from different organisations in the UK) and designed a frame (recycling at home and at work) (Miles & Huberman, 1994), fifteen "information rich" (Patton, 2002) individuals or key informants (Onwuegbuzie & Leech, 2007) from different organisations in the UK were interviewed (Table 6).

Table 6: Participants Affiliations

Participants	Sectors	Category	Size*	Job Role
Par_001	Private	Energy (including oil & gas)	Multinational	Facilities Manager
Par_002	Private	Utilities (Waste, Energy & Recycling)	Large	Regional/Contract Manager
Par_003	Private	Energy (including oil & gas)	Multinational	Facilities Manager
Par_004	Public	Government (including Local Councils & Agencies)	SME	Business Waste Officer
Par_005	Private	Energy (including oil & gas)	Multinational	HSEQ Manager
Par_006	Private	Finance services/Management	SME	Business/Wealth Manager
Par_007	Private	Automotive	SME	Facilities Manager
Par_008	Private	Energy (including oil & gas)	Multinational	Facilities
Par_009	Public	Government (including Local Councils & Agencies)	SME	Recycling Officer
Par_010	Private	Transport, Storage & Distribution	SME	Facilities

Par_011	Public	Education	SME	Facilities
Par_012	Private	Utilities (Security)	SME	Facilities
Par_013	Public	Government (including Local Councils & Agencies)	SME	Environmental Officer
Par_014	Private	Energy (including oil & gas)	Large	HSEQ
Par_015	Voluntary	Business Services	SME	Chief Executive/ Consultant
* http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en				
Source: Author				

Based on the fact that multiple data collection approaches are adopted in this research coupled with the key informants (see Table 6) as used in this research, the sample size is sufficient according to Lee, Woo and Mackenzie's (2002) recommendations. Consequently, this sample size is neither too small to achieve data saturation (or informational redundancy) nor too large to perform a detailed analysis (Charmaz, 2006; Onwuegbuzie & Collins, 2007). In this research, the sample size (fifteen key informants) is appropriate and adequate in achieving the purpose of this qualitative phase, given that up to ten interviews are recommended for phenomenology study (see Creswell, 2013) while twelve participants are considered to be adequate for interview-oriented study (see Guest et al., 2006). Nevertheless, the achievement of saturation was confirmed through the analytical discussions with my supervisory team.

5.3 Qualitative Data Collection Instrument

To collect the qualitative data for this research, different options including interviews, observation, and focus group discussions (Bryman, 2015; Hennink et al., 2011) could have been used. However, focus groups were ruled out due to the logistical problems of getting enough participants if times and locations when they were all available was introduced as a constraint. Interviews were also preferred to focus group discussions as there was a concern that focus groups may provide a misleading consensus (conclusion) due to the group interactions (Bryman, 2015) and the group dynamics regarding the participants' power status (Ritchie et al., 2013). This might have resulted in the collection of data on the group's

views rather than the individual's account of recycling behaviour if focus group discussions were used. This can be a particular problem with research questions related to socially desirable behaviours such as recycling.

Having settled on interviews as the data collection method, using a semi-structured approach was selected due to the understanding that the approach offers more flexibility than structured interviews. This is important because it gives the opportunity for the researcher to gather data which is unexpected rather than just following predetermined questions. This is particularly pertinent for this research as one of the aims of the qualitative phase is to ensure that the survey covers all the salient issues from the employees' perspectives. Unstructured (open) interviews were ruled out, partly to ensure that each participant covered some similar ground and to take account of the skill set of the researcher. In conducting the semi-structured interviews, an interview protocol (interview guide) (see Appendix 3) was developed and used to assist the researcher to focus on the research purpose and objectives. The guide was divided into three different stages; each stage was sub-divided into different parts where the participants were asked relevant questions. The questions were therefore designed to provide a possibility for the participants to express their views without any restriction. This flexibility was required to facilitate a dialogue between the investigator and the research participants, to expand further (or build) on the previous questions, and to uncover any areas or issues not anticipated by the researcher.

The approach enhanced the opportunity to explore both the depth of the participants' experiences and views on recycling in general and particularly recycling at home and at work. In addition, it allowed the investigator to further probe the views and perceptions of the participants based on their responses. However, emerging themes or new information not considered in the interview guide was further examined in the next interview session. This interlink between earlier and later interview sessions allowed lessons from the previous session to be learnt while using the obtained information to refine the questions in the next sessions.

5.4 Qualitative Data Analysis Process

In qualitative research, no particular rigid technique is available for data analysis (Corbin & Strauss, 2015) rather the analysis is mainly informed by the goal as well as the objectives of a qualitative study. With this knowledge, the analytical process as adopted in this research was guided by constant comparisons (for similarities and differences) of texts that were identified and/or indexed from the research subjects' perceptions or experiences. Thus, it allowed the investigator to go back and forth between the data collection and analysis to achieve an in-depth explanation of recycling behaviour.

In order to achieve the goal of this exploratory phase, every attempt was made to make sense of each participant's individual accounts in terms of how they recycle at home as well as their recycling behaviour at work. These accounts were later juxtaposed to identify common themes across the participants' lived experiences. For the purpose of identifying and analysing different themes from the participants' accounts, across-case coding and sorting was combined with within-case data analysis techniques (Ayres, Kavanaugh, & Knafl, 2003; Miles & Huberman, 1994). Following Gibbs' (2007) suggestions, this case-by-case approach allowed the cross comparison of ideas, concepts, and patterns of the same theoretical and/or descriptive connotation. Rather than identifying texts that portrayed similar meanings from participants' accounts by depending only on coding and sorting (Ayres et al., 2003) of such texts, each participant's experience (or account) was considered as a case in its own right. As a result, codes were assigned using across-case in combination with within-case data management and analysis techniques (Ayres et al., 2003; Miles & Huberman, 1994) to illuminate the participants' worldviews. According to Miles and Huberman (1994), within-case analysis aims at eliciting a grounded sense of "local" reality while across-case analysis provides a system of comparing outcomes across multiple cases including their interrelationships for a holistic description of the reality which can enhance the generalisation of research findings.

The processes involved in these analytical techniques encompass Yin's (2003) techniques of data analysis and facilitated by the use of computer aided qualitative data analysis software (CAQDAS) (Bazeley & Jackson, 2013). In this research, the CAQDAS used was NVivo 11 (see sub-section 5.4.2 below) to facilitate how unstructured qualitative data are organised, analysed, and presented in a concise and logical format to inform a better understanding of recycling behaviour. These techniques according to Yin (2003) included matching of similar pattern, linking data to propositions, building explanation, time-series analysis, logic models, and across-case synthesis. Although an interview protocol with prior-defined guide questions was used during each interview session in this research, the data analysis process involved an inductive de-contextualisation and re-contextualisation of the participants' subjective accounts. As a result, analysing the collected data manually without the use of CAQDAS was adjudged to be impractical, unreliable (Leech & Onwuegbuzie, 2011), and could lead to a loss of important relationships in the dataset due to the "messiness" of qualitative data.

5.4.1 Using Software in Qualitative Data Analysis

Like quantitative data analysis procedures, the use of a computer in qualitative research especially for qualitative data analysis is attracting increasing attention within the last three decades particularly in the mid-1980s (Bryman, 2015). This has facilitated the ease of data access and enhanced the manner in which qualitative data are managed and processed (Bazeley & Jackson, 2013) although this approach has attracted mixed feelings and scepticism (Richards & Richards, 1994) especially about its efficacy to the understanding of research data. On the one hand, it has been suggested that qualitative researchers might be caught-up in "tactile-digital divide"[1] (Gilbert, 2002) where they lost the closeness and became less familiar with their data when using a software for qualitative data analysis (Bazeley & Jackson, 2013). On the other hand, researchers might be too close to their data to the extent

[1] The 'tactile-digital divide' is a distancing process whereby a social researcher is fixating or adapting to working on a digital screen rather than on a piece of paper.

that significant information that could contribute to the research goal is omitted during coding and retrieving while they become entangled in a "coding trap"[2] (Gilbert, 2002). Nevertheless, the use of software packages in qualitative data analysis enhances the effectiveness and efficiency of the data analysis process and its findings (Bazeley & Jackson, 2013).

The recent advancement in CAQDAS is therefore perceived (Bryman, 2015; Richards & Richards, 1994) to be underpinned by code-and-retrieve mechanism, thus providing a system to code and retrieve the coded text. Although no computer program is dedicated to a particular qualitative data collection approach, the recent development in qualitative data analysis software packages can be attributed to the increasing popularity of qualitative methods. The popularity of this approach to qualitative data analysis suggests that manual coding is becoming obsolete and may be eventually become irrelevant when analysing qualitative data. Whatever the approach taken in analysing qualitative data, the main goal is to make sense of people's perceptions of the social reality (Richards, 2014) under investigation. However, making sense of people's accounts without losing sight of important details can be a daunting task considering the complexity and "messiness" of qualitative data. As a result, a computer programme can be deployed to record, link, explore, test, and build cumulative knowledge and insights from messy, unstructured, and complex qualitative data. Using a computer in qualitative data analysis may offer many advantages over manual data analysis although the creativity and intuition of investigators are still required when manipulating and interpreting the data.

While there are arguments for and against the use of computer programs in analysing qualitative data, NVivo 11 was used in this qualitative phase to facilitate the analysis (such as transcribing, organising, and syntheses) of people's perceptions and views concerning

[2] According to Gilbert (2002), the adaptation to the digital (screen) environments allows ease or comfort of using a software package and may present a situation where investigators become too close to their data.

recycling at home and work. The software offered an opportunity to collate and explore all the interviews' transcripts in a manageable (organising and analysing) folder for the ease of accessibility. Apart from data recording (interview transcripts) capability, NVivo is a piece of powerful software that accounts for memos (researcher's thoughts during data manipulation), nodes which are containers for storing codes (references), classifications for the participants' attributes (such as demographics), and symbolic presentations of ideas about the data (and their relationships).

For this research, a new blank project named "Workplace" was created in NVivo where all the audio files were imported and stored prior to the transcription process. Although different suggestions can be found in the literature (see Bazeley, 2013; Richards, 2014), there is a lack of agreement on how to approach qualitative research. According to Bazeley and Jackson (2013) and Richards (2014), verbatim transcriptions of audio recording may not be required in many cases especially when nuances of participants' accounts are not needed to answer the research questions. Nevertheless, full transcription was adopted in this research where each audio file was transcribed verbatim. Each audio file was fully transcribed in this research given that all the repetitions, hesitations, emotions (such as laughter, pauses, and overlap in conversation), and thinking of the participants that may contribute to the research findings were captured (Bazeley, 2013).

Having transcribed all the audio files, each interview transcript was cross-checked (validated) against its corresponding audio recording for data accuracy with the opportunity to further explore the data (interview transcripts). This approach also facilitated a better understanding of the transcripts (sources) and assisted in cognitive (concept) mapping of significant/relevant texts that proved useful during the coding process. In this familiarisation stage, key ideas and recurrent themes (including their patterns) were identified which informed the process of abstraction and conceptualisation.

In the second phase, nodes that represented themes (or concepts) were created and this allowed all the related materials to be gathered in one place for emerging patterns and ideas. In addition to nodes, cases (for the participants) and their underlying classifications (where the participants' attributes such as demographics and other personal information contained in the transcripts were recorded) were created whilst maintaining the anonymity of the research participants (as agreed during the interview process). In order to be familiarised with the data and to harness the information including the emerging patterns from the participants' accounts without falling into "the coding trap", a "broad brush[3]" approach to coding (Gilbert, 2002) was initially utilised. The approach allowed the data to be further explored by advancing the relationships and verified against the data based on the holistic understanding of the data. This code and retrieve (through query) capability of NVivo enabled deeper insights into the participants' accounts and lived experiences in reference to waste recycling at home and at work.

5.4.2 Data Analysis Approach

Having transcribed and typed each recorded interview verbatim, the researcher was immersed in the collected data and reviewed all the participants' interview transcripts against the original recording to establish the accuracy of each transcript. Prior to sifting and sorting (Bazeley, 2013; Ritchie et al. 2013) for the purpose of identifying significant themes and patterns, all the transcripts were carefully read through in order to get familiarised with the data and to gain an in-depth understanding of the participants' perceptions of waste, recycling at home and recycling at work. After a sufficient understanding of the participants' accounts, within-case analysis was adopted by revisiting each transcript to identify and code important texts, themes, or patterns (words, sentences, and/or paragraphs) that best described the research purpose (recycling behaviour at home/work, antecedents

[3] The approach is synonymous to open coding where relevant information (or text) was retrieved from the participants' accounts (interview transcripts) by surface scanning without concentrating on any details.

(motivations and barriers) of recycling, including the relationships between the two contexts of interest) of this research.

The next stage of the analysis involved across-case comparison of important texts from the participants' accounts that were identified in the first stage (within-case analysis) with more emphasis on the texts/sentences that shared similar semantic and contextual meanings. This across-case analytical approach provided an opportunity to compare the perspectives of all the participants with a possibility of identifying themes/texts that were common to the research participants.

The last stage of the analysis involved a further analytical process whereby each category (such as the key element) was reconnected to make a comprehensive and coherent story and to validate the identified categories using the original accounts. In order to thematically identify and categorise texts in a more analytical manner, open coding, axial coding, and selective coding (Corbin & Strauss, 2015) were deployed. The intention was to facilitate the use of the within-case and across-case approaches adopted in this research so as to ensure that the categories/texts that were considered relevant to the purpose of this exploratory phase were selected. The techniques were not only enhancing the within-case and across-case approaches that underpinned the analysis process of this research but also provided an impetus to integrate all the ideas in a unified and coherent story that reflected the participants' worldviews of recycling at home and at work. The entire process embodied how the collected data were described (and constructed) while making sense of the participants' views of reality.

5.5 Qualitative Findings and Discussion

In this section, findings from the exploratory phase are reported using direct quotes from the participants' accounts to provide in-depth descriptions of waste and recycling practices at home and at work in terms of how these phenomena were constructed by the participants. Based on the tenets of qualitative enquiry, the meaning of these phenomena was

socially constructed and sometimes contradicting considering that the interaction of each participant with the social realities (such as waste and recycling) as considered in this research is unique and in total flux.

Nevertheless, different themes were generated (using within-case analysis) from the participants' accounts; these themes were adopted to further probe the accounts across different cases. In contrasts to many studies (such as Goldenhar & Connell, 1993; Largo-Wight et al., 2012) that have increasingly emphasised psychological and personality factors to explain recycling behaviour, the effects of situational factors emerged strongly in this exploratory phase and reported in this section along with the perceptions of the participants. Nonetheless, findings of previous studies that emphasised psychological/personal factors have resulted in profiling people based on their recycling behaviour, such as recyclers and non-recyclers without considering the influence of situational factors that may influence people's decision-making process. Although psychological/personal factors may explain recycling behaviour, studies (such as De Young, 1988; Vining & Ebreo, 1990) have shown that recyclers and non-recyclers are not explicitly different in their attitudes and beliefs towards recycling. According to Young et al. (2015), attitude change is not required when influencing and/or changing the existing behaviour at work. It should be noted that there is no theoretical or empirical justification to limit the explanation of recycling behaviour to psychological/personal factors considering that multiple factors have been identified to underpin pro-environmental (recycling) behaviour (see Chapter 3 above).

There is a need to explore the contributions of other factors particularly situational factors when explaining or determining recycling behaviour especially at work. Therefore, this research demonstrates that the contributions of situational factors should not be underestimated considering that solutions to waste problems can only be informed by policies that are based on a holistic understanding of people's waste management (recycling) behaviour (see Barr, 2007). From the findings of the exploratory phase this research, the

effects of situational factors (such as facilities) on recycling behaviour is profound irrespective of the behavioural contexts and personality traits involved. For instance:

> "*I think if I was in a different industry I would have a different approach, I will like to think I would still recycle but I would only do it because the system is there*" (Par_002).

> "*So, I guess it kind of ties with the council given you specific bins to do this and I think you start to think more about it and everywhere you look through the papers, media there's always about do you do your bit for the environment be it recycling*" (Par_005).

> *"I think the whole waste is not clear . . . I just don't think it's well enough advertised, there's nothing there*" (Par_014).

Rather than a descriptive presentation of the generated themes, questions were posited based on the identified themes in order to provide analytical representations of waste and recycling practices at home and at work including their relationships. For instance, to what extent can situational factors influence people's recycling behaviour, at home and at work? In what manner does recycling behaviour at home translate to recycling practices at work? These were some of the concerns addressed in this section using the participants' comments.

5.6 Participants Characteristics

The overall participants' attributes in terms of age, education, ethnic background, employment, gender, and personal annual income are presented in Table 7.

The age range of the participants falls between 16 and 70 although the exact age was not collected. The youngest participant is within the age range of 16 and 25 while the oldest participant is above the 65 range. This showed that all the participants are adults and could reflect as well as describe their own behaviour without the influence of the investigator. Both men (11) and women (4) participated in the interviews.

Table 7: Socio-demographics						
Participants	**Gender**	**Age**	**Education**	**Employment Status**	**Income (£)**	**Ethnic Background**
001	Male	56 – 65	HNC	Full-time	25,000 - 49,999	Scottish
002	Male	36 - 45	Higher Education	Full-time	50,000 - 99,999	British
003	Male	46 - 55	A/AS	Full-time	50,000 - 99,999	British
004	Female	26 - 35	Higher Education	Full-time	25,000 – 49,999	British
005	Male	46 - 55	Higher Education	Full-time	50,000 - 99,999	British
006	Male	46 - 55	Diploma	Full-time	> 100,000	Scottish
007	Male	> 65	Other	Part-time	< 24,999	Scottish
008	Female	16 – 25	A/AS/higher or equivalent	Part-time	< 24,999	Asian
009	Female	26 - 35	Higher Education	Full-time	< 24,999	Scottish
010	Male	36 - 45	GSCE or Equivalent	Full-time	25,000 – 49,999	Scottish
011	Female	26 - 35	Higher Education	Part-time	< 24,999	Any other background
012	Male	56 – 65	A/AS/higher or equivalent	Full-time	25,000 – 49,999	Scottish
013	Male	36 - 45	Higher Education	Full-time	25,000 - 49,999	African
014	Male	46 - 55	Higher Education	Full-time	25,000 - 49,999	British
015	Male	26 - 35	GSCE or Equivalent	Full-time	25,000 - 49,999	Scottish
Source: Author						

Furthermore, all the participants have some form of formal education whilst the highest level of qualification is a degree (Bachelor and above) and there is only one extreme case of income at above £100,000. In addition, the participants included one African, one Asian, and one classified as other while others were White (British and Scottish[4]); this was based on the availability of the participants rather than the racial landscape of the UK. Although the level of education may influence the participants' views (in terms of awareness and understanding of waste issues as well as current approaches), it may have little or no effect on the participants' recycling behaviour. According to Ajzen, Joyce, Sheikh and Cote (2011), the provision of accurate information about a social reality (issue) has no influence

[4] While Scotland is part of the UK, some participants preferred to be classified as Scottish rather than British.

on people's decision-making and consequently on their behaviour. Although the contribution of knowledge may be attenuated when the influence of situational constraints is strong, different forms of knowledge must converge together to enhance recycling behaviour (see Kaiser & Fuhrer, 2003). To establish the influence of socio-demographics on recycling behaviour, the relationship is further examined in the quantitative phase of this research whilst they are presented here simply to provide a feel for the variety of participants interviewed.

5.7 Perceptions of Waste and Waste Management in the UK

According to the findings of this exploratory phase, the participants demonstrated increasing awareness and sufficient knowledge of the current state of waste and recycling practices in the UK. For instance:

> *"In the UK, I guess is been a big push possibly (in the) within the last decade I'll say . . . so you're reducing, re-using and then recycling"* [Par_005].

> *"It's becoming less acceptable not to recycle, I think that people are aware that we can't continue to put things to landfill that's not sustainable and they want to take action to do something"* [Par_009].

While the participants' views are mixed (see Appendix 4), the findings suggest that the issue of waste is of global concern as observed by the participants. For example:

> *"It's not just in the UK, it's a global thing to reduce the overall amount of . . . the amount of waste that could potentially be generated"* [Par_006].

As a result, the efforts of individuals are required to address this problem irrespective of the waste generation contexts as argued by the participants. This supported the observation that the public participation in "private-sphere environmentalism" (Stern, 2000, pp. 409-410) such as recycling schemes (Best & Kneip, 2011; McDonald & Ball, 1998; McDonald & Oates, 2003) is necessary for scheme success and to address the prevalent environmental issues.

In addition, the participants' perceptions suggest that the UK is still lagging behind and has a lot to learn from other European countries by using examples of best practices from other European countries such as Denmark, Germany, and Switzerland. As a result, *"I think some certain definite improvements are to be made, we are behind some other countries in particular in Europe"* [Par_004]. In support of this perception, DEFRA (2016) shows that the rates of households recycling in the UK are not improving and may decline further if no drastic measures are considered. Although some participants believed that Scotland is making improvements in terms of the available infrastructure (such as facilities and legislation), others raised concerns that many social issues may take precedence over waste management particularly in Scotland. Therefore, "*in Scotland I think we're a little bit ahead of the game but it's difficult to see, as a householder, how waste management and recycling can be more of a priority than schools, the criminal system, keep the street lights on for example; I think we always all going to struggle in that battle to see which is more important*" [Par_002]. This was evident in the 2016 budget (HM Treasury, 2016) where waste was mentioned only eight times and recycling four times, regarding the issues of tax evasion rather than the improvement in recycling or provision of infrastructure.

Considering the current economic climate and the fact that other social issues such as education and crime may be prioritised, recycling "*doesn't seem to be very important issue perhaps it has become more apparent feasible in the media in recent years*" [Par_011]. This could eventually become a recurrence pattern with negative effects not only on waste planners' behaviour (authorities) but also on consumers' (and/or householders) recycling behaviour in the UK. This is in line with Knussen and Yule (2008) who argue that measures of past behaviour (such as lack of attention to recycling) and lack of recycling habit may inhibit recycling behaviour.

On the other hand, the research participants observed that the UK government's efforts do not reflect the general practice in terms of consumers' behaviour, behavioural change, and actual investments. The lack of investment suggests that new facilities that can

enhance recycling behaviour and divert waste from landfill sites have not been adequately introduced. For example,

> *"There's not been a lot of new facilities come along from there . . . things like drink cans, glass, wood, cardboard and etc. things haven't really moved on"* [Par_003].

Whilst this may be responsible for the declining trends of households recycling in the UK (see DEFRA, 2016), the current trends in recycling rates highlight a disconnection between the government's efforts and what people do suggesting that what people profess they do may not necessarily reflect their behaviour. This may relate to the inconsistencies between attitudes and behaviour (Corraliza & Berenguer, 2000; Gatersleben, Steg, & Vlek, 2002; Schultz et al., 1995). In addition, it suggests that people tend to portray a positive self-image when confronted with behaviours (such as recycling) that are socially and ethically desirable. The effect of social desirability bias[5] on recycling behaviour is further examined and reported in the quantitative phase of this research.

In general, the perceptions of the participants suggest that waste management especially recycling in the UK is still evolving although rapid changes have been experienced within the last two decades. While the participants' views are divergent in some areas, there is unanimous agreement that the throw-away culture is a thing of the past and that many "*people know now that they can't just throw your rubbish away, stuff got to be recycled whenever possible*" [Par_006]. Nonetheless, recycling is still considered as "*one of those things that everyone has an opinion whether is good or bad thing or what we can do to recycle or what can't recycle or what we should recycle and that doesn't necessarily tie or linking with what we can*" [Par_002].

It can be argued that recycling opinion/perception is not actually explaining individual's recycling behaviour; some other underpinning factors exist that can instigate or

[5] This is a common source of measurement error in quantitative survey where a respondent reported a socially acceptable response than the respondent's actual attitude/beliefs/behaviour.

enhance recycling. In support of this, studies (such as Perrin & Barton, 2001; Tonglet et al., 2004) have reported discrepancies in what people confess to and what they do with regards to recycling. Nonetheless, the participants' views reflect the current state of waste management practices in the UK considering the in-depth knowledge of the research participants in this realm.

5.7.1 Recycling Perceptions in the UK

Different approaches have been advanced in the literature to explain recycling behaviours, many of which are focused on psychological (such as attitudes) and personal (such as socio-demographic) factors as previously explained in Chapter 3. Considering the goal of this research, the presentation of exploratory findings is sub-divided into two different genres – recycling at home and at work. The rationale is to understand how people perceive and describe their recycling at work with reference to how they recycle at home.

In the next section, factors influencing recycling behaviour at home are discussed using the participants' accounts; this is followed by their experience within the workplace

or opinions on recycling practices at home. For example, there is enough context. Both strands are later triangulated to provide a holistic understanding of the dynamics of recycling behaviour from home to work and vice-versa.

5.7.2 Explaining Recycling at home

As previously mentioned in Chapter 1, recycling at home is well structured and advanced especially from research and policy perspectives. However, this may not necessarily reflect the reality or householders' views evidence to suggest that the rate of household waste recycling in the UK is declining despite increasing attention devoted to household waste management. The current state of household waste recycling in the UK can be explained in different ways such as lack of recycling knowledge which may result in fear of doing it wrong, lack of concern for the environment (or recycling), and/or lack of interest in recycling. For instance:

"Anxiety or fear of doing it wrong . . . some people are afraid to do it wrong, so they don't just do it at all as well, you find that some people are just really don't care - generally just don't care, genuinely don't care. You will find some people that can't be bothered, is too difficult, not interested" [Par_004].

It becomes imperative to understand recycling behaviour from the perspective of the individual to identify factors other than psychological/personality traits that are influencing recycling. This section is designed to achieve that specific goal using the research participants' lens of viewing and understanding the reality of waste and recycling at home.

5.7.2.1 Influence of Materials on Recycling Behaviour at Home

This part is to address how the materials (waste) being produced at home are affecting recycling behaviour at home. From Table 8, it is understood that different materials are produced at home and these include cans and tins; clothes; food waste; garden waste; glass; paper and paper products; packaging (including tetra packs) plastics; and pots and trays. According to a participant for example:

"Paper, cardboard, cereal boxes, newspapers, magazine - we don't have many magazines, but tins, cans, aerosols, foil trays and what else yeah plastic bottles and glass we get" [Par_004].

While paper (including newspapers and magazines) was reported by all the participants, clothes were the least mentioned materials by householders. This was supported by Schultz et al. (1995), that paper (including newspapers) was reported as the most collected (at 96%) material for recycling in the USA. According to Lee et al. (1995) paper was reported by the office workers in Taiwan as the most recycled material at home. In addition, studies (such as Barr, 2004; Perrin & Barton, 2001) observed that paper is the most recycled material while textiles are the least recycled material by householders in the UK.

Table 8: Items and the associated Facilities				
Participants	**Items Recycled**		**Facilities**	
	Home	**Work**	**Home**	**Work**
001	Papers (including magazines & Newspapers).	Food waste; Papers, Cardboard; Plastics; Glass; Metals.	General waste (communal bin); No recycling facilities.	Bin for each recyclable; No food waste bin; Communication (Email; Posters).
002	Cans; Food waste; Glass bottles; Garden waste; Plastic bottle, Containers & Trays. Brown cards, Large & other household items.	Food waste; Coffee grounds; Tea bags; Paper towels; Pots & Trays; Containers, Papers (& cards); & cans,	Black bag (residual waste); Blue bin (for dry mixed recycling except glass); Box (for paper); Food waste caddy; Household items (use bring sites); Storage space.	Black bin bag (for general waste including coffee cups, coffee grounds, paper towels, film); food waste bin; dry mixed recycling bin (paper, cards, cans, tray, containers.
003	Packaging, Cardboard, Brown paper, Food waste; Glass; Plastics.	Food waste & Tea bag, paper; Milk (plastic) sachets & Coffee cups (general waste).	Food waste bin; Wheelie bin (commingle dry recyclables – plastics, cans, & glass); bin for cards & papers.	Segregation bins (confidential and non-confidential papers), Different bins for plastic; cans; food waste (main kitchen); a cardboard compactor, & we put things in clear bags.
004	Paper (including newspaper, magazine); Packaging (cardboard, cereal boxes, & drink cartons); Plastic bottles; Cans (including aerosols); Foil trays; Food waste; Garden waste; Glass; Tins.	Paper (envelopes, letters); Plastic bottle; Tea bags.	General waste bin; Food waste container (on street); Recycling sites (for glass, paper, cardboard, tins, cans, glass, tetra packs; & plastic bottle).	Paper bins; General waste bin; & Mixed recycling bin.
005	Paper; Plastic bottles; Cardboard; Tins; Glass bottles; & Garden waste.	Compostable food containers; Food leftovers; Paper; Paper towels, Tea bags.	Two streams: A general bin (for bottles, glass; & plastic); Another bin (for Paper & cardboard); then food waste bin.	General waste bins; different bins each (for cans, food & biodegradable, Glass, & Plastics); & box (for papers). Bins for batteries.
006	Cans; Cardboard; Clothes; Paper (including junk mails); Plastics; Garden waste & Household items.	Papers (mostly confidential); Ink cartridges.	Different bins each for cardboard; paper; shredded paper, plastic & glass bottles; tin cans.	Bins for paper; box for inks & cartridges; bins for tins, cans, plastics, & films no general waste bin.
007	Cardboard; Paper (including newspapers); Cans; Glass; Garden waste; & Plastic.	Paper (including newspapers); Glass; & Plastics.	Two bins - a brown one & a black one, & small bin for cans; glass; plastic & hessian bag for paper only.	Four bins – one for glass & bottles; one for cardboard; & two for rubbish (general waste); & two for cardboard. No bin for food waste.
008	General waste; Food waste; Paper; Plastics; Cardboard; Cans.	Paper cup; Pieces of paper; Plastic lid. Food waste goes into the general bin.	Paper bin & Normal (general) bin; Food bin; & Designated area (communal) for different materials.	Three designated recycling bins (one for cans, plastic, & glass; one for general & one for paper. No food waste bin.
009	Food; Packaging; Glass; Plastics; Paper; Yoghurt pots; Tetra packs; Tea bags.	Packaging; Paper; Yoghurt pots (Mixed recycling bin); Food waste.	Composter; Mixed recycling (wheelie bin); Food caddy.	Food caddy; Paper bin; mixed recycling bin; & general (residual) waste bin.
010	Metals (Tins); Paper; Cardboard; Glass; Food waste.	Batteries; Cardboard Paper; Plastics.	A box/bin for each item.	Different bins for different items; No food bin.
011	Cardboard; Plastics; Glass; Metals (Cans).	Plastics; Papers; Coffee cups.	General waste bin; No recycling bins & no food waste bin.	General waste bin (including coffee cups); separate bins for papers, plastics, & cans. Food waste bin in the kitchen area.
012	Cardboard; Food; Glass; Garden waste; Paper (including magazines); Plastics; & Tins.	Paper, Plastic; Cans.	General waste; Separate bins for paper & food; bins for cans, plastics, & glass.	Separate bins for different items.
013	Food; Glass; Plastics; Cans.	Food; Paper; Plastic.	Food waste bin & General waste bin.	Separate bin for each item.
014	Food; Paper, Packaging; Glass; Plastics; Cans.	Food; Paper; Plastic.	Mixed recycling bin	Separate bin for paper; Mixed (commingle) bin
015	Food; Paper (including newspaper), Glass; Plastics; Large goods; Tins.	Food; Paper; Paper towels.	Mixed	Paper bins; General waste bin; No food waste bin.
Source: Author				

One possible explanation is that paper requires less or no additional effort (in terms of cost and time) to recycle compared to other materials. For example, food cans are supposed

to be rinsed and possibly dried before they are deposited into a recycling bin, this is not the case for paper and other paper materials. On the other hand, used clothes in the UK are most likely to be donated to charity and/or sold as second-hand materials. As a result, this practice/behaviour can be labelled as re-use or upcycling rather than recycling. For instance, donations to charity are not considered as recycling behaviour and do not contribute (in any way) to recycling practice or the UK government recycling and landfill targets (see The Scottish Government, 2010). Textile waste is also produced less frequently than other fractions such as paper or plastic materials, making it harder to remember or to follow a behavioural pattern.

In addition, the way these materials are being prepared for recycling is different from participant to participant and is strongly influenced by the volume of waste being produced as well as the available services (or schemes). A well-designed scheme with the provision of adequate facilities would increase the ease of recycling and householders may feel obliged or forced to recycle their waste. For example,

> "*Well when the facilities are there from a personal point of view you going to force down that route because if you just put everything in your wheelie bin then your wheelie bin will be over flow, then you tend to use your recycling bin . . . it is easy to recycle than not to recycle to be honest*" [Par_003].

As a result, the effects of materials on recycling behaviour cannot be assessed in isolation, there may be other factors (such as volume and type/variety of materials) that can contribute to the effects of materials on recycling behaviour. For instance,

> *"We never recycle food, I've not really thought of it; I don't eat a lot by the way, I eat most of it so there's no a lot of waste, but it just goes in my normal bins . . . we don't have that much waste from food"* (Par_007).

According to previous studies (such as McDonald & Oates, 2003; Williams & Kelly, 2003), a perceived lack of sufficient materials is one of the reasons for non-participation in recycling at home. Rather than situational factors (such as facilities), psychological factors (such as

values and beliefs) can motivate householders to correctly prepare materials for recycling especially when facilities or schemes are not available. As a result, only householders with positive environmental personal values and concern may engage in recycling when the amount of effort (such as time and cost) is considerably high.

Considering the evidence in this section, an understanding of materials (including type/variety and volume) being produced would not only enhance scheme design but would also allow householders to participate in recycling. On this premise, the contribution of scheme designs on people's recycling behaviour at home using the participants' accounts is examined in the next session.

5.7.2.2 Scheme Design and Recycling at Home

In the UK, different recycling schemes (such as kerbside commingled and source separation) are implemented within and across all the 418 principal councils with consequent effects on material collections as well as the collection time. The type/variety and volume of materials (see sub-section 5.7.2.1) being produced by householders may be a significant factor, suggesting the lack of provision (schemes and facilities) by Local Councils for materials with less economic values. According to the participants, for example:

> "*There is always a different system and different councils have different steps as well - some collect glass, some have to separate glass and some the collections (*times*) are different as well; some you've to walk around the corner to . . . put your materials right there*" [Par_002].

Although this may influence recycling behaviour, the existing differences in recycling schemes across the country can be attributed to the political situation as well as the available budget for implementing recycling initiatives. Therefore,

> "*A lot will depend on the local authorities and what the political situation of councils and how they want to manage it and where the funding is in*" [Par_004].

On the other hand, the differences in recycling schemes, especially within a Local Council, are perceived as a function of residential areas or socio-economic conditions of that area. For instance:

> "*In the UK, I think it's very much depends on the area you live in, whether you recycle or not, whether you're wealthy or you live in a sort of less wealthy area*" [Par_008].

> "*A lot of recycling is down to the area where you live . . . everybody that lives in my area will also have the same attitude toward recycling*" [Par_006].

This is important when explaining householders' recycling behaviour and supported by Kurz et al. (2007) who observed a positive influence of socio-economic status of a community on recycling behaviour at home. Nonetheless, the current lack of uniformity in recycling schemes is not only challenging to the UK householders but could also prevent those coming from overseas to actively participate in recycling. For example:

> *"There are challenges around different places and different kinds of bins so there are differences . . . so also for people coming from overseas is different again, maybe they've done something one way where they came from originally and they come into Scotland or UK and is different"* [Par_009].

These challenges include the ease and/or convenience (in terms of storing, sorting, and rinsing) of recycling, access to a range of collection options, and proximity of recycling facilities. Although the effects of scheme design on recycling behaviour is a function of householders' circumstances in terms of residential type for example, scheme may be more effective when householders are not restricted in what and how they can recycle. It could also be the case that whilst information about schemes are provided when they start, it may not be accessible once the scheme is running, making it difficult for people to join the scheme if they move to the area later. As a result, some residents may find the available scheme including the accessibility to its supporting facilities more convenient than other residents. As reckoned by the participants, for instance:

"*On my street, there aren't really any recycling bins, we have one black general waste bin and is collected every second Tuesday; and many of my neighbours put their recycling in that bin and they all have cars however they don't drive down which is five minutes - drive down to . . . a sort of recycling centre*" [Par_011].

"*Generally, I'll take them to . . . the recycling point, we've got paper and cardboard bin and a plastic bottles, tins and cans; just not far from house - just across the road but because we have a bit of glass and things like that and tetra packs, drink cartons it's easy to just send all lot to (*a supermarket name*) and do all in one go*" [Par_004].

This is also the case for the residents of multi-family dwellings (MFD) (apartment or communal residential areas) compared to those in single family dwellings (SFD). According to Par_001 for example:

"*We stay in apartment at home which is got communal bins . . . we don't have recycling bin and general bin; the problem you have with that, not everyone does it very seriously, you've got bins tossed, there's rubbish lying about on black bags with bottles lying there".*

This explains the influence of context (such as storage space, distance, and time cost) as a direct consequence of available facilities on recycling behaviour regarding the extent to which recycling is made convenient for people to undertake. As a result, householders may have a positive inclination toward waste and/or recycling although the opportunity of translating such disposition to behaviour can be enhanced/hindered by the available scheme in their jurisdictions. This is significantly important considering that any scheme that increases the recycling efforts in terms of time and cost may be less attractive compared to the schemes that reduce recycling effort. This notion is well supported in the literature (see Chen & Tung, 2010; Knussen et al., 2004; McDonald & Oates, 2003; Schultz & Oskamp, 1996) on recycling at home. As a result, some of the participants expressed their displeasure toward recycling schemes, for example:

"*Previously we stayed down in Inverbervie, that's half way between Stonehaven and Montrose; if you want to recycle there was a bottle bank down the beach,*

there's nothing there you have to drive to Stonehaven or you have to drive to Aberdeen so that wasn't so good" [Par_005].

From the research participants' accounts, the differences in recycling schemes across the UK may create confusions on how and what to recycle at home as well as reducing the possibility of transferring the behaviour to another context. For example:

"*They take glass in Aberdeen, this causes some confusion, in Aberdeenshire they said you've to separate your glass and take them to your recycling points or shopping centre but in Aberdeen city you can recycle glass . . . with your box - your black box so I think the service is leading the behaviour in a way*" [Par_009].

To reduce the level of confusion introduced by disparities in waste schemes across the UK and to enhance recycling, there is an urgent need for the government to unify waste management approaches and introduce a uniform scheme in the UK. It should be noted that the Scottish government is taking a lead in harmonising waste management practices and ensuring a unifying definition of materials that can be collected for recycling across Scotland by introducing a household waste recycling charter through the partnership between the Scottish government and the Convention of Scottish Local Authorities (CoSLA). The primary intention of the household recycling charter and its underlying code of practice are to ensure consistency of service delivery across the participating Councils in Scotland. Although the charter is a voluntary initiative and agreement, councils are encouraged to participate for efficient and effective service delivery. For instance, householders can be motivated to participate in recycling by introducing a mixed recycling scheme across a Local Council as observed by the participants:

"*If there's more availability of mixed recycling that would encourage people to use mixed recycling and we are seeing there is a few, there is mixed recycling in across our municipalities*" [Par_009].

The approach would not only reduce the behavioural effort (cost and time) associated with recycling at home, it would also lower the financial requirements (overhead cost) of waste

collection from each residential area. Although commingled recycling may attract additional cost (such as sorting at materials recovery facilities), studies (such as Keramitsoglou & Tsagarakis, 2013; Timlett & Williams, 2008) have shown that schemes (especially commingled kerbside schemes) can facilitate ease of recycling and increase householders' participations. As a result, using a simple, less time-consuming and low-cost method (such as commingled recycling scheme) for attracting participants may increase participation in recycling process at home. This is likely to be the case considering that recyclers and non-recyclers are not only similar in their pro-recycling attitudes and extrinsic motivations but also similar in the way facilities influence their recycling behaviours.

However, recycling at home is not a definitive behaviour (contrary to Barr, 2004) and profiling householders as absolute recyclers or non-recyclers is misleading in view of the influence of situational factors such as scheme design on recycling at home. Taken together, recycling schemes are undoubtedly influencing recycling behaviour and suggest that recycling behaviour may not be consistent within the same locality when schemes are not similar. On the one hand, scheme design with adequate facilities (such as correct bins and storage space) can motivate householders to recycle. For instance,

> "*When you got two bins and they sit side-by-side and I have two little bins under my sink - one for recyclable waste, one for non-recyclable waste, and the container for food waste. So, there's no reason why you wouldn't*" [Par_003].

On the other hand, scheme design in terms of collection times can prevent householders from recycling:

> "*Bin collection every fortnight can be a bit of nightmare, if you have set certain things that collection vehicle doesn't take away . . . you got to get into your car use your petrol to go and recycle it . . . so I think collection time, collection medium has a big influence on what you could and couldn't do and could do better*" [Par_005].

Like any other situational factors, collection times may enhance or inhibit recycling behaviour at home depending on the householders' perception of the collection times in terms of

favourable/not favourable. One obvious reason is a lack of storage space especially for decomposable waste (organic waste) prior to the actual collection rounds. For example, householders may require no storage space when councils are operating a weekly collection compared to a fortnight collection although it may increase the financial cost associated with the collection.

Nevertheless, householders may use designated bring sites (supermarkets and/or household recycling centres) and household recycling centres for materials that are not collected for recycling in their areas due to the lack of facilities or for logistical reasons. According to the research participants, for instance,

> "*We only have the general waste bin . . . there's no recycling done on that street . . . so anything we need to recycle we actually put on the balcony and then when we decide to make a trip to either* [names of supermarkets] *we take the recycling and put in the recycling centre"* [Par_011].

On the contrary, many people may prefer an easy option and put all items in a general waste bin when the service or facilities for those materials are not available or accessible in their locality although this is likely to be contingent on people's moral values.

According to Par_004 for instance,

> "*Very little goes into a general waste bin what you find thus is plastic containers which domestic side can't take at the moment*".

This may likely be the case when there is no process and capability to support the scheme being implemented, given that plastics and other dry recyclables are not supposed to be deposited in a general waste bin.

5.7.3 Understanding Recycling at Work

Contrary to the observation in 1990s (such as Schultz et al., 1995) that recycling in general had received little or no attention from academics and policy-makers, many studies albeit on recycling at home have been published in recent times (see Chapter 3 above). This

suggests the importance of recycling not only to enhance the knowledge about behaviour underpinning pro-environmental activities but also as a means of conserving natural resources. As a result, various policies, legislation, and schemes (such as pay-as-you-throw) aimed at increasing recycling practices have been advanced. The proliferation of legal and market-based frameworks has drastically changed the landscape of waste management and particularly recycling globally (see Chapter 2). In contrast to recycling at home, recycling at work is less structured and observed to have attracted little or no attention in the past although there is a renewed interest in promoting recycling at work. This is evident with the introduction of legal-based instruments (such as Waste (Scotland) Regulations 2012) to enhance recycling at work although many businesses are still reluctant in complying with the legislative requirements for many reasons. This is supported by participants' comments, for example:

> *"Being a city location, some businesses struggle with space and is just would not going to be practical for a lorry going down the road for general waste, a lorry going the road for plastic, a lorry going down the road for cardboard, a lorry going down the road for glass and whatever else as well* [Par_004].

> *"I think we're not very good, I know that sounds a bit strange considering the nature of our business"* [Par_002].

Nevertheless, the current structure of recycling at work suggests that recycling at work is mainly altruistic and ecocentric behaviour without any financial gains for participation although recycling at work may be enforced by businesses. For example:

> "*At work, you have to do it . . . you've no choice but at home you've a choice, you can choose to recycle or not to recycle. At work, you must recycle. I recycle at work because you have to, you've no choice*" [Par_006].

While individuals at work may either feel pressured to engage in recycling at work or perceive recycling at work as the right thing to do, the type of workplace and nature of its business have a combined influence on whether people recycle or not. For instance:

The kind of workplace, if I'm in a office, like here, is taking it more seriously because of the image it portrays as well to everyone. Whereas I used to work in retail shops and others like restaurants or bars sometimes they care less, it just depends" [Par_008].

"*If I was working in an office that wasn't do with recycling waste, I probably won't think as much about it really good, depends on workplace and what bins they have and how easily identifiable the bins are because if you look at bins from the rest of the bins it needs to be clearly defined that's the bin for this, this is the bin for that*" [Par_009].

However, the findings of these qualitative interviews suggest that people in the private sector support and participate in recycling more than people in the public sector based on the participants' comments. Although this perspective cannot be generalised, it is supported by Marans and Lee (1993) who reported that workers in the private sector are more likely to instigate and engage in recycling compared to those in the public sector. This can be attributed to the fact that workers in the private sector are likely to initiate and commit to recycling schemes while recycling schemes in public sector are commissioned and promoted by the management. On the other hand, private organisations may encourage participatory (voluntary) or discretionary initiatives (Lamm, Tosti-Kharas, & Williams, 2013) outside employees' formal responsibilities (Ones and Dilchert 2012b) where they are perceived as citizens (members) of those organisations (Boiral, 2009; Paillé & Boiral, 2013).

While the current legislation mandates all UK organisations (private, public, and voluntary) to separate materials into different components, the lack of monitoring and enforcement suggest that organisations may choose collection options that are suitable and cost effective to their businesses. For instance,

"I've yet to hear, I'm not saying it hasn't been done but I've yet to hear of any business been prosecuted for failing to follow that legislation . . . I think a lot of businesses took it on, the honest businesses introduce the service and complied while it was not going to cost them too much, where they have the space to store the containers, where they want to get brownie points for being green contractors" [Par_002].

"That (Waste (Scotland) Regulations 2012) *is best practice, unless you can demonstrate otherwise and we basically said no we can't demonstrate that, is not best practice for us to separate each material and that's the decision that's been backed up by management, senior management, and things like that"* [Par_004].

Based on this illustration, it could be the case that many organisations in the UK are not implementing the regulations underpinning recycling (source separation of materials) at work. For example,

*"Well is very mixed (*recycling*) yeah, they're not too particular in separating different items into different bins yeah"* [Par_007].

Although it has not been established empirically, a personal conversation with a member of staff of Resource Efficient Scotland supported the participants' observations and indicates a lack of compliance by many organisations in Scotland. On the other hand, the fact that the participant (Par_004) is from a governmental organisation responsible for business waste supports the fact that businesses are not separating their waste as required by the regulations.

5.7.3.1 Influence of Materials on Recycling Behaviour at Work

In a similar way to the materials that are produced at home (see sub-section 5.7.2.1), papers (and paper products) are observed as a major material being generated at work. For example, *"a lot of paper* [Par_004] . . . *so, you hit print to go to printer, you go and do something else so if I come back now to the printer, stuff that I left might still be there or somebody might put it in the bucket, so I'm re-printing stuff and then somebody comes or there's issue; I should re-print it so I think there's a lot full of paper waste*" [Par_005]. The use of paper may be influenced by the type of workplace (such as office environment) of the research participants and this suggests another reason why the higher percentage of previous studies on recycling at work had focused on waste paper (see Oke, 2015; Oskamp et al., 1994) compared to other waste streams. It may further reinforce the findings (such as Lee et al., 1995) that observed a correspondence between recycling at home and at work when a similar material (especially

paper) was the unit of analysis. As observed from the participants' comments, food waste is not prevalent at work due to the lack of cooking activities although tea bags and coffee grounds are observed to be the most common food waste at work. For instance:

> *I bring in my lunch in Tupperware so there's no waste from there that needs to be recycled". "I may have tea bags that will go in the food waste". "If I do have drinks bottle or water again that will go in the recycling bin we've got"* [Par_004].

In respect of waste generation at work, there are similarities in the materials being produced at home in terms of composition (see Table 8) but differs in terms of frequency and volume. As observed from the participants' accounts, the most difficult materials at work are coffee cups and sachets due to the non-availability of facilities or outlets for their recycling. The material composition of some of the available coffee cups may suggest that waste contractors are not willing or incentivised to collect them and may consequently inform the lack of outlets for these materials. This may be frustrating especially for employees with a strong inclination towards recycling. For instance,

> "*. . . frustrating are things like cups like that are not recyclable because of the wax coating on them, little plastic sachets are really no really outlets for that*" [Par_003].

As a result, there is a tendency for people at work to throw coffee cups into dry mixed recycling bins irrespective of their values and business area due to the lack appropriate opportunities (such as facilities) considering the participants' accounts. For instance,

> "*It worries me that in my area of business we can still have people putting Costa cup into dry mixed recycling bin"* [Par_002].

On the contrary, others may opt for general waste bins when preparing coffee cups for collection although there is a confusion on how to recycle coffee cups at work due to lack of knowledge or guidance on their recycling. This is evident from a participant's comment:

> *"I was looking for a bin to put my coffee cup that I used, and I asked people in the office where did I put this to recycle it, they couldn't tell me where I could put it they said just put it in the general waste; to me that's not where coffee cups would go"* [Par_011].

The lack of clear guidance on how and where to deposit materials, especially coffee cups, in some workplaces suggests that many people are still throwing the materials in any available bins which may likely increase cross contamination of materials being collected for recycling. The current concern about coffee cups is not likely to be the case at home as people are generally re-using their mugs/cups rather than using disposable cups when at home. Nonetheless, it emerged from the interviews that some organisations have introduced the use of reusable (glass) mugs/cups while others are still considering the introduction of the approach to reduce the amount of waste from disposable cups. One of the challenges of this approach is health and safety issues at work as many workplaces in the UK especially large corporations are implementing safety culture such as usage of lids on hot drinks' containers although some participants are using re-usable rather than disposal cups. For instance,

> *"I don't use disposable cups, it's a reusable cup, you wash it and you re-use it so I'm not contributing to the additional waste"* [Par_005].

Nevertheless, recycling of food waste at work was observed to be the most recent improvement in recycling practices in the UK. This is influenced by the increasing investment in composting and anaerobic digestion and enhanced by the state of infrastructure (physical and regulation) to address food (and/or organic) waste in the UK. The increasing awareness and the UK government efforts on food waste issues have provided opportunities for business investment with the installation of facilities for food waste collection in the UK workplaces by some food waste specialised contractors or collectors.

In order to enhance recycling at work however, adequate knowledge of where and how to prepare materials for recycling is necessary. According to Brothers et al. (1994), provision of recycling information is not only contributing to recycling behaviour but also sustaining recycling at work. As a result, organisations should provide a clear guidance on these materials rather than making unrealistic assumption that recycling is simple, easy, straight forward, low-cost behaviour, or that employees would know how to recycle when facilities, particularly bins, are provided.

5.7.3.2 Influence of Facilities on Recycling at Work

The findings of this study show that recycling approaches are different across various organisations despite the introduction of a single legislation that is guiding recycling approach at work. As a result, the available facilities are not similar and observed to be mainly influenced by organisations' circumstances in terms of size and sector including their orientation toward waste. Nevertheless, there is a presence of recycling facilities for paper and paper products within most organisations in the UK including those with strict waste management policies. For example:

> "*The Company has got strict recycling policy and that's why none of the people in the office has got a bin, everything must be recycled . . . we've got bins in the ground floor for recycling paper; there's no other recycling and there's no bins - there's no actual office bins because you're not allowed to have any rubbish anywhere; very, very strict . . . so, there's no actual rubbish produced at all*" [Par_006].

From an organisational point of view, it makes business sense to recycle paper compared to other materials and the decision to focus more on paper recycling may be informed by economies of scale rather than for the environmental improvement. On the contrary, organisations may set-up a recycling scheme to enhance their image, as part of their corporate social responsibility, and to demonstrate their continuous improvement in support of their environmental (and/or quality) accreditations, given that recycling is a visible/obvious behaviour. For instance:

> "*I think it means a social responsibility, we've ISO14001 accreditations and you've got to demonstrate continuous improvement and waste is seen as kind of low-hanging fruit on making improvements it has been for a long time*" [Par_003].

Nevertheless, different factors associated with recycling at work have been identified and reported (see sub-section 3.3.1) based on the evidence in the literature. Findings of these studies have demonstrated the influence of personal/psychological facilitation including physical facilitation on recycling (see Oke, 2015) and other pro-environmental behaviours

(see Lo et al., 2012) at work. For example, the association between bin proximity and recycling behaviour was observed to be positive; and suggests that proximity of recycling bins could enhance recycling behaviour (Hansen et al., 2008; Marans & Lee, 1993; Price & Pitt, 2012). It also suggested that those who do not consistently participate in recycling may not be motivated when recycling requires additional personal efforts.

Similar to the contribution of facilities to recycling at home, recycling behaviour at work is motivated by recycling facilities in terms of accessibility and convenience. However, this exploratory phase suggests that the influence of facilities on recycling is observed to be more pronounced at work compared to home settings. This may be attributed to the perceived lack of control and/or responsibilities felt for recycling activities by people at work. This is supported and explained further by the perceived behavioural control construct of the Ajzen's (1991) theory planned behaviour (TPB). According to the participants' accounts, the issue of waste management is the responsibility of organisations rather than individual's (own) responsibilities when at work.

> *"I think there's something in there that for some reasons again when we get out of the car . . . at work you know we come through the door we just think is somebody's else issue . . . whoever I work for, is their issue"* [Par_002].

The transfer of responsibility to organisations may reduce control over recycling which may negatively affect recycling responsibility as well as people's actual participation in recycling at work. As a result, many people are not too interested in recycling at work even when the facilities are provided and adequate. For instance, "*Well is very mixed yeah, they're not too particular in separating different items into different bins yeah*" [Par_007]. It may make business sense to commingle materials at work for ease of collections and for lack of space. According to a participant's comment,

> *"It is mixed recycling . . . the fact that being a city location some businesses struggle with space . . ."* [Par_004].

Although it may increase the volume of contaminants, organisations may be constrained by space which may prove challenging or costly when providing different bins for separate materials.

> *"Probably is (facility) good as is can be, I think we're constrained by space; space wise there're certain locations we can put them in I think with the good effort"* [Par_005].

This is supported by Andrews et al. (2013) who reported that a lack of trash bins increased the level of contaminations as people were observed to be depositing commingled materials and paper in a single bin.

On the contrary, many organisations can afford to implement source segregation of waste and provide adequate facilities, that may lead and enhance recycling practices in such workplaces:

> "*Well again is the infrastructure that we provide here . . . segregation bins for paper - two types of paper: confidential and non-confidential, there's plastic there, there's cans we have down in the main kitchen area we've got food waste for composting both from the kitchens and from the . . . food on the plate, we've got a cardboard compactor, we put things in clear bags*" [Par_003].

While commingling of materials especially dry recyclables at work may make more business sense, the current legislation requires businesses to segregate their materials into separate collection system. Nevertheless, some participants suggested that a commingled scheme could be more attractive and consequently influence recycling behaviour at work although its impact on the quality of materials remains unclear:

> *"So, I personally think you'll get more buy-in from people to do it that way, I personally think is a better idea; what I don't know and don't fully understand is the actual impact. I know it has impact but how much does the quality, how much is the quality reduced by, mix things and that will depend on your sorting facilities, so time will tell"* [Par_004].

5.7.3.3 Influence of a Champion on Recycling at Work

From these findings, some of the factors differentiating recycling at work from recycling behaviour at home is a lack of responsibility, ownership, and control at work. Nevertheless, the contributions of a green champion have been positive in promoting recycling practices and to achieve executive (management) buy-in in some organisations. For example,

> "*At work is probably not so many phases we have a focal point (colleague name) who looks after green elements, recycling, waste, energy usage and stuff like that. So, she's very active in that, she's the one that's driving it forward I think; the rest of us are lazy, lazy at work that is the way I'll describe it*" [Par_005].

> "*I used to tell my team and say probably we should go back and say look I put a wrong material into the wrong bin, we are to have some sort of sanctions, we are to have some something inert to back our responsibility if you won't have 100% compliance*" [Par_002].

> "*The green spokesperson, she's giving time off to do the meeting, she's giving time off . . . she's our environmental spoke's person and is driving it forward, she's giving a fair bit of leeway. I think it's her muscle that push things along I think from a corporate perspective they're doing a good job*" [Par_005].

This was supported by Humphrey et al. (1977), who reported an increase in quantity and quality of paper recycling when a personal contact (leadership) was appointed. According to Hargreaves (2011), the presence of a green champion to promote pro-environmental behaviours at work is a necessity. In addition, the Resource Efficient Scotland has launched a free online platform to develop green champions in different organisations to enhance green and pro-environmental activities as well as resource conservation efforts at work.

Besides the influence of a dedicated focal point (such as a green champion) on recycling at work, behaviour of other people (such as colleagues) at work may have a strong influence and contribute significantly to recycling practices at work:

"*Well, everybody else does it, so fine I just carried on. Yeah people will turn around and say what are you doing, why are putting that in for, why not put it in recycling?*" [Par_004].

The influence of social norm or pressure (subjective and descriptive) in enhancing recycling at work is well supported in the literature (such as Largo-Wight et al., 2012; Wan et al., 2012). According to Wan et al. (2012), social norms are not only enhancing the intention to recycle but also increase the level of perceived control over recycling at work. On the contrary, studies (such as Kelly et al., 2006; Tudor et al., 2007a) have reported that social norms have no influence on recycling behaviour. A lack of internalisation of social norms into personal norms may be responsible for the reported discrepancy concerning the contribution of social norms to recycling at work. Also, other factors (such as recycling bins, accessibility, and information) may be inadequate to the extent that people have no knowledge of what, where, and how to recycle. As a result, "*information, training, supervision; those are the key things*" [Par_002] any workplace can introduce to engage its workforce in recycling. People should be aware of what, where, and how to recycle possibly through educational campaigns including other non-monetary initiatives, such as "tool box talk" so as to enhance and sustain recycling at work.

5.8 Relationship between Recycling at Home and at Work

The main intention of this section is to answer the question of whether recycling at home translates to recycling at work and vice-versa including the mechanisms that may facilitate the spillover of recycling behaviour. As a result, the participants' views in terms of recycling at home and work are presented for an in-depth understanding of how the participants described their experience in both contexts. It is obvious from the participants that people may have a similar mentality about recycling at home and at work, a lack of facility either at home or work may prevent their ability to recycle. For instance,

"For me if the recycling bins are available then I'll use them at work and I'll do exactly the same at home . . . I've the same mentality to how I do recycling, I don't use glass bottles, plastic bottles at work so I've no requirements to recycle them" [Par_005].

In addition, the type/variety including the volume of waste being produced by people affect the extent to which their recycling behaviour at home translates to recycling at work. According to the findings of this exploratory phase of this research, there is a strong indication that people often generate more volume and varieties of waste at home compared to work settings which may influence what and how they recycle at work compared to their recycling experience at home. For instance:

"*I think at home I generate more waste and recycle more, at work because I'm not buying items I'm not recycling as much but because I don't have as much packaging and things to recycle*" [Par_009].

Although the intention of this research is to establish a relationship or lack of it between recycling at home and recycling at work, many participants argued that the way they recycle at home is different from their recycling at work. As a result, people may recycle in a certain way at home for many reasons, they may recycle differently at work for a very different reason. For instance, only four participants argued that there is no difference between their recycling behaviour at home and at work. For these participants, their recycling behaviour is consistent in terms of materials being recycled perhaps different in relation to the volume as well as the frequency of recycling:

"*I don't differentiate; I think recycling is recycling wherever you go as long as I've a designated bin to throw into. I have more trash at home just because all my food is at home and all my food droppings but if I have anything at work I would just recycle the same way. In terms of amount I do recycle more at home because I just have more but in terms of my own effort I just both . . . both home and work I will say I recycle the same way*" (Par_008).

However, two of these participants were observed to be using a desk bin where all materials they produced at work are been deposited. On the one hand, it suggests that what they claim

they do is not a reflection of their actual behaviour. On the other hand, the way they conceive recycling might be different from what is stipulated in the regulation (see Chapter 2) that is guiding recycling at work.

As a result, a general environmental or recycling behaviour (such as recycling of different materials) may not complete the narratives of why people are not recycling certain materials (such as food) at work. Accordingly, past behaviour (such as recycling at home) and target behaviour (recycling at work) should be measured at the same level of specificity to achieve a correspondence (Lee et al., 1995; Tudor et al., 2007b). This may include materials to materials (such as paper in both contexts) and/or schemes to schemes (for instance, commingle in both contexts). In terms of home and work correspondence, the exploratory findings of this research suggest that paper (paper products) is a likely material that an individual recycles in both contexts. For some participants, their recycling at work is influenced by the convenience/ease of recycling through facilities at work while their recycling at home is a function of volume, frequency, type of material being produced. For instance:

> "*I recycle more at work, maybe not, yes there's more recycling at work obviously we've got different bins in the premises we've got the plastic bins, we have can bins, we've got paper bins; it's a lot more here. At home, as I said the most recycle we do at home in our house is the papers which we easily take to one of the recycling points in Aberdeen*" [Par_001].

In support of Barr et al.'s (2010) observation, people compartmentalise their behaviour in terms of behavioural settings with respect to how they recycle at home and at work:

> "*What goes on at work it goes on at work and what goes at home goes at home; they are two separate things and the two don't mix. Waste recycling at work is more of a chore and I'm less enthusiastic but I don't really care about what they do at work is somebody else's problem. If all goes wrong, it has nothing to do with me but at home it is my responsibility, so I take it much more seriously at home than I do at work*" [Par_006].

"*I know at home I'm responsible for everything whereas in the workplace if I see a colleague doing something I don't agree with it's harder for me to enforce that because is a moral and personal choice to recycle and it's hard to say no you shouldn't put that in your general bin*" [Par_009].

Therefore, recycling behaviour at home is not consistent with recycling at work due to the observation from the participants' comments that work context is not perceived as an extension of home setting. This may lead to dissonance where people experience conflicts of values and/or norms especially in two competing contexts such as home and work as uncovered in this exploratory phase. For instance, people may endorse self-transcendent values at home and self-enhancement values at work (see De Groot & Steg, 2008) and vice-versa depending on the context (home or work) that is significant to their personal belief system. Nevertheless, there is a need for recycling to be normative rather than the exception (De Young, 1990) that could make significant impact and/or contributions especially to the environment.

In addition, there is a semantic difference on how recycling experience at home and at work is constructed by the participants. While a collective term (such as "we") is used to explain recycling at home, an individualised term (such as "I") is being adopted to construct recycling behaviour at work. The transition from "we" at home *(*such as *"We recycle glass . . . "*), to the use of "I" at work (for instance *"I have been putting plastic . . .*) [Par_011] is so dramatic that it influenced the perceptions and practices of recycling in both contexts. On the one hand, it suggests that recycling at home is a collective decision although a certain individual may play a dominant role (such as instigating and sustaining) which influences recycling behaviour of others within a household. According to Oates and McDonald (2006) who investigated the role of gender in household recycling behaviour and demonstrated that the recycling initiator in a household is most likely to sustain the recycling practices. On the other hand, the influence of significant others is stronger at home compared to work contexts for the same individual which may also relate to the issue of collectivistic versus individualistic culture in home and

work respectively. It may also relate to the issue of responsibility and ownership as well as power and authority at home and at work. For instance,

> *"If I don't put the right thing in the container, do you think she* (office administrator) *is going to tell me, the gaffer to sort it out? Whereas if I don't do that in the house and the wife is taking responsibility, I'm going to damn well do it because she will kick me for that because that's wife she does, and I have to admit that so perhaps there's a little disconnect in general, a champion, so who is going to have that responsibility"* [Par_002].

> *"She's (*wife*) quite hard on me she's stubborn so if she sits there, she will give me hard time - why are you bothering doing that? I told you before just throw it in the general waste skip so why are you doing? And for me it has to be another challenge to keep up doing what I'm doing and to convince her to come back to it, that you should be recycling"* [Par_005].

While the actions of family members (such as wife) can dis/encourage people to recycle at home, behaviours of colleagues at work may have little or no effects. For example,

> *I don't care what they do or what they think nor do I ask them, is not a thing that is talked about* (Par_006).

In order to bridge the current gap between home and work and to ensure consistency in recycling behaviour across these two contexts, some participants argued for continuity of how recycling is practiced at home and at work. If a workplace is construed as an extension of a domestic context, then recycling scheme should be consistent across the two contexts. As a result, there is a need for consistency between home and work settings in terms of recycling schemes, available facilities, and materials that can be collected for recycling. In addition, recycling schemes across and within local councils should be harmonised to enhance consistency in the way people prepare their materials for collection. For instance, the proposed introduction of mixed recycling system for households in Aberdeen should be implemented in all areas/districts both at home and at work settings within Aberdeen city to achieve continuity.

"*I think it would be continuity because sometimes we're moving to a mixed recycling in Aberdeen so at the moment we have the box and the bag (at home) and in the workplace, you don't have a box and bag you have bins*" [Par_009].

As a result, if people recycle in a certain way at home, they should be exposed to a similar situation at work in terms of bins (and their design), materials designated for such bins, and available information. There is a tendency therefore for behavioural spillover from home to work when people are not relying on their cognition in terms of what goes into what in order to prepare materials for collection. For example,

"*I know that's a bottle bin or I know that's this, so it needs to be clear and I do think it helps if there is a correspondence between home and work so it easier to identify the bins and what goes in what . . . I know what I do at home and I'm coming to work I have to readjust my mind set and think okay that's a different bin for that and this goes here. So, it would be easier if there's a correspondence*" [Par_009].

"*Not having the correct bins available, not been told where they are located, and not been advised on what can or cannot be recycled . . . I think that people should be told; first of all, I think the recycling bins in the office should be held in one section of the office and easily accessible and easily feasible as well*" [Par_011].

However, recycling behaviour at home may become habitual to the extent that recycling at work occurs without deliberate and planned thoughts especially when facilities are available:

"*Once you get into the routine then whether you're at home or work then the routine is to recycle. So, it's habitual thing so when you start doing it, it becomes automatic*" (Par_012).

"*I think if you recycle at home you would want to recycle at work but you want to because you're doing it anyway at home, so why would you change completely when you're at work*?" [Par_009].

On the contrary, a negative recycling habit at home may prevent recycling at work especially when facilities are not available or insufficient. According to Klöckner and Matthies (2004), habitual behaviour may lend itself to a situation where habits become so engrained that the

adoption of new behaviours are prevented. Many other factors beyond the control of a social actor may as well prevent the adoption and activation of new behaviours (in a similar or different contexts). Taken together;

> "*It can be frustrating with workplace, I think there needs to be a shared approach across businesses and households, I would love to see bins that are similar in households are being used in businesses as well. So, households and businesses having more continuity so is easier for people to know*" [Par_009].

5.9 Chapter Summary

In this chapter, a step by step exploratory qualitative investigation of people's perceptions and worldviews on waste and waste management especially recycling in the UK was presented. This was achieved by conducting a semi-structured interview with purposive (or information-rich) individuals (employees) from different organisations in the UK.

From this qualitative phase, there is a strong evidence to suggest a similarity between recycling at home and recycling at work in terms of how people recycle, however, recycling behaviour is different across these two contexts regarding the volume and the range of materials including the frequency of recycling. This is likely to be a significant factor in the UK government's waste management strategies and recycling decisions by focusing on home contexts with the collection of dry recyclables including food waste. Also, we can understand that people are more likely to engage in recycling at home or at work irrespective of their personality traits or belief systems when facilities are available. However, motivations for recycling at home were observed to be different than motivations for recycling at work. While the effects of psychological factors (such as attitudes and norms) have been well documented in the literature, the influence of facilities and other situational factors such as organisational support/commitment regarding scheme design including its accompanying facilities remain dominant, especially in the work context. For instance, the provision of personal desktop bins in some organisations was observed to be preventing people to segregate their waste despite the availability of separate receptacles while the lack of correspondence between recycling

schemes at home and work is perceived as a barrier to the spillover of recycling from home to work.

As a result, situational factors (such as scheme design) may inhibit or facilitate the recycling at work by activating people's personal norms (and other personality traits) and contribute to their feelings of control over recycling and responsibility to engage in recycling at work. For instance, it should be noted from the findings of this exploratory phase that people may exhibit a similar mentality and/or concern for recycling at home and work, other factors that are context-specific such as work schedule, priorities at work, lack of responsibility, lack of organisational support, inadequate recycling facilities may prevent recycling at work.

Whilst people may have a similar mentality towards recycling, the observed lack of similarities between recycling facilities at home and work suggest that recycling is likely to be inconsistent. Accordingly, the way people recycle at work may not necessarily reflect their personality traits and suggest that factors other than personality or psychological attributes are responsible for recycling in both contexts. However, the influence of psychological factors is less noticeable at work based on the knowledge that behaviour can be adapted, learnt, and disguised possibly to align with the existing social norms especially when green champions are present. To engender recycling behaviour, organisations have a responsibility to support and encourage their employees (including visitors/clients) to undertake pragmatic actions in reducing the negative impact of their decisions not only at work but also at home. This may cause recycling behaviour to spill from home to work and also to other pro-environmental behaviours such as energy conservation at work.

Nevertheless, this exploratory phase has provided answers as well as well revealed some intriguing questions (on waste, recycling, and waste recycling behaviour), many of which have been neglected in previous studies on recycling and other pro-environmental behaviour literature. As a result, this exploratory phase concludes that:

1. Different factors beyond psychological (such as attitudes) and personal (including socio-demographic) variables influence recycling (and/or pro-environmental) behaviours.

2. Contrary to the perception and expectation that environmental (and/or recycling) knowledge is a strongly determined behaviour, these qualitative accounts showed that adequate knowledge is not a prerequisite and not sufficient to explain recycling (or pro-environmental) behaviour. Based on the findings of this study, waste management professionals (or practitioners) are not always recycling rather they mostly adopt easier or convenient means of depositing materials into a nearest bin like ordinary people.

3. The influence of situational or contextual factors on recycling behaviour is stronger compared to other factors irrespective of orientations (inclinations) and belief systems of social actors. This research argued that the influence is more visible at work compared to home settings considering a lack of control and responsibility in terms of decisions concerning recycling (pro-environmental) behaviour at work. This is often the case when the benefits of participating (or investing) in pro-environmental activities (such as recycling) are not immediate or not directly accrued by organisations.

4. While legislation has played significant roles in driving recycling in the UK (see Chapter 2), a lack of proper monitoring and enforcement suggests that the implementation of recycling schemes (such as source segregation) is not consistent across different organisations in the UK. As a result, there is a need to harmonise recycling practices with a consistent recycling system across and within the local councils (including organisations) in the UK. The rationale is to reduce confusion on what, where, and how to recycle when moving from one organisation (or local council) to another.

5. As result, the lack of similarities between recycling schemes (such as different facilities) across multiple contexts suggests that recycling behaviour at home is different from recycling at work as experienced by individuals. This is a significant revelation considering that social actors often compartmentalise behaviours in terms of behavioural contexts. This may reduce the likelihood of behavioural spillover from home to work.

6. Also, perceived differences between home and work are signalled by a change from the use of "we" (at home) to "I" (at work) suggesting different beliefs about responsibility for recycling. Therefore, recycling at home is perceived as a collective activity contrasting recycling at work that is generally construed as an individual activity.

7. Considering the findings of this exploratory phase, factors that may contribute to recycling at work as well as enhancing the spillover over of recycling from home to work can be summarised into the followings:

    - Facilities (similarities, availability, convenience, proximity, office layout)
    - Feedback (measured at organisational level)
    - Green champion (social influence/subjective norms)
    - Incentives/Recognition (at organisational level rather than individual)
    - Organisational commitment/support
    - Ownership/Responsibility
    - Perceived control
    - Similar materials (type, volume, range) in both contexts
    - Similar mentality (personal/moral values) in both contexts
    - Similar scheme in both contexts.

These findings are important especially when explaining recycling behaviour for a better understanding of how recycling could be consistent between home and work. It is therefore argued in this research, that the anticipated correspondence (or the spillover effect) between home and work is more complicated and mostly moderated/mediated by contextual factors than earlier thought and reported in previous studies. As a result, it is high time investigators advanced the search for behavioural consistency beyond psychological and/or personal factors to contextual factors that may confound the effects of psychological/personal factors on recycling behaviour. This understanding is not only important to policy design but also valuable for waste planners (including facilities managers) to design effective schemes that could facilitate ease of recycling not only at home but also across different contexts.

As a result, the findings enhance our current understanding of recycling in the UK including its underlying factors as well as the possibility of achieving consistency across different contexts. As previously stated therefore, the knowledge from this exploratory study is further elaborated and integrated with the extant studies on pro-environmental (particularly recycling) behaviour to enhance the design of the conceptual framework including its underpinning hypotheses.

In the next Chapter, the research hypotheses, conceptual model, quantitative data collection method including the design and dissemination of the data collection instruments are further discussed. These are followed by the quantitative data analysis process and presentation of findings.

Chapter 6 Theoretical Framework and Hypotheses Design

6.0 Introduction

In previous Chapters, relevant studies on recycling, including some examples from other pro-environmental behaviours, were presented. From the review of these studies, particularly in Chapter 3, different factors influencing recycling at home and work were identified and broadly categorised under socio-demographical, personal, psychological, and situational factors (see Figure 8 for example).

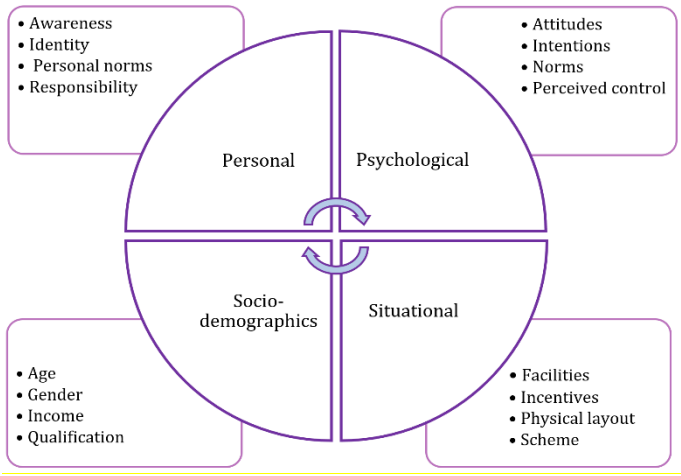


Fig. 8: Factors Influencing Recycling Behaviour (Author)

However, the findings of the qualitative phase (see Chapter 5) suggest that contextual factors, such as facilities, rather than personal/psychological traits, such as attitudes, are major determinants of recycling at work. The knowledge from the exploratory findings (Chapter 5) suggest that people may have a similar mentality regarding recycling at home and at work, however, behavioural context can either prevent or facilitate recycling behaviour, especially recycling at work. To maintain consistency between recycling behaviour at home and at work, the findings of the qualitative phase highlight the dominant roles of contextual factors including the similarities in materials that can be recycled at home and at work.

Contrary to the findings of previous research (Chapter 3) that emphasised personal/psychological traits, the exploratory findings of this research suggest that

contextual factors, such as organisational commitment as well as the similarities in materials (waste) that can be found at home at work are the only major facilitators of recycling at work including its consistency with recycling at home. In addition, the exploratory findings demonstrate the importance of responsibility and control not only to engage in recycling at work but also to translate recycling at home to recycling behaviour at work. It should be noted from the exploratory phase that whilst recycling at home is similar to recycling at work regarding how people recycle in both contexts, recycling in both contexts is different with respect to the type (volume and range) of materials and frequency of recycling.

The understanding from the exploratory phase with regards to recycling at home and at work including their relationship is necessary for the development of the conceptual framework including its underpinning hypotheses. To achieve the main goal of this research and to align the research to its pragmatic philosophical assumptions, this chapter presents the quantitative approach used in this research. Based on the knowledge from previous chapters, especially as presented in Chapters 3 and 5, this chapter presents the research conceptual framework and its hypotheses to provide a foundation for the development of the framework and to align the analytical procedure of this research to the tenets of an SEM analysis.

6.1. Design of Conceptual Framework

6.1.1. Theoretical Perspective Underpinning Recycling Behaviour

As previously discussed, the complexity of human behaviours has been highlighted by many scholars while the process of human decision making is argued to be ambiguous (see Armitage & Conner, 2001; Lo et al., 2012; Miafodzyeva & Brandt, 2013; Oke, 2015; Osbaldiston & Schott, 2012). In order to understand this complexity, different theories have been advanced and utilised especially in social and behavioural sciences research. Contrary to the findings of the qualitative phase of this research, many of these theories and previous studies (see Chapter 3) are explicitly or implicitly focused on attitudes and other socio-

psychological traits to explain pro-environmental behaviours (such as recycling and energy-use).

On the one hand, these theories are based on the "expectancy-value model" of motivation (see Ajzen & Fishbein, 2000) where human actions are assumed to be influenced by the values/benefits attached to behaviours as well as the expectations of a desired outcome from performing those actions (Ajzen, 1991; Bamberg & Schmidt, 2003). These motivations may be intrinsic, extrinsic (De Young, 1996; De Young, 2000), social, and achievement oriented (ego enhancement) in nature (Stern, 2000). On the other hand, many of these theories have been adapted, modified, and contextualised (such as Barr, 2004; Knussen & Yule, 2008) to understand how behaviours interact with and consequently influence the natural environment.

As human behaviours are not likely to be analysed using the principles of natural laws, using social and behavioural theories in explaining the human-recycling relationship seems plausible and becomes increasingly imperative, albeit challenging. These theories include the theory of reasoned action (Ajzen & Fishbein, 1977, 2000); the theory of planned behaviour (Ajzen, 1991, 2002); the theory of interpersonal behaviour (Triandis, 1977, 1979); the norm activation model (Schwartz, 1977), the new environmental paradigm (Dunlap & Van Liere, 1978), and the social cognitive model (Bandura, 1977). Nonetheless, it is difficult to be certain that these theories would explain (and/or change) recycling behaviour at work although behavioural theories offer a heuristic understanding of how human behaviours are predicted. Therefore, constructs from these theories that fit into the narratives of the current research based on the findings of the qualitative phase, with the intention of explaining the in/consistency in recycling behaviour between home and work are used. The rationale is to design a comprehensive model (see Section 6.1.2) that could offer a better explanation to people's recycling behaviour at work and in reference to how they recycle at home.

Whilst there is no specific theory of recycling (and/or pro-environmental) behaviour at the time of this research, the spillover effects (see Section 3.4) serve as a basis to explain why people recycle in/consistently between home and work. For instance, the notion of spillover as presented in Section 5.8 suggests that people who recycle regularly at home and perceive themselves as pro-environmental may likely maintain consistency in their self-perception by recycling at work. Nonetheless, the knowledge from the qualitative findings shows that this may only be possible under ideal situations, such as when recycling facilities are perceived to be adequate including the presence of organisational support that can facilitate recycling.

Although the available evidence (such as De Young, 2000; Thøgersen & Ölander, 2003; Thøgersen, 2004) suggests a possible spillover, people tend to compartmentalise pro-environmental behaviours (Barr et al., 2010; Berger, 1997) according to their domain/context (Bratt, Stern, Matthies, & Nenseth, 2015). So that being active in recycling at home may not affect the propensity of being active in recycling at work (see Barr et al., 2010; Berger, 1997; Thøgersen, 1999). This may lead to a denial of responsibility or attribution of responsibility to organisations as a justification for not engaging in recycling at work or to another family member at home as revealed by the qualitative findings of this research (see section 5.8). Nevertheless, the exploratory findings suggest that people with a similar mentality, personal norm or commitment, towards recycling are likely to behave consistently across these two (home-work) contexts, especially when organisational support regarding facilities is perceived to be adequate.

6.1.2. Design of Conceptual Framework: A Comprehensive Model

Considering that a theory is a set of interrelated constructs that results in research hypotheses (Creswell, 2014), the constructs for this conceptual model (see Figure 9 below) are directly linked to the findings of the qualitative phase of this research (Chapter 5) along with constructs from social-psychology theories (such as the theory of planned behaviour and

the norm-activation-model). These constructs include Attitudes, Past behaviour (recycling at home), Perceived control, Perceived organisational commitment, Incentives, Knowledge, Personal norms, Performance feedback, Recycling at work (dependent factor), Perceived convenience (Office layout), Perceived subjective (social) norms, and Socio-demographics. As established in Chapters 3 and 5, each of these constructs may independently explain recycling or interact together in predicting recycling at work.

While the relationship between recycling behaviour at home and at work can be explained by the concept of spillover, the identified constructs are used in this research to design a comprehensive model that has the potential to determine the propensity of spillover of recycling from home to work. The rationale of this comprehensive model is to relate the conceptual framework and its underpinning hypotheses as well as the questionnaire questions to the research goals, purposes as well as the research contexts.

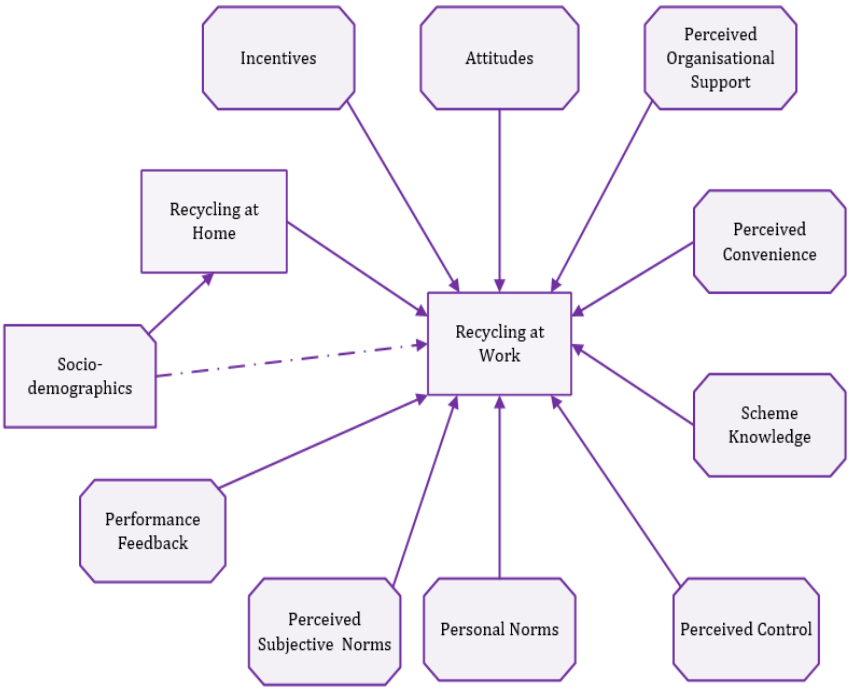


Fig. 9: The Research Conceptual Model (Author)

In contrast to many studies (such as Castro et al., 2009; Carrus et al., 2008; Chen & Tung, 2010; Nigbur et al., 2010; Wan, Shen, & Choi, 2017) that operationalised intention as a proxy for recycling behaviour, self-reported recycling behaviour is investigated in this research.

The rationale to drop intention is informed by the instability of intention, especially due to contextual factors as observed from the qualitative findings of this research including the evidence (such as Davies et al., 2002; Tudor et al., 2007b) that intention does not always translate to behaviour. More so, Bandura (2001) argued that intention should be operationalised as a self-motivating (and not as a predicting) factor considering the time frame between intention and target behaviours. This further compound the incapability of intention to predict recycling at work. For instance, people may express a positive intention to recycle based on their mentality towards recycling, however, the absence of adequate facilities and office demands may inhibit the performance of recycling at work based on the findings of the qualitative phase of this research. According to Davies et al. (2002), attempts to relate intention to recycling behaviour should be completely abandoned due to its inability to predict/explain (kerbside) recycling.

Similarly, self-reported recycling behaviour, based on the understanding of materials that can be recycled at home and at work (see Table 8), is investigated due to the inherent difficulty and challenges in measuring actual recycling behaviour. Although people may exaggerate their self-reported recycling behaviour (Tonglet et al., 2004), a positive association between self-reported and actual recycling behaviour has been observed (Huffman et al., 2014). Considering that recycling behaviour in both contexts was self-reported, it was expected that recycling behaviour in both contexts would be reported in the same manner (over- or under-estimation). As a result, this is not likely to have any significant effect on the analysis, given that the study is focusing on the dis/similarity between recycling at home and work, rather than the absolute figures reported (McDonald, 2011).

Whilst theories are used to guide research, particularly the data collection (and analysis) process, theories can also illuminate or conceal important information (Creswell, 2013; Denzin & Lincoln, 2011). Nevertheless, many theories have been developed and investigated in the realms of pro-environmental behaviour although the specificity of theories including models and/or perspectives to a study and context remains elusive (Wells et al.,

2016). Thus, the understanding of different factors and how they cluster together in influencing behaviour is likely to assist in developing a single (and holistic) intervention framework (or strategy) for pro-environmental behaviour (Bratt et al., 2015) across multiple domains and contexts.

Furthermore, four main issues associated with the existing waste management models and frameworks have been summarised in the literature. According to Tudor, Barr and Gilg (2008) these short-comings include a lack of comprehensiveness (that is, holism), fixation on TPB, application of wrong assumptions in terms of decision criteria, and overly restricting the research contexts to household or community sectors. However, this present research further argues that many studies (see Miafodzyeva & Brandt, 2013; Oke, 2015; Osbaldiston & Schott, 2012) have extensively focused on recycling intention rather than actual and/or self-reported recycling behaviour as the fifth issue.

Therefore, it is conceptually coherent to combine (or apply) more than one theory when investigating pro-environmental decision-making (Kollmuss & Agyeman, 2002; Stern, 2000). As a result, no particular theory (or theoretical framework) is used in this research; this decision is informed by the findings of the qualitative phase and the knowledge that no single theory has a definite utility to explain or predict behaviour. Consequently, a comprehensive model that eliminates the weaknesses of a single model/theory while enhancing the reliability and validity of why people recycle at work is used.

This decision found support in many studies (such as Botetzagias et al., 2015; Do Valle et al., 2005; Park & Ha, 2014) that combined two or more theories to create a model to investigate recycling. For example, Park and Ha (2014) combined the theory of planned behaviour (TPB) and the Norm-Activation-Model (NAM) to investigate consumers' recycling intentions although ascription of responsibility was not included, and intention was used as a proxy for recycling behaviour in their model. In addition, Klöckner and Blöbaum (2010) developed a comprehensive action determination model by incorporating the elements of the

theory of planned behaviour, the Norm-Activation-Model, the theoretical concept of habit, and the ipsative theory of behaviour to investigate travel choice behaviour. Similarly, Norton, Parker, Zacher, & Ashkanasy, 2015) proposed a conceptual model for employee green behaviours based on the existing knowledge in the literature. Although the model is based on person-environment interaction, job performance, and self-determination theory and differentiate between required and voluntary employee green behaviours, there is a lack of guidance on how the model can be empirically operationalised.

Rather than conceptualising recycling as either a self-interest or pro-social behaviour with the adoption of Ajzen's TPB or Schwartz's NAM respectively (see Bamberg & Möser, 2007), constructs from both theories are included in this present research. For example, attitude is adapted from TPB, social norm is adapted from the theory of interpersonal behaviour and personal norm is incorporated from NAM based on the findings of the exploratory phase (see Chapter 5) of this research.

6.2. Research Hypotheses

As presented above, the developed conceptual model resulted in the design of the hypothesised model (Figure 10) including its underlying hypotheses. It is important to understand that the hypothesised model represents a structural model of the full SEM model that this research seeks to estimate.

Nevertheless, two different effects can be identified in the model – direct and indirect effects. Contrary to a direct effect, an indirect effect occurs when the influence of independent on dependent variables is either transmitted or influenced by other variables in the model (Baron & Kenny, 1986; Hayes, 2013; Preacher, Rucker, & Hayes, 2007).

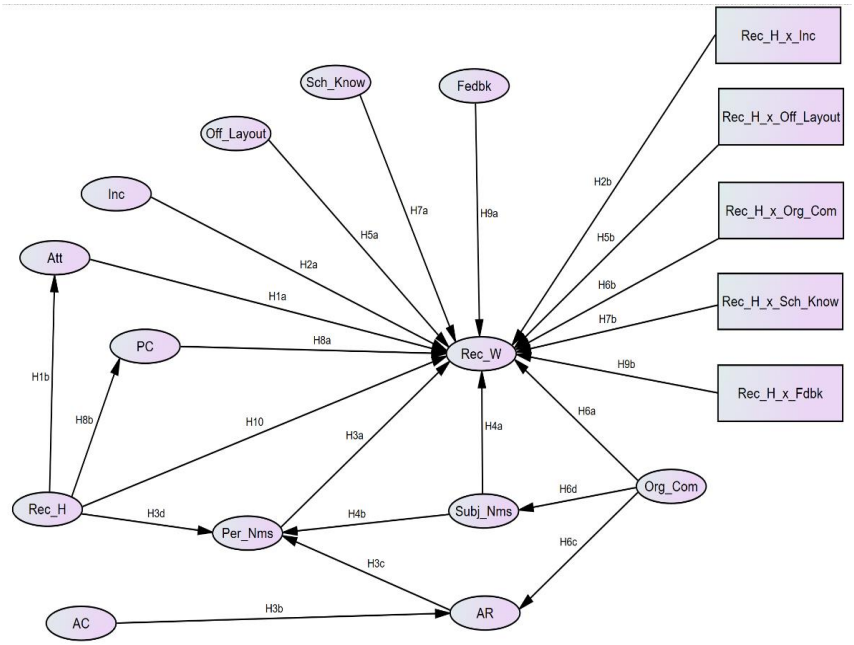


Fig. 10: The Research Hypothesised Model (Author)

Following the hypothesised model in Figure 10 above, the following research hypotheses are proposed based on the AMOS SEM analytical capabilities:

6.2.1. Attitudes

Attitude is widely embraced in social and behavioural science research to predict and explain people's behaviour toward an attitudinal object. As shown in Chapter 3, attitude is one of the most investigated factors in behavioural studies and has been conceptualised as well as operationalised in terms of how people, objects, and/or any other phenomena are evaluated (Ajzen, 1991; Miafodzyeva & Brandt, 2013; Osbaldiston & Schott, 2012). From the qualitative phase of this research, recycling, especially recycling at home, is considered as a type of pro-environmental behaviour that many people generally evaluate based on their subjective opinion. For instance, "*So, I think is one of those things that everyone has an opinion whether is good or bad thing or what we can do to recycle or what can't recycle or what we should recycle and that doesn't necessarily tie or linking with what we can*" [Par_002].

However, the evaluation process could be deliberate (conscious/explicit) or unconscious (implicit) in many cases although there is a likelihood for people to evaluate

recycling unconsciously without formal/prior reasoning or planning. While explicit attitudes are more likely to influence recycling behaviour, given that they are easily accessible/activated, implicit attitudes are innate and less accessible to human consciousness. Nonetheless, implicit attitudes can be activated automatically without any cautious reasoning due to the presence of attitude information (or objects) that may provide a cue (Fishbein & Ajzen, 2011). Whether implicitly or explicitly activated, attitudes indicate the extent to which people's beliefs towards recycling produce a favourable or unfavourable feeling in undertaking recycling behaviour. Therefore,

H1a: *A positive association between attitudes toward recycling and recycling at work is expected*

Therefore, positive attitudes are likely to be formed when people evaluate their participation in recycling with favourable outcomes and when that belief is readily accessible. For instance, people may likely develop a positive attitude toward recycling when they believe that waste (attitudinal object) generation has a negative consequence on the environment. In other words, attitudes are developed by people's beliefs about the consequences of their behaviour. For example, "*Ever since the beginning of time, humans have produced waste and we don't want to over-pollute the planet*" [Par_006]. While this approach is intrinsically instigated, external conditions such as persuasion (and/or pressure) can also influence the formation of attitude. According to the qualitative findings of this research, "*There is a growing emphasis on recycling now and recovery of waste*" [Par_013]. And "*It's becoming less acceptable not to recycle, I think that people are aware that we can't continue to put things to landfill that's not sustainable and they want to take action to do something*" [Par_009].

On the other hand, external conditions can lead to attitude formation and can also activate the already formed attitude with a consequent effect on recycling behaviour. While there is a plethora of research on the influence of attitudes on recycling behaviour, there is a

lack of consensus on when and how attitudes are formed or translate to (recycling) behaviour. According to the qualitative findings of this research, recycling attitudes can be formed from prior recycling experience. For instance, "*I think the practices have all got very good intentions; I think we are still learning and we learn by experience, certainly is a different world now than it was before*" [Par_006]. This corroborated studies (such as Ajzen, 1991; Knussen et al., 2004; Thomas & Sharp, 2013; Tonglet et al., 2004) have shown that recycling attitudes can be formed from past recycling experience. As a result,

H1b*: Recycling at home is expected to have a positive effect on people's attitudes towards recycling.*

Nevertheless, attitudes have been operationalised in pro-environmental studies using different approaches such as TPB and New Environmental Paradigm (NEP) to infer people's behaviour. While attitudes remain the most investigated psychological factors, there is a lack of consensus on the operational definition of attitudes leading to disparities in research findings.

6.2.2. Incentives

The use of monetary incentives in instigating and/or motivating recycling at home (see sub-section 3.2.1.3) and at work (see sub-section 3.3.1.3) has been widely reported in the literature. Based on the findings of previous studies on pro-environmental behaviours, Young et al. (2015) observed that financial incentives are a stronger predictor of other pro-environmental behaviours such as driving to work behaviour. Although Young et al. (2015) failed to associate incentives with recycling at work, the durability of incentives on recycling behaviour is a debatable issue with the understanding that recycling behaviour may return to the status quo once the reward system is discontinued.

In support of the qualitative findings of this research, the efficacy of monetary incentives in enhancing and sustaining recycling has been challenged, given that financial incentives can only exert a temporary influence on recycling behaviour, especially at work

(De Young, 1986; Lee et al., 1995). Although the use of a reward system has been challenged for its negative effect on pro-environmental behaviour (see Chapter 3), an understanding of recycling contexts such as home/workplace, as well as its targets (or recipients) such as householders/employees, prior to its introduction can enhance its effectiveness. For instance, the qualitative findings of this research suggest that financial incentives being introduced at an individual level, particularly at work, may not be attractive and are likely to be counter-productive.

However, some participants argued that the UK government should introduce a reward system for organisations that achieve a prescribed recycling target. For instance, "*if there were measured depending on the measurement, maybe they do independent measurements and then it depends if you can show how well your company does maybe they will give incentives then increase percentage to get higher*" [Par_012]. On the one hand, monetary incentives can be used to instigate/initiate recycling in a context where recycling is at a rudimentary level. For example, "*I remember as a child if I found a glass bottle I can go to a shop and get some money for it and I could buy sweets. So, it was almost like you were rewarded . . . and you want to keep doing it so is sort of innate within me*" [Par_011].

On the other hand, monetary incentives can be productive in motivating people when the rates of recycling are declining. For example, "*I think if you want to introduce recycling in the office like that, then you need to, maybe encourage that more actively, tell them to do it or provide incentives*" [Par_008]. However, monetary incentives as an intervention strategy have to be constantly evaluated and renewed in order to maintain their stability although it may eventually reach a saturation point, particularly when recycling becomes normative. On the other hand, incentives can be effective when used with other intervention strategies such as feedback and prompts (Luyben & Cummings, 1981; Timlett & Williams, 2008). According to Bandura (2001), the influence of incentives on behaviour is synonymous to the behaviour of weather vanes that constantly experience changes in direction in a mechanistic way to

conform to the external stimuli. On this basis, the development of an intrinsic motivation for participating in recycling, particularly recycling at work, is beyond the influence of financial inducements. Therefore,

H2a*: Monetary incentives are expected to have a negative effect on recycling behaviour at work*

H2b: *The influence of recycling at home on recycling at work is likely to be dampened by the interacting effect of monetary incentives.*

6.2.3. Personal Norms

Personal norms as conceptualised within the Norm Activation Model (NAM) have been operationalised as a feeling of moral obligation towards a certain pro-social action and construed as an antecedent of behaviour (Schwartz, 1977; Schwartz & Howard, 1984). The model (theory) has attracted a significant amount of interest from social and behavioural scientists (De Groot & Steg, 2009; Klöckner, 2013) especially in explaining altruistic (see Bednall, Bove, Cheetham, & Murray, 2013), pro-social (Klöckner & Ohms, 2009; Thøgersen & Ölander, 2006), and pro-environmental behaviours (Bamberg, Hunecke, & Blöbaum, 2007; Guagnano et al., 1995; Onwezen, Antonides, & Bartels, 2013; Zhang, Wang, & Zhou, 2013).

Although studies (see sub-section 3.2.1.2) have demonstrated an association between a sense of moral obligation and household recycling behaviour, the influence of personal norms on recycling behaviour at work has not been adequately investigated, mainly due to the dearth of empirical research in this domain. Nevertheless, there is a tendency to suggest a positive effect of personal norms on recycling behaviour at work based on the findings of the qualitative phase of this research. According to the qualitative findings of this research, a sense of moral obligation towards recycling is innate although it can be induced by learning, through parental upbringing or education. For instance,

"*I've always had that sort of understanding, awareness of waste and stuff because of the way that we used to deal with it as a householder at my Dad's house*" [Par_002].

This perception (or awareness) may lead to a value-system (and/or belief-system) that waste generation is unaccepted. As commented by a participant for example,

"*I was brought up sort of very much like you don't waste things you know, you do what you can, especially you don't waste any food or anything like that . . . I've always done it, always since I was little*" [Par_004].

Therefore, recycling may seem the right thing to do which is likely to underpin people's personal norms towards waste production. For instance,

"I've got a strict regime actually, because I hate waste, it's a personal hatred of mine . . . I hate waste and I just like seeing things dispose properly and it just seems the right thing to do" [Par_006].

As a result, pro-environmental and particularly recycling behaviour has been argued (Thøgersen, 1996) to be mentally categorised within the domain of morality while participation in such behaviour is conceived on the basis of perceived beliefs about what is right, wrong, or important.

As a result, personal norms are conceptualised as an immediate antecedent of recycling at work and highlight a feeling of moral obligation towards recycling at work in this research. Accordingly, a sense of moral obligation to recycle at work provides a basis on which to develop personal norms towards recycling and people with strong personal norms are more likely to recycle. As a result, there is a propensity for people with a sense of moral obligation to participate in recycling at work when personal norms are activated. Therefore,

H3a: *The relationship between personal norms and recycling behaviour at work is expected to be positive*

Based on Schwartz's (1974, 1977) NAM, however, it is difficult to activate personal norms when social actors are not aware of the consequences of their actions. For instance, "*Even though I know I need to recycle things in a proper way, sometimes you have that kind of lay back attitude kind of, you don't care much where it goes, or you will take assumptions that even if it goes in this bin, it will be sorted out somewhere*" [Par_013]. As a result, awareness of

consequences and ascription of responsibility can contribute significantly to the activation of personal norms (Schwartz, 1974) in motivating recycling at work. On the contrary, a lack of awareness can result in the denial of responsibility for the consequences of waste generation and may inhibit recycling at work. For recycling behaviour to be morally right or important at work to the extent that people engage in recycling at work, people will be adequately aware of its consequences while accepting the responsibility of recycling when at work. For instance, "*It's becoming less acceptable not to recycle, I think that people are aware that we can't continue to put things to landfills, that is not sustainable*" [Par_009].

According to NAM and corroborated by the qualitative findings of this research, personal norms can be formed when people are aware of the consequences of waste generation followed by the perception that recycling can address the negative consequences of waste while ascribing the responsibility of recycling at work to themselves rather than to their organisations. For example, "*We know that landfill sites are filling, and we must find an alternative to get rid of our waste*" [Par_007]. Therefore,

H3b: *A direct positive relationship between awareness of consequences and ascription of responsibility is expected. As a result, awareness of consequences is an antecedent of ascription of responsibility and ascription of responsibility in turn is an antecedent of personal norms.*

From the qualitative interviews, people's personal norms to undertake recycling activity at work is a function of the extent to which they ascribe recycling responsibility to self rather than to their organisations. For instance, "*waste recycling at work is more of a chore and I'm less enthusiastic but I don't really care about what they do at work is somebody else's problem. If all goes wrong, it has nothing to do with me but at home it is my responsibility, so I take it much more seriously at home than I do at work*" [Par_006]. Although it may be challenging to implement, making people feel more responsible for their waste at work is likely to activate their personal norms to engage in recycling. For example, "*I think you can*

make people more responsible but it's a tough one because there's a cultural change as well and that is what no one wants" [Par_002]. Therefore,

H3c: *It is expected that ascription of responsibility will exert a positive influence on personal norms. In other words, ascription of responsibility is expected to positively lead to the activation of personal norms.*

On the other hand, ascription of responsibility is more likely to enhance the propensity of maintaining consistency between recycling at home and recycling at work. Put differently, the extent to which people engage in recycling at home will contribute to the likelihood of ascribing the recycling responsibility to self which may consequently affect their moral obligation to engage in recycling at work. As a result, there is a tendency for a positive spillover of recycling behaviour from home to work for people with strong personal norms toward recycling, especially when recycling becomes normative. According to Thøgersen and Crompton (2009), the sense of moral obligation underpinning a behaviour may lend itself to people maintaining behavioural consistency across different domains/settings. Therefore,

H3d: *It is expected that recycling at home will have a positive effect on people's sense of moral obligation to perform recycling at work which may consequently influence their propensity to recycle at work. As a result, the relationship between recycling at home and work will be indirectly influenced by personal norms.*

6.2.4. Social Influence (Perceived Subjective Norms)

Social influence (subjective norms) is included to examine the degree to which recycling at work is influenced by the recycling activities of significant others based on the evidence that the presence of champions or colleagues (see sub-section 5.7.3.3) contributes to recycling behaviour. According to TPB, social norms (or subjective norms) describe the perceived expectations of significant others in terms of the reference behaviour and observed to explain a significant variance in people's behaviour based on Armitage and Conner's (2001) meta-analytical review.

Also, the findings of the qualitative phase of this research suggest an interaction between social influence in terms of recycling of family and recycling at home. Similar to recycling at home, the findings of this research demonstrate the influence of colleagues on recycling at work although it is likely that social influence is dominant at home compared to work settings. As commented by a participant for instance, *"if I don't put the right thing in the container, do you think she's (admin staff) going to tell me, the gaffer to sort it out? Whereas if I don't do that in the house and the wife is taking responsibility, I'm going to damn well do it because she'll kick me for that"* [Par_002].

Nonetheless, the extent to which social influence can influence recycling at work is associated to "perceived lack of responsibility and/or ownership" as uncovered by the qualitative findings (see Section 5.7.3.3) of this research. The presence of a green champion and/or a working environment (see Section 5.7.3.3) where people can correct/assist their colleagues in engaging recycling at work were observed in the qualitative phase of this research to enhance recycling. For example, "*I think it's hardest to challenge people in the workplace than it is at home. I can say to my husband hey . . . don't put tea bag into the general bin, put it in the caddy please you know because I've that relationship and I've a closeness. Whereas if I say to my, maybe a close work colleague, maybe somebody in another office, excuse me you shouldn't put that in there, I'll find that rude and difficult because of my personality*" [Par_009].

Although the effect of subjective norms is observed to be stronger at home, there is a tendency for subjective (social) norms to contribute significantly to recycling behaviour at work, especially when there is a good working relationship (interactions). According to a participant's comment for example, colleagues have "*no influence whatsoever, I don't care what they do or what they think, nor do I ask them; it is not a thing that is talked about*" [Par_006]. However, it is most likely that the interactions among the participants in the experimental set-up (see Brothers et al., 1994; Ludwig et al., 1998) contributed to the

observed increase in the collection of recyclables on the university campus although the influence of social norms was not investigated.

Although descriptive and injunctive social norms have been operationalised by many investigators, both forms of norms have been effective in predicting and enhancing pro-environmental behaviours (see Chapter 3). In this research, subjective norms are captured using the perceptions of respondents in relation to how their significant others, particularly champions and/or colleagues, contribute to their recycling behaviour at work. Considering that "*everybody else does it* (recycling) *so fine I just carried on*" [Par_004],

H4a: *Subjective (social) norms will have a positive influence on recycling at work*

In addition to the direct effect of perceived social norms on recycling at work, people at work are more likely to recycle at work when social norms are internalised or aligned to their personal norms in order for social norms to be activated. As a result, there is a possibility for behavioural spillover from home to work when an individual with the internal disposition of being ethical or a recycler is willing to identify with a reference group that shares a similar internal disposition or ethos. While the conflicts between norms (social and personal) may create inconsistency, McDonald, Fielding and Louis (2014) argue that the conflicts are likely to motivate pro-environmental behaviour. For example, "*I generally affect them - their behaviour, their wrong behaviour isn't going to affect my good behaviour*" [Par_010].

The conflicts due to disparities in self- and group-norms can de/motivate recycling behaviour depending on the salience of recycling norms at work. Rather than being defiant to the existence of social norms, this research argues that people may tend to align their personal norms to the dominant social norms at work to conform to the perceived group norms. As a result,

H4b: *Subjective norms are expected to have a direct positive effect on personal norms.*

6.2.5. Office Layout (Perceived Convenience)

As uncovered in the exploratory phase of this research (see sub-section 5.7.3.2), there should be opportunities in terms of facilities including their accessibility for people to engage in recycling at work. The opportunities should reduce the level of personal effort and costs that may be involved in performing recycling. These should address the question of how easy or difficult the office settings (or layout) make it for people to perform recycling at work.

The influence of office layout in terms of convenience (such as proximity of facilities) on recycling behaviour cannot be underestimated and indicates an important factor to consider when explaining recycling. For instance, convenience has been identified in the literature (see sub-section 3.3.1.4) as one of the major barriers to recycling behaviour at home. Also, the qualitative findings of this research suggest that convenience is one of the strongest predictors of recycling behaviour. For example, "*as a householder, it is availability, is the ease which I can do what I'm required to do . . . so having the ease and availability to service is the easier thing as a householder . . . at work is probably the same*" [Par_002]. Therefore, access to a system such as kerbside recycling, rather than a drop-off point, can make recycling more convenient suggesting that recycling participation is expected to be increased.

Similarly, materials that require more personal effort (such as washing/cleaning) may be least recycled, given that recycling is more than throwing used materials in the bins (see Oke & Kruijsen, 2016). For instance, paper and related products that require no additional effort are the most recycled material at home and at work according to the qualitative findings of this research (see Table 8) including the evidence from the literature (see sub-section 3.3.1.4).

Also, there is a tendency for convenience (such as availability and location of facilities) to have positive effects on recycling behaviour at work while the perceived lack of convenience is a potential barrier for to engage in recycling at work. For instance, "*I think at work is more challenging because of time constraints, I mean we're under a lot of pressure to*

work quickly . . . and sometimes when you're eating something, like a yoghurt, and you don't have anywhere to recycle . . . and if you're in a rush the convenient is not there sometimes in the workplace" [Par_009]. In addition, studies have shown that ease of recycling in terms of office layout that can facilitate bin availability, location, and arrangement is not only increasing recycling but also enhancing the quality of materials (see sub-section 3.3.1.4) being collected for recycling.

Also, the amounts of recyclables are expected to increase when bins are located where materials are being consumed. According to Ludwig et al. (1998), there was an increase in the recycling of can(s) when recycling bins were situated in proximity to where people were consuming beverages. Therefore, the quality and quantity of materials being collected is likely to increase when recycling bins are positioned at a convenient location and laid side-by-side, particularly where waste is being produced.

However, the tendency of those who have not been consistently participating in recycling will be reduced when recycling is perceived as inconvenient and requires additional effort. As a result, any scheme that requires additional personal effort and costs is not likely to be attractive for participation, suggesting that low cost interventions that can facilitate the ease of recycling may be adopted to enhance waste recycling participation at work.

Considering that the current legislation in the UK requires organisations and businesses to present their materials for separate collections, recycling at work may be perceived as inconvenient and may limit the participation in recycling especially when office layout is perceived to be hindering recycling. Therefore,

H5a: *The way people perceive office layout in terms of how easy/difficult it is to recycle is expected to have a direct causal effect on recycling at work. As a result, perceived convenience is expected to have a positive effect while inconvenience is expected to have a negative direct effect on recycling behaviour at work.*

Given that pro-environmental behaviours are voluntary at work (Boiral et al., 2015), office layout as a form of organisational support towards recycling as perceived by employees

can reinforce a sense of satisfaction and convenience in performing recycling at work. This support includes the provision of recycling bins and/or installation of a waste management strategy (or policy) that can make recycling more convenient for people to perform. As a result, those who have recycled and/or currently recycling at home are more likely to recycle at work when facilities are perceived to be convenient. Therefore,

H5b: *The positive influence of recycling at home on recycling at work is expected to be moderated by the interaction effect of office layout.*

6.2.6. Perceived Organisational Support/Commitment

The possibility for recycling to become a norm at work is a function of the extent to which organisations support and/or facilitate recycling at work. For instance, "*the company as a whole has got a policy of recycling as much as we can, the more we can recycle the better, so it's a company's recycling policy*" [Par_001]. The commitment of organisations to the environment in general and recycling in particular may be perceived by employees as a form of organisational support that can enhance recycling at work. According to a participant for example, "*the company has got strict recycling policy and that's why none of the people in the office has got a bin, everything must be recycled*" [Par_006]. Although organisations may install a recycling scheme based on their policy, at the centre of recycling at work are employees through whom recycling is implemented in various organisations. It is therefore imperative to understand how people at work can be enlisted and naturalised into their organisation's recycling initiatives although personal norms may play a significant role when organisational commitment is perceived to be lacking. As a reckoned by a participant, "*is something we've put together ourselves partly because in the general ground scheme of things, this building doesn't have anybody responsible for it*" [Par_004].

On the one hand, organisations may facilitate recycling at work by adopting a command and control (such as compliance) approach using a top-down system where recycling is made mandatory. For example, "*I got into recycling at work because you got no choice; one I don't even have a bin at my desk anymore, so you're forced into recycling; the*

company removed the bins and I just have to comply, it was the company that made decision and everything" [Par_006]. Also, "*I've never heard it yet (but) until somebody get disciplined for putting the wrong thing in the wrong container . . . it won't change*" [Par_002]. On the other hand, organisations can embrace participatory (voluntary) or discretionary methods using the principles of organisational citizenship behaviour (Smith, Organ, & Near, 1983). Organisational citizenship is construed as a concept often adopted whereby employees are perceived as citizens (akin to citizens of a country) with duties or responsibilities beyond their formal contractual (or role-based) obligations (see section 3.4). As a result, organisations are not only required to provide recycling facilities but may also encourage people to recycle at work, possibly through training, education, and other interventions. For instance, "*I think it's lack of education . . . if they were really told that they have to specifically put A into A, B into B they may do it but then you have the minority that won't do it, they just throw it*" [Par_007]. In addition, "*educating, it's hard, keep telling them this is what you meant to do and show them why as well*" [Par_010].

Although a voluntary recycling initiative and an organisational prescribed or imposed recycling scheme represent two distinct but related initiatives at work (see section 3.4), people are more likely to be motivated to recycle when there is a positive perception of organisational commitment and/or support toward their recycling behaviour. Three forms of commitment (or support) can be identified in the literature. According to Mesmer-Magnus, Viswesvaran and Wiernik (2013), these classifications include employee commitment to organisation; individual commitment to the environment; and organisational commitment to the environment.

However, these classifications exclude the most significant aspect of commitment and undermine the contribution of reciprocity especially to employees' recycling behaviour. Based on the findings of the qualitative phase of this research, these classifications are extended to four dimensions in this research with the addition of "organisational commitment to pro-environmental behaviour of employees". The rationale for the fourth

dimension of commitment is to understand the extent to which employees' environmental initiatives are encouraged and supported by their organisations. In this research therefore, this fourth classification is conceived as the willingness of organisations to persistently support, influence (or encourage), and believe in the recycling behaviour of their employees.

The addition of the fourth dimension is based on the findings of the qualitative phase of this research that indicates that employees are expecting some form of support from their organisations so as to facilitate their recycling. This support includes training, awareness, facilities (such as bins and their proximity), signage, and provision of enabling conditions that can facilitate recycling at work. According to this research, recycling behaviour at work can be enhanced when organisations are committed to recycling while supporting the recycling efforts on their employees when at work. Therefore,

H6a: *A positive association between perceived organisational support (commitment) for recycling and recycling at work is expected*

H6b: *The causal relationship between recycling at home and recycling at work is expected to be moderated by the interaction effect of perceived organisational commitment (support).* In other words, people that recycle at home are most likely to recycle at work when they perceive that their organisations are in support of their recycling behaviour (such as by providing recycling facilities or recycling information)

In addition, organisational support with regards to the provision of recycling information and facilities is likely to have a catalytic effect on people's sense of moral obligation to engage in recycling at work. However, it is expected that people are more likely to ascribe the responsibility to engage in recycling to self rather than their organisations when it is perceived that organisations are committed to the idea of recycling. For instance, organisational support (or commitment) through the provision of information can increase employees' self-efficacy, self-predisposition (Ramus & Killmer, 2007; Smith & O'Sullivan, 2012), perceived control (Boiral et al., 2015), and contribute to employees' personal commitment to recycle at work.

Although organisational commitment may not alter people's commitment to engage in recycling (Lee et al., 1995), it may enhance people's ability to perform recycling when there is a perception that organisations are making efforts to facilitate recycling. According to the findings of the qualitative phase of this research, the installation of recycling schemes, and provision of recycling facilities and information have a positive effect on the people's ability to recycle at work. The ability to recycle at work with regards to perceived organisational commitment indicates that people feel more responsible for recycling at work and ascribe the responsibility to themselves. Therefore, it is hypothesised that,

H6c: *There will be a positive influence of organisational commitment on ascription of responsibility to perform recycling at work*

As a result, there is a tendency for recycling to become normative at work to the extent that people feel more responsible and committed to the idea of recycling at work. Therefore,

H6d: *There will be a positive influence of organisational commitment on perceived subjective norms.*

6.2.7. Scheme Knowledge

In this research, specific recycling knowledge rather than the global environmental (and/or waste) management knowledge is operationalised. This is based on the exploratory findings of this research (see sub-section 5.7.2) including the literature (see Table 1) that recycling at home is a function of the extent of people's knowledge about a local recycling scheme. Accordingly, a good understanding of recycling including the available facilities will have a positive effect on kerbside recycling behaviour (Barr et al., 2001a, 2001b; Tonglet et al., 2004). It is understood from the literature that the available knowledge about recycling as well as materials that can be recycled can differentiate those who recycle from those who do not.

Likewise, the knowledge about a recycling scheme at work has been reported to positively contribute to recycling behaviour while a lack of knowledge has been shown (see sub-section 3.3.1.3) as a barrier to recycling at work. This is supported by the findings of the

exploratory phase of this research. For example, "*it really depends on workplace and what bins they have and how easily identifiable the bins are because if you look at bins from the rest of the bins, it needs to be clearly defined. That is the bin for this, this is the bin for that; and if that's not obvious, then people just see a bin and they don't think*" [Par_009]. According to Kelly et al. (2006), people may require no additional information when their present knowledge is perceived to be sufficient. Nonetheless, the more the knowledge of employees on environmental issues, particularly on recycling, the more the participation in waste management and/or recycling. For example, "*it's the awareness of doing your bit for the environment and what you can do for the environment is far more prominent than ever used to be before . . . and I think you start to think more about it and everywhere you look, through the papers, media there's always about do you do your bit for the environment, be it recycling*" [Par_005].

As a result, the propensity to recycle at work depends not only on experiential knowledge but also on tacit knowledge that may likely contribute to the competency and/or self-efficacy in performing recycling at work. For instance, "*some people are afraid to do it wrong, so they don't just do it at all . . . for these people, you know you got to try and get to try and find a way that works, that you can communicate with them and you've got to make it easy so*" [Par_004]. While different approaches can be used to enhance employees' tacit recycling knowledge at work, any adopted method should be explicit on what, where, and how to recycle in order to address individual needs. This may involve effective communication using a combination of different communication options targeted at specific recycling issues particularly on what, where, and how to recycle rather than justification for recycling alone (see Oke & Kruijsen, 2016). This is supported by a participant's comment, "*I think the most influencing factors is visual . . . may be the colours; you know this is a green bin or this is a yellow bin - colour is about everything; colour, signage so you're more aware*" [Par_012].

Therefore, a lack of specific information or knowledge about what and where to recycle may reduce the level of participation in recycling as well as reducing the quality of

materials being collected. The understanding of these components of information that encompass declarative and procedural knowledge (Iyer & Kashyap, 2007) will enhance recycling behaviour at work. The observed positive association between specific recycling knowledge and recycling behaviour suggests that people with adequate knowledge of waste recycling are more likely to recycle in contrast to those without recycling knowledge. As a result,

H7a: *A positive association between recycling scheme knowledge and recycling at work is expected*

Considering the positive influence of knowledge on recycling behaviour, it is likely that recycling knowledge gained from home (experiential knowledge) is likely to explain why people recycle at work. This is supported by the exploratory findings of this research including previous studies that observed that the knowledge of performing pro-environmental behaviours in one context/domain is likely to lead to behavioural spillover to another context/domain (section 5.8). However, the recycling knowledge from home can be easily transferred to workplace when there is continuity in terms of schemes including the facilities being provided. Based on the exploratory findings of this research for example, "*it can be frustrating with workplace, I think there needs to be a shared approach across businesses and households, I would love to see bins that are similar in households are being used in businesses as well; so, households and businesses having more continuity so is easier for people to know*" [Par_009]. Accordingly, the experiential knowledge gained from past experience can assist in developing the expertise or tacit knowledge required in performing similar behaviour in other contexts. Therefore,

H7b: *The causal relationship of recycling at home to recycling at work is expected to be indirectly influenced by recycling scheme knowledge.* In other words, scheme knowledge will have an interaction effect on the causal influence of recycling at home on recycling at work.

6.2.8. Perceived Control

Perceived behavioural control (PBC) is one of the constructs of the theory of planned behaviour (TPB) and is the only construct that is conceptualised to have direct as well as indirect effects on behaviour. Although the construct was not part of the earlier theory, the theory of reasoned action (TRA), it was added to TPB to address behaviours that are not under the volitional control of social actors. According to Ajzen (1991, 2002), PBC provides an explanation for the available resources and opportunities of performing a behaviour. As a result, the construct defines people's perceived ease or difficulty in performing a behaviour in a specific behavioural context although the perception is likely to vary across contexts. In other words, the construct explains the extent to which people believe that certain behaviours (such as recycling) are under their volitional control.

Since its addition, the influence of PBC on recycling behaviour as posited by TPB has been investigated by many researchers (see sub-section 3.2.1.2), albeit with mixed findings. While PBC has been found to influence recycling at home (Botetzagias et al., 2015; Park & Ha, 2014; Wan, Shen, & Yu, 2014), a lack of association (Tonglet et al., 2004; White & Hyde, 2012) and insignificant association (Knussen et al., 2004) between PBC and recycling behaviour have also been reported. In addition to recycling at home, a positive influence of PBC on recycling at work, especially within academic institutions, has been reported (see sub-section 3.3.1.2).

However, studies (see sub-section 3.3.1.2) argued that PBC is not a strong predictor of recycling behaviour at work despite the presence of adequate recycling facilities. Contrary to these studies, the exploratory findings of this research suggest that people may likely perceive a lack of control when organisational (commitment) support is lacking (see section 6.2.6) and when the office layout is perceived to be inconvenient (see section 6.2.5). As a result, contextual factors such as perceived lack of facilities or lack of access to recycling scheme may determine the effects of PBC on recycling behaviour. Considering the conflicting

findings in the literature, it is likely that there are contextual confounding factors, such as facilities and organisational commitment, not considered by many authors in their analysis if PBC is synonymous with self-efficacy as suggested by Ajzen (1991).

Although the construct can be considered as a proxy for actual control when people are truthful in their evaluation (Ajzen, 2002), it is not operationalised in this research as operationalised in TPB. In reference to the current legal requirements in UK workplaces (see section 2.3.2), recycling at work requires a significant amount of personal time and costs, suggesting that recycling may be perceived to be difficult and not under the control of people at work. For instance, "*may be people don't know what materials they can recycle, so there's a bit of confusion about can you recycle this, can you recycle that*" [Par_009]. As a result, "*a lot of people just throw into a general one because they are not able to differentiate between certain papers that are covered with plastic sticky paint*" [Par_008] despite the presence of separate bins. While recycling facilities may be adequate at work, people with strong control (self-efficacy) over recycling are most likely to recycle at work compared to others. Taken together, the presence of PBC including its influence on recycling behaviour suggest the effects of convenience, awareness of an on-going scheme as well as knowledge of recycling, particularly with regards to what, where, and when (see section 6.2.7).

However, it is less realistic that a measure of PBC has the utility to be substituted for actual behavioural control although it suggests a tendency to perform recycling in terms of self-efficacy, given the amount of information available on recycling in the UK. According to Ajzen (2002), the accuracy of PBC in determining the actual control is a function of the amount of information about the behaviour in question. Considering that the perception of control contributes significantly to recycling at home (see section 3.2.1.2), it may also contribute to recycling at work (see section 3.3.1.2). Therefore,

H8a: *The relationship between perceived control and recycling at work is expected to be positive*

H8b: *The relationship between recycling at home and recycling at work is expected to be indirectly influenced through perceived control.*

6.2.9. Performance Feedback

The positive influence of performance feedback, especially at the individual and organisational levels, on recycling at work has been acknowledged and demonstrated by many authors (see sub-section 3.3.1.4) using experimental approaches. In addition, feedback has been identified through meta-analysis of many studies (Miafodzyeva & Brandt, 2013; Oke, 2015; Osbaldiston & Schott, 2012) as a significant factor influencing pro-environmental behaviour including recycling.

On the one hand, performance feedback provides information on the current state of pro-environmental or recycling initiatives that could demonstrate the extent of organisational and people's involvement in addressing the environmental issues. On the other hand, it shows the extent to which organisations are committed not only to the scheme but also in supporting their employees in participating in the scheme. As result, many approaches such as written and graphic feedback (see sub-section 3.3.1.4), have been used to influence recycling. The main intention of these intervention strategies according to the literature was to understand whether performance feedback could increase recycling behaviour. Although the intention was to increase recycling, performance feedback is also likely to demonstrate to people at work that their organisations are committed to the idea of recycling.

Rather than using financial incentives, performance feedback can serve as a motivation for people at work to recycle especially when there is a set goal to achieve specific targets. For instance, McCaul and Kopp (1982) observed that students who were given a target to collect aluminium cans performed better than other groups without any targets over a period of two weeks of their experiment. Similarly, Kim et al. (2005) demonstrated the positive influence of feedback on the recycling behaviour of a university community and argued that written feedback is more efficient in encouraging recycling participation. As a

result, when people see and know how much they have recycled in the past, either at the departmental or organisational level and how it has compared to nation-wide performance, for instance, there is a tendency for people to engage more in recycling.

As a result, performance feedback can serve as an extrinsic motivation for people to recycle more. However, like any other forms of extrinsic motivation such as rewards, recycling behaviour may likely return to the pre-intervention regime when the interventions are withdrawn. Nevertheless, performance feedback can be more effective in instigating recycling behaviour as well as motivating people at work to recycle more. Taken together, performance feedback can serve as a prompt or nudge for people towards recycling at work and it should be regularly updated at a consistent interval to maintain its relevance. Therefore, this research hypothesised that,

H9a: *There will be a direct positive effect of feedback on recycling at work. In other words, feedback will have a positive causal effect on recycling at work*

H9b: *The relationship between recycling at home and recycling at work is expected to be moderated by the interaction effect of performance feedback.*

6.2.10. Recycling at Home

From the review so far, it is evident that recent efforts have been concentrated on home-based recycling compared to other contexts, particularly workplace contexts, suggesting that recycling is now a norm especially in UK households. Also, there is a convincing evidence from the qualitative phase of this research (see section 5.8) that recycling is more popular at home compared to work settings. For example, "*I pay more attention to my recycling at home*" [Par_007]. However, the extent to which this normative behaviour translates to recycling at work is a contentious question worth examining. While there are still controversies surrounding the concept of spillover, the available evidence suggests that the effects can be positive or negative, within the same domain/context, and across different domains/contexts (see section 3.4). This can be better explained by the

assumption that people can either rationalise or normalise their behaviour in order to maintain in/consistency in their recycling behaviour.

Although people may recycle at work as they do at home, especially when situations at work facilitate recycling behaviour, it is noted from exploratory phase that recycling is different from home to work in terms of volume and range of materials being recycled including frequency of recycling (see section 5.8). As commented by a participant for instance, "*I don't differentiate I think recycling is recycling wherever you go as long as I've a designated bin to throw into. I have more thrash at home just because all my food is at home and all my food droppings but if I have anything at work I would just recycle the same way. In terms of amount, I do recycle more at home because I just have more but in terms of my own effort . . . I will say I recycle the same way*" [Par_008].

Nonetheless, previous studies have attempted to explain the concept of behavioural spillover (see section 3.4) from one domain/context to another using different approaches. Although the concept of spillover is generating interest, only a few studies (such as Anderson et al., 2012; Barr et al., 2010; Lee et al., 1995; Ofstad et al., 2017) have investigated the spillover effects across different behavioural contexts. Although Andersson et al. (2012) adopted different behavioural contexts, similar pro-environmental (waste separation) behaviours were studied. Barr et al. (2010) investigated a possible relationship between home and vacation contexts, and a correspondence between work and home was investigated by Anderson et al. (2012).

While there is evidence of recycling at home, past experience for a certain material is not likely to be generalised to the recycling of other unrelated materials at work. However, the presence of correspondence with regards to schemes, facilities, and materials that can be recycled is likely to enhance behavioural consistency between the two contexts. As reckoned by a participant, "*if you do one thing at home so I live in Aberdeenshire so we've got the wheelie bin so is mixed recycling in the wheelie bin which is what Aberdeen is going to get so I put*

everything in that one bin but at work we have a box for plastics and tins and is a bit confusing because I know what I do at home and I'm coming to work I have to rejig my mind set and think okay that's a different bin for that and this goes here. So, it would be easier if there's a correspondence" [Par_009]. Therefore, normalisation of recycling at home including its harmonisation with recycling at work, particularly in the UK, suggests that,

H10: *The relationship between recycling at home and recycling at work is expected to be positive*

6.3 Chapter Summary

This chapter was dedicated to the development of the research conceptual framework with specific hypotheses based on the hypothesised model designed to investigate the possible spillover of recycling behaviour from home to work. Although no particular core theory is adopted to explain the in/consistency between recycling at home and at work, the framework and its underpinning research hypotheses were based on the evidence from the exploratory phase of this research (Chapter 5) including the findings from the literature (Chapter 3).

While the identified constructs were hypothesised to be exerting direct effects, they were also hypothesised to have significant effects in the spillover of recycling behaviour from home to work. Nevertheless, it is empirically challenging to model the complexity of recycling behaviour including its underlying constructs using a simple pathway. As a result, a comprehensive model was designed for further examination using AMOS SEM analysis.

Based on this model, past experience (recycling at home) may stabilise the influence of personal/psychological constructs on recycling at work especially when the situations at work are supportive of recycling. Using an SEM analysis, the complexity of recycling practices at home and work including the intervening effects of the theoretical constructs will be analysed. Therefore, the next chapter describes and presents the process of the quantitative data collection that is required to achieve that purpose.

Chapter 7 Quantitative Data Collection Process

7.0 Introduction

This Chapter presents the approach used to collect the required data in the quantitative phase of this research. Having described the research design in Chapter 4, this Chapter outlines the process of data collection specifically for the statistical assessment of the hypothesised model and its underpinning hypotheses as presented in Chapter 6. As a result, the instrument used as well as the recruitment process including the challenges encountered during the data collection process are presented in this chapter.

7.1 Data Collection Method

The decision to use a particular data collection technique is a function of the sample frame, research topic, characteristics of the sample, and available resources (Fowler, 2014). Nevertheless, each method of data collection has its inherent advantages and disadvantages (Bernard & Bernard, 2012; Bryman, 2015). Accordingly, the instruments often adopted in surveys include mail/postal, telephone, web-based (or online), personal (or face-to-face), and group administration (Bernard & Bernard, 2012; Bryman, 2015; Fowler, 2014).

Therefore, the selected data collection technique has profound effects on the question formats including the response rates. While no data collection approach is perfect, all the available techniques were examined in this research to select a reliable and realistic data collection instrument with reference to the available resources and the research purpose. Having assessed the available techniques (see Table 9), a cross-sectional online (web-based) questionnaire survey was adopted in this research. The decision to select an online questionnaire survey is mainly due to its low administrative and environmental cost and to access respondents that are only relevant to this research. Nonetheless, the recruitment of respondents was challenging and not straight forward.

Table 9: Data Collection Techniques		
Approach	**Pros**	**Cons**
Face-to-Face	Offers opportunities to sample disadvantaged people (i.e. illiterate, blind, & old)	Data collection may not be entirely objective due to the likely interaction of surveyors
	Opportunities to clarify difficult (or perceived ambiguous) questions	High administrative cost (i.e. time & money) especially when using more than one surveyor
	Reduced response bias as respondents are not be allowed to flip through questions	Could be excessively long (due instructiveness & reactiveness of surveyors)
Internet (web-based)	Easy to design & build due to the existence of different software packages	Sample frames may be unavailable
	Ease of data management (arrangement & collation)	Random sampling is not always possible
	Attract a substantive low administrative cost	Difficult to recruit respondents
	Hard-to-reach respondents can be easily accessible	Response rates are likely to be lower compared to other approaches
Mailed (Postal)	Useful when sampling frames & mail services are effective	No control over responses (i.e. how questions are interpreted)
	Influence of surveyors is minimal (i.e. reduced response bias)	Low response rates compared to drop-and-collect & face-to-face
	Complex & sensitive questions could be included	Lack of clarity on who responded to the survey
	Responses are convenient	Respondents could flip through questions & may bias responses
Drop-and-Collect	Useful when sampling frames or mail services are unavailable	Could be too costly (i.e. time) especially for a lone surveyor
	High response rates	Surveyor has no control over how questions are answered
	Reduced administrative cost (i.e. money)	Respondents may likely flip through questions & could introduce response bias
	Complex & sensitive questions are possible	Another person may fill-out the survey rather than the intended respondent
Telephone	Relatively inexpensive & convenient to administer depending on the location (i.e. countries or cities)	May not be representative of the target population (i.e. those who do not have phone or not listed on phone directories will not be sampled)
	Allows surveyors to clarify uncertain questions	Response rates are lower compared to other modes
	Response bias due to the interaction of surveyors are reduced compared to face-to-face mode	Responses can be manipulated (or falsified) especially when using hired surveyors
	Safe and less intimidating compared to face-to-face	Response time is likely to be considerably short
Source: Bernard & Bernard, 2012; Dillman et al., 2009; Millar & Dillman, 2011		

7.1.1 Survey (Questionnaire) Design

The main goal of this questionnaire design is to provide a suitable instrument in establishing and explaining correlation between recycling at home and at work using the hypothesised model developed in Chapter 6. As a result, the process of item generation (Figure 11) as posited in the literature (such as DeVellis, 2017; Fowler, 2014; Oppenheim, 2000; Spector, 1992) was adopted to ascertain the validity and reliability of the instrument used.

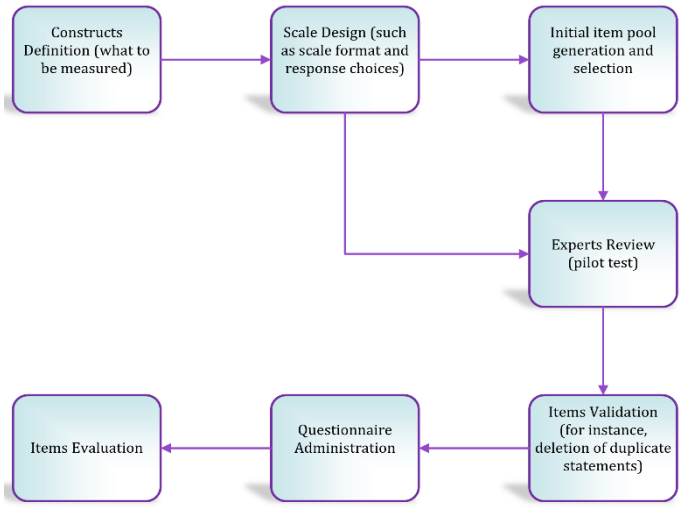


Fig. 11: Item Generation Process Framework (Author Adapted)

Therefore, the constructs to be measured were first identified based on the findings of the exploratory phase of this research including the evidence from the literature as illustrated in Figure 11.

Having identified the construct dimensions, some of the items were adapted to the present research from previous studies on pro-environmental behaviours while other items were developed based on the findings of the exploratory interviews of this research (see Table 10). A considerable amount of time was devoted to the questionnaire design and testing to ensure that the instrument reflected the research contents and contexts. Therefore, the validity and reliability of the chosen scales were taken into consideration during the instrument design stage to enhance the data quality. Although Table 10 provides an overview

of the questionnaire items including their sources, the full questionnaire instrument as operationalised in this research after piloting (see Section 7.1.2) was presented in Appendix 5.

Table 10: Questionnaire Items and Sources

Constructs	Questionnaire questions	Sources	Code
Recycling behaviour (materials often recycle at Home and at Work)	Paper (including envelopes, magazines & newspapers)	*Exploratory findings (Table 8); McDonald (2011); Waste Regulations (Northern Ireland) 2011; Waste (Scotland) Regulations 2011*	Rec.1
	Plastic (including bottles & food containers)		Rec.2
	Glass (including bottles & jars)		Rec.3
	Metals (including aluminium cans)		Rec.4
	Food waste		Rec.5
	Cardboard		Rec.6
	Garden waste (excluded for recycling at work based on the exploratory findings)		Rec.7
	Textiles		Rec.8
	Other items (such as batteries, ink or toner cartridges)		
Recycling (Volume of Materials)	I recycle more at HOME	*Exploratory findings; McDonald, 2011*	Vol.H.W
	I recycle more at WORK		
	Why you recycle more material at HOME/WORK		
Recycling (Range of Materials)	I recycle a wider range of materials at HOME		Ran.H.W
	I recycle a wider range of materials at WORK		
	Why you recycle a wider range of materials at HOME/WORK		
Frequency of Recycling	I recycle more often at HOME		Fre.H.W
	I recycle more often at WORK		
	Why you recycle more often at HOME/WORK		
Attitudes	It frustrates me that my organisation doesn't do more to encourage recycling	*Exploratory findings; Pickett, Kangun and Grove, 1993*	Att1
	I feel people worry too much about recycling at work	*Pickett, Kangun and Grove, 1993*	Att2
	I feel guilty when I fail to recycle at work	*Smith, Haugtvedt and Petty, 1994*	Att3
	When I recycle at work, I feel good	*Smith, Haugtvedt and Petty, 1994*	Att4
	I'm not interested in the idea of recycling	*Knussen et al., 2004*	Att5
	I do not have enough items to recycle at work to make recycling worthwhile	*McDonald and Oates, 2003; Tudor, Barr & Gilg, 2007b; Ebreo & Vining, 2001*	Att6
	To me personally, recycling at work is very important	*Smith, Haugtvedt and Petty, 1994*	Att7

Awareness of Consequences	I'm aware that recycling at work reduces the amount of waste that goes into landfill	*Exploratory findings; Davies, Foxall and Pallister, 2002*	AC1
	I know that recycling at work helps preserve natural resources	*Exploratory findings; Davies, Foxall and Pallister, 2002*	AC2
	I believe waste recycling could save land that would otherwise be needed for landfill	*Exploratory findings; De Young, 1986*	AC3
	I'm aware that recycling at work is good for the environment	*Exploratory findings; Davies, Foxall and Pallister, 2002*	AC4
Ascription of Responsibility	It is my personal responsibility to recycle waste at work	*Exploratory findings; Davies, Foxall and Pallister, 2002*	AR1
	I make every effort to recycle at work	*Exploratory findings; Lee, 1995*	AR2
	Recycling at work isn't worth the effort	*Davies, Foxall and Pallister, 2002*	AR3
Performance Feedback	I would recycle if there was feedback about my personal contribution	Exploratory findings	Fedbk1
	I would recycle at work if there was feedback about how much had been recycled in my workplace	Exploratory findings	Fedbk2
Incentives	I would take recycling at work more seriously if financially penalised for not doing it	*Exploratory findings; Shaw and Maynard, 2008; Meneses, 2009*	Inc1
	I would recycle at work only if I was paid to do so	*De Young, 1986; Lee, De Young and Marans, 1995*	Inc2
	I don't need monetary reward to recycle at work	*Exploratory findings; De Young, 1986; Lee, De Young and Marans, 1995*	Inc3
	Recycling at work is a trivial activity	Lee, De Young & Marans, 1995)	Inc4
	Recycling only benefits people in the recycling business	*De Young, 1986; Lee, De Young and Marans, 1995*	Inc5
	I would recycle at work if it was a legal requirement	*Exploratory findings; Shaw and Maynard, 2008; Meneses, 2009*	Inc6
Office Layout	The arrangement of my work space makes recycling easy for me	Exploratory findings	Off_Lay1
	The location of recycling bins makes it difficult to recycle at work	*Exploratory findings; Perrin and Barton, 2001*	Off_Lay2
	It's convenient for me to recycle at work	*Exploratory findings; Lee, De Young and Marans, 1995*	Off_Lay3
	Recycling at work takes up too much room	*Exploratory findings; Tonglet, Phillips and Read, 2004*	Off_Lay4
	I'm satisfied with the current recycling scheme at my workplace	*Chung and Leung, 2007; Exploratory findings; Lee, De Young and Marans 1995; Kaplowitz et al., 2009*	Org_Com1
	My organisation should put more effort into promoting recycling	*Exploratory findings; Chung and Leung, 2007; Lee, De Young and Marans, 1995; Kaplowitz et al., 2009*	Org_Com2

Organisational Commitment	In general, it takes a lot of effort to recycle at my workplace	*Exploratory findings; Chung and Leung 2007; Lee, De Young and Marans 1995; Kaplowitz et al. 2009*	Org_Com3
	There's little concern for recycling at my place of work	*Exploratory findings; Chung and Leung, 2007; Lee, De Young and Marans, 1995; Kaplowitz et al., 2009*	Org_Com4
	There's little information about recycling at my place of work	*Exploratory findings; Chung and Leung, 2007; Lee, De Young and Marans, 1995; Kaplowitz et al., 2009*	Org_Com5
	There's no recycling facility in my place of work	Exploratory findings	Org_Com6
	The recycling facilities in my place of workplace are sufficient	Exploratory findings	Org_Com7
Perceived Control	I have plenty of opportunities to recycle at work	*Tonglet, Phillips and Read, 2004 and Knussen and Yule, 2008*	PC1
	It is mostly up to me whether I recycle at work or not	*Ajzen, 2002*	PC2
	I understand well enough what is being said about recycling at work	*Kaplowitz et al., 2009; Meneses, 2009*	PC3
	I have no control over whether I engage in recycling at work or not	Exploratory findings	PC4
Personal (Moral) Norms	It would be wrong of me not to recycle at work	*Exploratory findings; Tonglet, Phillips and Read 2004*	Per_Nms1
	It would go against my personal principles if I did not recycle at work	*Exploratory findings; Tonglet, Phillips and Read, 2004*	Per_Nms2
	I believe people at work should make every effort to recycle	*Exploratory findings; Lee 1995*	Per_Nms3
	Recycling should be a normal part of our life at work	*Exploratory findings; Lee, De Young & Marans, 1995*	Per_Nms4
	I don't consider recycling to be an important issue	*Exploratory findings; Smith, Haugtvedt and Petty, 1994*	Per_Nms5
	Recycling seems like the right thing to do	*Exploratory findings; Lee, De Young & Marans, 1995*	Per_Nms6
	Acting ethically is an important part of who I am	*Exploratory findings; van der Werff, Steg and Keizer, 2013*	Per_Nms7
	Recycling at work is an important part of who I am	*Exploratory findings; White and Hyde 2012*	Per_Nms8
	I'm the type of person who acts in an environmentally-friendly way	*Exploratory findings; van der Werff, Steg and Keizer, 2013*	Per_Nms9
	I'm not the type of person who is inclined to engage in recycling at work	*Exploratory findings; White and Hyde, 2012*	Per_Nms10
Scheme Knowledge	I know the items that can be recycled at work	*Exploratory findings; Kaplowitz et al., 2009; Meneses, 2009*	Sch_Know1
	I require more information on the location of recycling facilities at work	*Exploratory findings; Iyer and Kashyap, 2007; Kaplowitz et al., 2009; Price and Pitt, 2012)*	Sch_Know2
	I've no knowledge of my workplace's waste management strategies	*Exploratory findings; Kaplowitz et al., 2009; Meneses, 2009*	Sch_Know3
	I know how to recycle at work	*Exploratory findings; Iyer and Kashyap, 2007; Kaplowitz et al., 2009; Price and Pitt, 2012*	Sch_Know4

	I require more information on what (materials) to recycle at work	*Exploratory findings; Iyer and Kashyap 2007; Kaplowitz et al., 2009; Price and Pitt, 2012*	Sch_Know5
	I require more information on how to recycle at work	*Exploratory findings; Tonglet, Phillips and Read, 2004; Knussen and Yule, 2008*	Sch_Know6
Subjective Norms	Most of my colleagues at work recycle	*Thøgersen, 2009*; *White et al., 2009; Tonglet, Phillips and Read, 2004*	Subj_Nms1
	When I see my colleagues recycling, I feel I should recycle as well	Exploratory findings	Subj_Nms2
	Most of the people who are important to me would approve of workplace recycling	*Thøgersen, 2009*; *White et al., 2009; Tonglet, Phillips and Read, 2004*	Subj_Nms3
	Most of my colleagues at work expect me to recycle	*Thøgersen, 2009*; *White et al., 2009; Tonglet, Phillips and Read, 2004*	Subj_Nms4
	I'm a person who considers friends and colleagues to be important	*Brown et al., 1986*	Subj_Nms5
	I like being a participant in group activities	*De Young, 1986*	Subj_Nms6
	It's important for me to maintain harmony within my group	*Singelis, 1994*	Subj_Nms7
Source: Author			

As a result, the respondents' views were assessed using a 5-point rating scale (Oppenheim, 2000). For instance, the antecedent (at home) and target (and work) behaviour (recycling) were assessed using items that were scored on a 5-point rating scale, ranging from "Never to Always. A 5-point rating scale was used in this research given that Likert scales are typically 5 points (Fink, 2012) and a higher rating scale offers no empirical advantage over the 5-point rating scale (Dawes, 2008; Oppenheim, 2000). According to Dawes' (2008) experimental analysis, there is no statistically significant difference between the lower (such as 5 and 7) and higher (such as 10 and 11) item scales with regards to their standard deviation, kurtosis, and skewness. However, the reliability and validity of data are improved with 5- and 7-point rating scales compared to 9, 10, and 11 rating scales although a higher rating scale may produce a lower mean with a greater dispersion of data around the mean (Dawes, 2008).

In addition, a rating scale between 7 and 9 categories is useful when exact information is required with respondents willing to provide the specific information needed (Fink, 2012). It

is challenging (and impractical) to establish whether respondents would be willing to provide the required information before the questionnaire is designed. However, the Likert scales as used in this research offer respondents more opportunity to supply precise information about their level of dis/agreement (see Oppenheim, 2000). As a result, the statements constituting each latent construct were examined using a 5-point rating scale, ranging from "Strongly Disagree" to "Strongly Agree". However, some sections in the questionnaire presented the respondents an opportunity to support the responses with their personal comments. The essence of this open-ended approach was to avoid only prescriptive or mechanistic questions that may not, in reality, reflect the holistic views of respondents' recycling practices.

Therefore, the questionnaire (see Appendix 5) included the measures of individual-based attributes (such as scheme knowledge) and organisational-based information (such as perceived organisational support) to capture recycling behaviour in both contexts. All the items in the instrument were classified into different sections reflecting the constructs in the conceptual model. However, the statements were not thematically arranged by grouping all the questions relating to one construct together to reduce a possible effect of response bias. Also, socio-demographics were collected using the guidelines suggested and prescribed by Oppenheim (2000). Consequently, socio-demographic questions were located at the end of the survey rather than the beginning considering that many people may be put off and not be motivated to answer personal questions such as age, gender, and personal income.

Rather than using a paper-based approach (see section 7.3.l), the questionnaire was designed using Google Forms, an open access platform for survey designs which neatly and automatically collects responses in "Forms" with real time information and charts.

7.1.2 Piloting

Prior to the actual data collection, the questionnaires were pre-tested through peer-assessment to ensure that the proposed questions are relevant, comprehensive, and logically sequenced (Fink, 2012; Fowler, 2014). Based on suggestions (such as Fink, 2012; Teddlie &

Tashakkori, 2009), a pilot study was used to establish the capacity of the questionnaire to measure what it is being designed for (internal validity) and to cover all the essential investigative areas (content validity). The pilot study was conducted to ensure that the right questions were asked and to identify ambiguities (such as misinterpretation of questions, double barrel questions, and technical jargon) in questions wording and presentation (see Bernard & Bernard, 2012; Fink, 2012; Fowler, 2014).

As a result, the questionnaire was pre-tested (see Cooper & Schindler, 2006; Fink, 2012; Oppenheim, 2000) using 25 selected individuals comprising 7 members of staff (4 academic and 3 non-academic) and 8 PhD students of Robert Gordon University. To ensure that the items represent the domain (recycling behaviour) and contexts (home/work) of interest, 10 participants (which included 7 experts in waste and/or environmental management) in the qualitative phase of this research were also approached to review the questionnaire instrument.

The questions were assessed item-by-item to enhance the content validity of the instrument by eliminating any form of ambiguities. This approach allowed an accurate estimate of the time requirements to complete the survey and ensure clarity of wordings, questions format, and scales (Bernard & Bernard, 2012; Creswell, 2014), and procedures (Oppenheim, 2000) used for the questionnaire survey. In addition, the letter of introduction including the questionnaire layout on the web-platform was the piloted.

These experts' opinions coupled with the findings of the interviews were incorporated to improve the final instrument and enhanced its validity beyond the subjective face validity to structured and thorough content validity. Prior to the formal dissemination of the final instrument, a second pilot study was conducted involving 21 staff of a prestigious university in England, UK. As no further changes were required to the instrument on the basis of this second pilot, those responses are included in the final dataset.

7.1.3 Reliability and Validity of the Instrument

Considering that many constructs in social and behavioural science research are latent and not directly measurable (Edwards & Bagozzi, 2000; Kline, 2015), there is a need for data collection instruments to be assessed for reliability and validity prior to the actual data collection. In quantitative terms, validity focuses on the ability of the measuring scales to adequately assess the constructs they are designed to measure while reliability indicates the extent to which the measuring scales produce consistent outcomes (DeVellis, 2017; Kline, 2015). The rationale was to reduce the measurement errors and to ensure that the instrument measured what it sets to measure while reflecting the true meaning (score) of the underlying constructs (DeVellis, 2017; Straub, 1989).

Therefore, the selection of the items from empirical literature which were further refined by the qualitative findings of this research enhanced the reliability and validity of the instrument used. Following the identification of the questionnaire items (see sub-section 7.1.1), experts' (statisticians) opinions were sought to establish the adequacy of the selected items. As a result, the reliability and validity of the instrument used in this research provide methodological evidence that this research was conducted with scientific rigor.

Prior to the actual data collection, the survey instrument was pre-tested (see sub-section 7.1.2) to confirm its reliability and content validity. Based on Teddlie and Tashakkori's (2009) suggestions, the instrument was piloted to ensure that the instrument measured what it was designed for (internal validity) and to specifically address recycling behaviour at work (content validity). Also, the pilot study allowed for the clarity/brevity of the questions, formats while enhancing the scales (Creswell, 2014), and procedures (Oppenheim, 2000) for the questionnaire. For example, a 4-point rating scale without a neutral value was initially considered, however, a neutral point was later included based on the feedback from the reviewers.

In addition to the considerations of content and face validity, construct validity which involves a statistical process is achieved using causal models, confirmatory factor analysis (CFA), and path analysis in SEM by estimating both convergent and discriminant validity (see Chapter 8). Also, the estimates of CFA including factor variances and covariances, loadings of the indicators on their respective factors, and the measurement error associated with each indicator (Kline, 2015) are discussed in Chapter 8.

The approach concerns how measures of a construct are comparable to one another rather than against any external standard (Fowler, 2014; Kline, 2015). Accordingly, it shows the extent to which the theoretical variables correspond to their underlying measurements. For instance, all indicators measuring a particular factor are expected to load significantly (with standardised factor loadings ≥ .70) on that factor alone to suggest convergent validity. On the contrary, the correlations with other factors in the hypothesised model should be considerably low (< .90) to indicate discriminant validity (Kline, 2015).

While convergent validity and discriminant validity are assessing the measures of a similar construct, criterion-related validity can be labelled as another type of construct validity that concerns the extent to which scores are related to an external criterion. Nevertheless, the difference between construct and criterion-related validity is a function of interpretation based on the research intent rather than the values of correlation obtained (DeVellis, 2017).

Reliability concerns the extent to which the observed scores of the sample are free from random measurement error, that is, the degree to which the observed scores reflect the sample true scores (DeVellis, 2017; Kline, 2015). As a result, the measuring scale must produce a score that is a true reflection of the construct (or variable) being assessed. In other words, reliability which is similar to construct validity addresses the relationship between the indicators and the latent true score (DeVellis, 2017).

In order to estimate reliability, different approaches (such as test–retest reliability and internal consistency) (Pallant, 2016) have been developed although the existing methods share a common conceptual foundation (DeVellis, 2017). On the one hand, test-retest reliability provides a temporal stability by estimating a correlation between the two scores obtained from administering an instrument to the same people on two different occasions. On the other hand, internal consistency indicates the extent to which the scale items are measuring the underpinning construct.

In this research, internal consistency reliability rather than test-retest reliability was adopted due to the logistical issues including the level of resources available for this research, given that test-retest involves the same respondents being assessed on two occasions and may also have raised issues about the protection of anonymity. However, the internal consistency was to reduce the error score in the observed score to achieve a near perfect true score obtained from the measuring instrument. As a result, Cronbach's Alpha coefficient which is often reported in empirical research as a measure of internal consistency reliability (Kline, 2015; Pallant, 2016) was applied in this research (see Chapter 8). Accordingly, a Cronbach's Alpha coefficient between 0 and 1 with a value closer to 1 signifies a strong reliability although the measures are sensitive to the number of items in a scale.

7.2 Sampling Design

7.2.1 Research Population

One of the major challenges confronting survey research is sampling including its credibility, comprehensiveness, and representativeness (Bernard & Bernard, 2012; Fowler, 2014; Pallant, 2016). The main dilemma is whether to survey an entire population or to select a sample that is representative of the target population. However, it is impractical in some instances to sample the entire population when conducting empirical research. As a result, some sampling procedures provide an equal opportunity for individuals in the population to be included while excluding others based on pre-defined criteria (Fink, 2012; Fowler, 2014).

On the basis that a research population is representing a complete set of elements with similar characteristics (Bryman, 2015; Creswell, 2013; Fink, 2012), the population of interest in this research consists of people working in different workplaces in the UK. According to the ONS (2017), about 32.01 million people, aged between 16 and 64 are currently at work in the UK. Although this population is eligible to participate in the research, the research is only focusing on those working away from home to ensure that the answers about home and workplace recycling are distinct and meaningful. Nonetheless, it is unrealistic to sample all these potential respondents within the allocated resources of this research.

7.2.2 Sampling Frame

Having defined the target population and due to the impracticability of sampling the entire population, a sampling frame was set-up to put the population of people at work in a useable format (Fink, 2012; Fowler, 2014). Therefore, the sampling frame that indicated the profile of people at work in this research includes the Financial Analysis Made Easy (FAME) and Kompass databases, companies' directory, and other specifications (such as referral).

Initially, the option of recruiting respondents from households using either the UK electoral register or by purchasing Postcode Address File (PAF®) from the Address Management Unit was considered. The decision to sample workplaces rather than households was made based on the available budget and to conserve resources (such as energy and paper). For instance, a vast amount of paper questionnaires would be required, printed, and sent by post to achieve a desirable response rate for the intended statistical analysis and to make a plausible conclusion about recycling behaviour at home and at work. By sampling postcodes, a large proportion of questionnaires would be sent to people who were ineligible to answer as they were retired, unemployed, or worked at home. This consequently influenced the approach for the selection of an online platform for the instrument administration although access to potential organisations was a major challenge.

Nevertheless, the sampling frame as designed in this research reflects the entire target population of employed people in the UK although only people working away from home were eligible to provide unbiased and independent estimates of recycling behaviour at work. Also, the recent advancement in Internet technology suggests that every member of the sampling frame had equal opportunities of participating in the survey which was likely to reduce sampling bias.

7.2.3 Sampling Procedure

In social and behaviour sciences research, the sampling procedure which is a process of collecting a sample from a wider population can be classified into probability (or random sampling) and non-probability (such as convenience) sampling techniques (Bernard & Bernard, 2012; Bryman, 2015; Creswell, 2014; Fink, 2012; Fowler, 2014). In probability sampling, every member of the target population has an equal opportunity of being selected while non-probability sampling involves a selection of respondents based on their availability and convenience.

Consequently, random sampling that requires a given number of respondents to be scientifically or statistically drawn from the sampling frame was initially used in this research. This approach contrasted non-probability sampling that relies on the investigator's personal judgement (Bernard & Bernard, 2012; Fowler, 2014). Accordingly, probability sampling can be sub-grouped into simple, systematic, stratified, and cluster random samplings (Bernard & Bernard, 2012; Bryman, 2015; Fink, 2012). The probability sampling provides an opportunity to pre-define a frame (see Section 7.2.2) from the target population where the unit of analysis can be randomly selected.

In this research, the main goal is to ensure that people in UK workplaces are represented as accurately and precisely as practically feasible although it was administratively impossible to sample individuals within the organisations. This was for ethical reasons (see Fink, 2012) including the enforcement of data protection law in the UK

which prevents employees' email addresses being accessible to those outside the organisation. In addition, it is unethical to send individuals an email without an established relationship (Dillman et al., 2009; Millar & Dillman, 2011), given that employees' email contacts are not in the public domain. Although not all procedures require strict probability sampling (Fowler, 2014), any sampling method that can increase the chance of individuals within the target population to be selected was adopted in this research to derive approximate sample estimates (see Bernard & Bernard, 2012; Fowler, 2014). Therefore, a multi-stage sampling approach was used in this research. The initial approach was to use a pre-defined sampling frame based on the FAME and Kompass databases. This allowed the selection of different organisations from the natural clusters of the UK countries (England, Northern Ireland, Scotland, and Wales). This approach did yield a few participating organisations but not a sufficient number to ensure the statistic robustness of the data analysis. Therefore, a second approach was adopted whereby organisations were recruited through personal contacts and networks. The two sampling procedures used are further detailed below.

To recruit respondents for the survey, FAME and Kompass databases were initially consulted to retrieve potential organisations in the UK given that employees' contact addresses are not available in public domain. A total of 38,302 organisations across the UK were retrieved due to the limited access as imposed by financial constraints, however, only a fraction (14,420) of these organisations has contact (email address) details. From FAME and Kompass databases, 3,000 different organisations with email (and/or telephone) contacts were randomly selected using "Research Randomizer" (www.randomizer.org) to generate a representative sample of organisations in the UK. The intention was to reduce the sampling error which is perceived as difference between the target population and the implied (and/or sample) population as used in a research (Field, 2009; Hair et al., 2010). Also, the decision to select 3,000 organisations was informed by the researcher's experience regarding the response rate (about 15%) from another study of consumer green/ethical behaviour that

adopted a postal survey method. Although no strict criteria were imposed in selecting organisations apart from the availability of contact details, the preliminary data cleaning process generated a total of 1,527 companies (out of 3,000 organisations that were initially retrieved) with useable contacts for participation in the main survey.

Although 1,527 organisations were initially contacted to seek their participations in the research, only 241 organisations expressed their interest in participating in the online survey by responding to the initial invitation. The non-respondent organisations were estimated to be 1,286 (1527 – 241 = 1,286) in total and representing about 84% of the invited organisations. A survey link and letter of introduction were sent to these organisations with the possibility of disseminating the link to their employees for completion. A total of 104 responses were obtained from 23 organisations using this approach.

Due to the non-response from the majority of the 241 organisations that expressed their interest, dedicated contact(s) were identified from these and other organisations mainly through referral and cold-call. It was difficult for the researcher to establish at the time of data collection process whether the survey link was eventually distributed to employees in those organisations. Notwithstanding, a personalised survey link was sent to the identified contacts rather than the organisations' email address as performed in the first wave of the survey distribution. In comparison to the first wave, using a dedicated contact motivated many organisations and enhanced the participation rate. Using this method, a total of 263 responses were obtained from 20 organisations. Although this second approach was more successful in that it elicited a far higher number of responses than the initial method, it was not possible to estimate the response rate in each organisation which could inform the total response rate (and non-responders) for this study. This was due to the inability of the researcher to know the total number of employees (including clients and contractors) in each organisation including the actual number of employees that received the survey link, as in several cases contacts sent the survey link to only a subset of employees, for example.

7.2.4 Sampling units and Sample size

In this research, the sampling units (or units of analysis) are individuals from different organisations in the UK. According to Bernard and Bernard (2012), data on individuals are less difficult to aggregate when explaining organisational performance rather than disaggregating data on organisations to explain the individuals' behaviour.

As a result, a cover letter (Appendix 1) that introduced respondents to the research and provided background information about the research was included in the survey that was sent to the 241 organisations that expressed their interest in the research. Considering that the survey link was sent to a dedicated email address (such as organisations or a nominated contact within the organisation), it was difficult to establish the influence of organisations (and/or colleagues) on the completion of the survey. Although this may likely introduce social desirability bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff, MacKenzie, & Podsakoff, 2012), the adoption of an SEM analysis in this research accounts for the possible effects of measurement errors (Arbuckle, 2016; Byrne, 2016; Kline, 2015). Given that individuals rather than organisations are the unit of analysis, it was difficult to estimate the actual response rates, non-responders, and those who engaged but failed to complete the survey.

Nonetheless, a sufficient sample size required to run the SEM analysis was anticipated although the appropriate sample size in statistics and particularly in SEM is a debatable issue (see Anderson & Gerbing, 1988; Bagozzi & Yi, 2012; Fan, Thompson, & Wang, 1999; Iacobucci, 2010; McDonald & Ho, 2002). For instance, studies (such as Anderson & Gerbing, 1988; Bentler & Yuan, 1999; Ullman, 2006) have suggested three or more indicators per construct with a sample size between 100 and 150. Also, Iacobucci (2010) argued for a sample size as small as 50 to yield a convergence validity. In order to provide a precise commentary on the sample size, the issue of sample size including its implications in an SEM analysis is further addressed in the analysis chapter.

7.3 Survey Distribution

In order to disseminate the survey instrument, the contacts (such as name, website, email, and telephone number) of the UK-based organisations were retrieved (see Section 7.2.2) from the FAME and Kompass databases. Although these databases are commercially available and full access was not granted due to the cost implications, access to FAME was provided by the RGU Library and Kompass by the Aberdeen City Library.

An invite for participation in the online survey was sent to each organisation due to the lack of access to employees' email contacts which is one of the major issues often encountered when conducting empirical research of this nature (see Fisher & Herrick, 2013; Wright, 2005). In the first instance, only the organisations that responded to the invite (see Section 7.2.2) were sent an anonymous web-based questionnaire link for completion. After 2 weeks of no response from the selected organisations, a reminder letter was sent to each of these organisations and this was repeated after 4 weeks of no response. After 6 weeks of no response, a decision was made by the researcher to identify and contact some dedicated individuals (mainly through referral) from different organisations (including the initially selected organisations) to assist in distributing the questionnaire to their colleagues through the organisation's email system. In comparison to the first approach, using an insider was more effective and efficient in terms of the response rate and time.

Although these sampling methods conform with "what works" pragmatism underpinning this mixed methods research, the use of dedicated individuals in this research is similar to Lee et al.'s (1995) sampling method where 32 different organisations were selected. Contrary to their approach that involved the survey (paper-and-pencil) instrument being hand-delivered to employees directly and indirectly through a dedicated member of staff in each organisation, the instrument for this research was sent electronically to respondents by a colleague within their organisation.

7.3.1 Internet- or Web-based Survey

The adoption of online, internet, and/or web-based platform as a data collection tool for empirical research has been attracting increasing interest (see Barrios, Villarroya, Borrego, & Ollé, 2011; Cook, Heath, & Thompson, 2000; Fisher & Herrick, 2013 for a review) since the popularity of the World Wide Web (www). As suggested by Couper (2000), the rate of diffusion and adoption of internet surveys suggest that the approach may replace the traditional (postal) survey.

This approach encompasses email, social network sites, blogs, and Hypertext Markup Language (HTML) that require human participation with access to the internet service. On the one hand, the increasing usage of this approach is influenced by the rate at which the internet technology is penetrating (Mavletova, 2013) and diffusing. On the other hand, the proliferation of smart devices such as Tablets, Notebooks, and Smart Phones has enhanced its accessibility.

In order to understand the efficacy of web-based surveys and also to legitimise its usage, researchers (such as Barrios et al., 2011; Cobanoglu, Warde, & Moreo, 2001; Kaplowitz, Lupi, Couper, & Thorp, 2012; Ravert, Gomez-Scott, & Donnellan, 2015) across different disciplines have attempted to compare paper (postal) surveys to web-based surveys. In addition, the advantages as well as the disadvantages of using online surveys have been documented (see Wright, 2005 for a review). Besides the issues of response rate (Barrios et al., 2011), sampling and accessibility issues have also been identified in the literature (Fisher & Herrick, 2013; Wright, 2005).

Nevertheless, the recent development in information technology may provide opportunities for researchers as well as social actors to access the internet platform through different devices. In other words, an array of cost-effective data collection approaches and techniques that may enhance response rates is available to social investigators and may not necessarily rely on postal surveys (paper and pencil) when collecting data.

According to Ravert et al. (2015), internet surveys are considered as an alternative to postal surveys and observed to offer relative advantages over the conventional data collection techniques such as postal surveys. The advantages include, efficiency, timeliness, extensive coverage, cost savings, reduced data entry errors, real-time access, resource conservation, interactive elements, multimedia features, question controls, reduced design efforts, extensive coverage, and data quality (Cook et al., 2000; Orr, 2005). For instance, some organisations that participated in this research requested additional questions based on their specific organisational needs and requirements that were not included in the survey. Although this attracted extra effort, it would have been unrealistic to modify a paper survey once it has been printed and distributed. The possibility to address the organisational specific requirements had a positive effect on the recruitment of organisations. With this approach, responses to organisational specific questions could be reported in aggregate to that organisation if requested but are not included in the data analysis for this research.

In addition, studies (such as Cobanoglu et al., 2001; Schleyer & Forrest, 2000) have observed that web-based surveys are more efficient in terms of response time and delivery cost compared to postal surveys. For example, the distribution of the survey instrument in this research attracted no financial costs. According to Barrios et al. (2011), data quality (in terms of missing data; errors in open-ended questions) is observed to be significantly higher in web surveys compared to postal surveys. To avert these issues, each section of the questionnaire in this research was made mandatory and designed in a way that forced respondents to address each question underpinning the latent constructs of this research. As a result, the internet platform can contribute immensely in a cost-effective manner to data collection processes especially within social and behavioural sciences research.

7.3.2 Response Rate

Web-based surveys have been reported (Barrios et al., 2011; Cook et al., 2000; Orr, 2005) to offer significant advantages over postal survey although findings concerning

response rates and representativeness are mixed. For example, studies (such as Fisher & Herrick, 2013; Kaplowitz et al., 2012) have shown that response rates for mail surveys are considerably higher compared to internet surveys. However, Barrios et al. (2011) observed that about 64.8% of web-based surveys were returned in comparison to about 48.8% of mail surveys suggesting that the response rate for web surveys is higher than that of mail surveys.

Many factors for instance methodological differences, sample characteristics, internet penetration, questionnaire design, and salience of questionnaire issue may be responsible for the mixed findings on response rate (Barrios et al., 2011). Nevertheless, factors observed to be influencing response rates for internet surveys are broadly classified under four distinct categories of web surveys process. According to Fan and Yan (2010), these categories include survey development (such as content and presentation of web questionnaires); survey delivery (for instance sampling methods, contact delivery modes, invitation designs, pre-notifications and reminders, and incentives); survey completion (participation and participation decision); and survey return (survey software and data safety). These factors were considered in parallel when conducting this web-based survey and contributed significantly to the increase in responses.

Nevertheless, the rate of internet penetration both in developed and developing countries may influence the adoption of web-based surveys especially among social and behavioural scientists. This was considered not to be an issue for the organisations who took part in this research, where employees have equal access to email. In conducting a web-based survey therefore, the major challenge includes lack of reliable population (and sample) size, insufficient knowledge of sampling frame which may consequently introduce a selection bias (lack of randomisation). This may affect the estimation of response rates. This could be resolved by carefully selecting a target group (such as a single workplace) or by randomly selecting different organisations while sending the survey web link to their employees' email addresses, however, the lack of accessibility to employees' contact emails is another issue to contend with when using this approach.

Although the existing findings on response rate for web and mail surveys are ambiguous, the Internet-Mediated Research approach (British Psychological Society [BPS], 2013) or Internet Research is governed by different epistemological, logistical and ethical perspectives (Markham & Buchanan, 2012). As a result, factors that can increase response rates for mail surveys may not have an effect on web-based surveys.

To increase the response rates of this research, different factors that have been identified in empirical research (such as Cook et al., 2000; Göritz & Crutzen, 2012; Kaplowitz et al., 2012; Keusch, 2012) were used. According to a meta-analytical review, these factors include: increasing the number of contacts, personalised contacts, pre-contacts, salience of issue being investigated, incentives (Cook et al., 2000). For instance, sending reminders about the surveys and the use of incentives were observed to be effective in this research. Although no monetary incentives were used, each participating organisation was offered a summary of their own organisational performance and how it compared to the UK-wide data. In addition, suggestions that could enhance the organisational environmental and particularly waste management efforts were offered as incentives for participation at the organisation level. Also, pre-notification (or pre-contacts) as well as the use of dedicated contact(s) had a very positive effect on the response rates (see Cook et al., 2000; Keusch, 2012) of this research. As suggested by Kaplowitz et al. (2012), using a personalised email to invite organisations had an incremental effect on the response rates.

Whilst pre-notification may influence the response rates, using the sender's official email address as well as its subject including the location of a web-link to the survey may have contributed to the obtained response rates. When designing the invitation (pre-notification) for the survey, the researcher was cognisant that design elements could have an inconsistent influence across the population. For example, factors influencing public sector employees may not necessarily be applicable in the private sector. Considering the response rates for this research, the level of efforts (such as length of survey and time required for survey completion) may have a small effect on the participation including the response rates.

7.3.3 Challenges in Conducting a Web-based Survey

As can be seen from the above discussion, web-based surveys offer many opportunities although the approach has its inherent challenges. The challenges described in this section are those encountered by the researcher and may not reflect the situations in other contexts and/or domains.

The recruitment of respondents was one of the major challenges encountered during the data collection process of this research. This was compounded by the lack of an established database (formal or informal) containing the email contacts of people in work within the UK. Rather than contacting respondents directly, organisations and/or dedicated individuals email address was used as a proxy for employees' contacts.

Similar to LaPiere's (1934) experience, some organisations that the researcher visited cited the UK data protection act as an excuse for not being keen to provide the contact details of specific individuals to be used as a point of contact. However, these same organisations were able to issue the contact details and also transferred phone calls to certain individuals within their organisations when contacted through telephone. Also, many organisations were less motivated to participate in the survey due to the current economic climate in the UK, job insecurity, and uncertainties surrounding Brexit.

In addition, it was observed that organisations are more likely to participate when the research outcomes benefit the organisations. Although no monetary incentives were provided for participation in this survey, organisations were offered an opportunity to request a summary of their employees' pro-environmental behaviours and perceptions in order to improve their current efforts. This transactional approach was effective in increasing the participation as well as the response rates.

Nonetheless, the whole process involved several phone calls, multiple emails, and many visits to different organisations to achieve the desired response rates. In comparison to postal surveys, it takes a lot of effort (tactical and strategic) to recruit organisations and to

persuade them to participate in the survey. It is worth mentioning that these challenges are specific to this research and may not be the case in other research contexts (or countries).

7.4 Chapter Summary

In this chapter, the quantitative data collection process including the sampling method adopted for this research was presented. The chapter specifically focused on the survey instrument, sampling design by identifying the sampling population and sampling frame as well as the approach used in disseminating the designed instrument. To identify the construct dimensions including their indicators, the findings of the exploratory phase of this research and the existing literature on pro-environmental behaviours were instrumental.

In addition, different methods of collecting data were assessed while considering the pros and cons of each approach to establish the rationale for the adopted approach. Having identified an online medium as an appropriate platform for the distribution of the instrument, the issues of accessibility including the response rate associated with online survey were described in this chapter. In order to ensure the confidentiality of the respondents, the research ethics and data protection policy of RGU were taken into consideration throughout the research process. Following the collection of the required data, the next chapter provides an overview of the quantitative data analysis technique and its capability in handling complex models as in the case of this research.

Chapter 8 Data Analysis

8.0 Introduction

This section provides an overview of the data analysis including the SEM fundamentals and its analytical capabilities. It addresses the data cleaning and preparation process required prior to the actual SEM analysis.

In addition, various tests to demonstrate the extent to which the data have achieved the minimum assumptions for the SEM analysis are described. Also, basic definitions of SEM, the SEM process, the application of SEM, the different symbols in SEM analysis, and different models are discussed.

The main rationale for this section is to introduce the statistical analytical method of this research for a better understanding of the data and the SEM techniques in confirming the hypothesised model.

8.1 Data Screening and Preparation

8.1.1 Data Coding

In order to present the collected data in a useable format for further analysis using IBM AMOS, there is a need for data preparation by presenting the data in a system readable format. As a result, a code book that was developed during the questionnaire design where numerical values were assigned to every response category was used to create a spreadsheet using IBM SPSS Statistics 24.0. For example, strongly disagree was assigned a value of 1 while 5 was allocated to strongly agree and 3 was assigned to neither disagree/agree. Considering that organisations were sent a personalised survey-link, the responses from each organisation were downloaded into a Microsoft Excel using the Google Forms spreadsheet before been imported into the data file in IBM SPSS. This potentially eliminated the data entry errors and prevented the introduction of inconsistencies in the dataset. Also, a pseudo-name (a case number) was allocated to each respondent to ensure the anonymity of each

organisation. Similarly, as can be seen in Table 11, each construct was allocated its corresponding stem abbreviation (for instance, attitudes are coded as **Att**) while questionnaire items were assigned unique case numbers regarding their associated constructs (such as **Att1**) for ease of data manipulation and interpretation.

Table 11: SPSS/SEM Constructs Coding

Constructs	Code	Items
Attitudes	Att1	It frustrates me that my organisation doesn't do more to encourage recycling
	Att2	I feel people worry too much about recycling at work
	Att3	I feel guilty when I fail to recycle at work
	Att4	When I recycle at work, I feel good
	Att5	I'm not interested in the idea of recycling
	Att6	I do not have enough items to recycle at work to make recycling worthwhile
	Att7	To me personally, recycling at work is very important
Awareness of Consequences	AC1	I'm aware that recycling at work reduces the amount of waste that goes into landfill
	AC2	I know that recycling at work helps preserve natural resources
	AC3	I believe waste recycling could save land that would otherwise be needed for landfill
	AC4	I'm aware that recycling at work is good for the environment
Ascription of Responsibility	AR1	It is my personal responsibility to recycle waste at work
	AR2	I make every effort to recycle at work
	AR3	Recycling at work isn't worth the effort
Feedback	Fedbk1	I would recycle if there was feedback about my personal contribution
	Fedbk2	I would recycle at work if there was feedback about how much had been recycled in my workplace
Incentives	Inc1	I would take recycling at work more seriously if financially penalised for not doing it
	Inc2	I would recycle at work only if I was paid to do so
	Inc3	I don't need monetary reward to recycle at work
	Inc4	Recycling at work is a trivial activity
	Inc5	Recycling only benefits people in the recycling business
	Inc6	I would recycle at work if it was a legal requirement
Convenience/Office Layout	Off_Lay1	The arrangement of my work space makes recycling easy for me
	Off_Lay2	The location of recycling bins makes it difficult to recycle at work
	Off_Lay3	It's convenient for me to recycle at work
	Off_Lay4	Recycling at work takes up too much room
Organisational Commitment	Org_Com1	I'm satisfied with the current recycling scheme at my workplace
	Org_Com2	My organisation should put more effort into promoting recycling
	Org_Com3	In general, it takes a lot of effort to recycle at my workplace
	Org_Com4	There's little concern for recycling at my place of work
	Org_Com5	There's little information about recycling at my place of work
	Org_Com6	There's no recycling facility in my place of work
	Org_Com7	The recycling facilities in my place of workplace are sufficient

Perceived Control	PC1	I have plenty of opportunities to recycle at work
	PC2	It is mostly up to me whether I recycle at work or not
	PC3	I understand well enough what is being said about recycling at work
	PC4	I have no control over whether I engage in recycling at work or not
Personal Norms	Per_Nms1	It would be wrong of me not to recycle at work
	Per_Nms2	It would go against my personal principles if I did not recycle at work
	Per_Nms3	Recycling should be a normal part of our life at work
	Per_Nms4	I believe people at work should make every effort to recycle
	Per_Nms5	I don't consider recycling to be an important issue
	Per_Nms6	Recycling seems like the right thing to do
	Per_Nms7	Acting ethically is an important part of who I am
	Per_Nms8	Recycling at work is an important part of who I am
	Per_Nms9	I'm the type of person who acts in an environmentally friendly way
	Per_Nms10	I'm not the type of person who is inclined to engage in recycling at work
Scheme Knowledge	Sch_Know1	I know the items that can be recycled at work
	Sch_Know2	I require more information on the location of recycling facilities at work
	Sch_Know3	I've no knowledge of my workplace's waste management strategies
	Sch_Know4	I know how to recycle at work
	Sch_Know5	I require more information on what (materials) to recycle at work
	Sch_Know6	I require more information on how to recycle at work
	Subj_Nms1	Most of my colleagues at work recycle
	Subj_Nms2	When I see my colleagues recycling, I feel I should recycle as well
	Subj_Nms3	Most of the people who are important to me would approve of workplace recycling
	Subj_Nms4	Most of my colleagues at work expect me to recycle
	Subj_Nms5	I'm a person who considers friends and colleagues to be important
	Subj_Nms6	I like being a participant in group activities
	Subj_Nms7	It's important for me to maintain harmony within my group
Source: Author		

This facilitated the ease of data entry into the statistical analysis software package (IBM SPSS) used for data preparation and preliminary analysis as well as the main analysis in AMOS including the PROCESS macro.

Based on the procedure for questionnaire design and administration, there was no missing data within the main constructs of interest apart from the respondents who selected "prefer not say" in some socio-demographics such as gender. Although the acquisition of a complete data set by forcing respondents to answer every question can enhance the quality

of the collected data, there may likely be a trade-off between the approach and the response rates. However, this was not an obvious issue in this research, given that the attained response rate (N = 367) was healthy enough to undertake the SEM analysis in AMOS. Therefore, there were sufficient data points for the SEM analysis and there was no indication to suggest the effects of missing data.

Nonetheless, it is difficult to establish non-responders and/or those who started the survey but later abandoned it due to forcing responses. In general, there is no observable evidence that forcing respondents to answer every question in the survey has had a significant effect on the response rate.

8.1.2 Data Cleaning

Following the data entry into SPSS, the data file was visually checked to ensure that the file was free of errors that may have crept into the database when recording/transferring the data. Also, a frequency distribution table (Appendix 6) was created for the main variables with their respective measuring scale to establish data accuracy and correctness. The measuring scale for each variable in the spreadsheet was "range-checked" (that is, minimum and maximum values) to ensure that the scales were correctly entered.

Whilst checking for non-response bias in this research was problematic, given that the identities (and the numbers) of those who failed to response were unknown, the possibility for response bias (such as social desirability) was assessed.

8.1.3 Assessing Missing Data

As previously mentioned above there are no missing data on the main constructs of interest in this research (see Appendix 6) although there were some sections under the socio-demographics where the respondents preferred not to answer.

The survey instrument was carefully designed in a way that allowed respondents to address every question in the instrument. As a result, there is no need to perform data

imputation for any missing values (such as the mean or median replacement method) or to delete respondents that have significant missing (or incomplete) variables from the dataset. However, missing values are assumed to be missing at random and can be addressed in AMOS through a full information maximum likelihood (FIML) procedure rather than the conventional listwise or pairwise deletion or mean imputation (Arbuckle, 2016).

8.1.4 Detecting Outliers

Outliers are extreme values that are outside the normal range of possible scores on a variable (univariate) and/or multiple variables (multivariate) in the dataset which can distort (deflate or inflate) the statistics (Hair, Black, Babin, & Anderson, 2010; Kline, 2015; Tabachnick & Fidell, 2014) such as means, standard deviations, and correlations (Schumacker & Lomax, 2010). In this research, these can result from data entry errors, data not belonging to the sample population, or the sample population with some extreme cases, rather than misspecification of missing values. The presence of these extreme values (or cases) can result in Type1 and/or Type II errors if not detected and addressed prior to statistical analysis (Hair et al., 2010; Tabachnick & Fidell, 2014).

Checking for outliers is a necessary step in an SEM analysis, given that their presence can lead to the violation of the normality assumption which is considered to be one of the most significant assumptions in SEM analyses (Arbuckle, 2016; Byrne, 2016). Although AMOS has the capability to detect and correct for outliers prior to the main analysis, different techniques have been developed depending on whether data are grouped or ungrouped among continuous variables (Tabachnick & Fidell, 2014).

For univariate outliers, extreme case(s) on a single variable, a graphical technique through frequency distributions, such as Q-Q plots and boxplots, can be used. There is the potential for univariate outliers when the distributions of z scores (standard deviations below/above the mean) are more than 3 (Kline, 2015; Tabachnick & Fidell, 2014). In order to detect the presence of multivariate outliers, cases with the highest contribution to

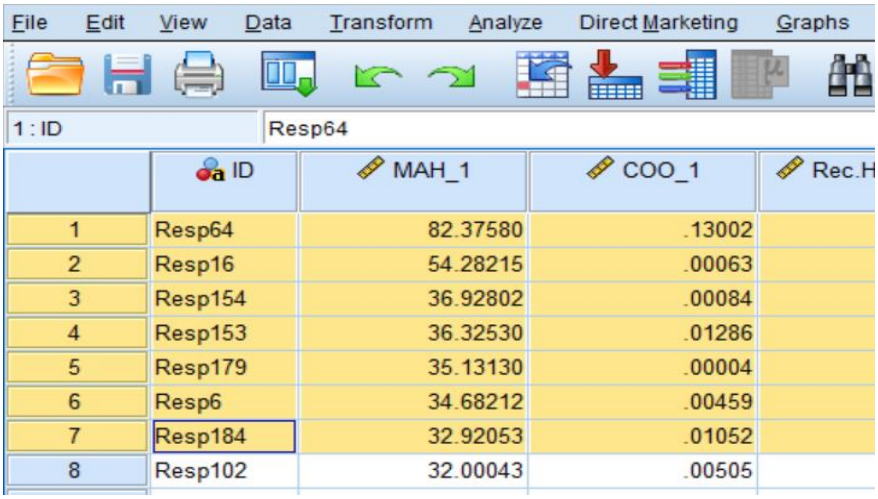
multivariate non-normality in reference to Mardia's (1970) index can be identified by AMOS (Byrne, 2016; Kline, 2015). The critical ratio (C.R.) value in AMOS output represents the estimate of Mardia's normalised multivariate kurtosis although it is not labelled as Mardia's normalised estimates in AMOS (Byrne, 2016). Another approach is to compute the squared Mahalanobis distance (d^2) in AMOS, which is a measure of distance in standard deviation units between a set of scores for a case and the sample means for all the variables in a data set (Byrne, 2016; Pallant, 2016; Tabachnick & Fidell, 2014). Using Mahalanobis distance, a set of guidelines is recommended by Tabachnick and Fidell (2014) and evaluated as Chi-Square with degrees of freedom corresponding to the number of independent variables in the model.

Although outliers are likely to be present in a dataset, the probability of outliers in a rating or Likert-scale is extremely low or non-existent (Pallant, 2016; Tabachnick & Fidell, 2014). Nonetheless, responses may tend toward a certain category which may reflect the actual distribution. For instance, answering a particular question with a value of 1 (strongly disagree) or 5 (strongly agree) in this research does not necessarily indicate a potential outlier. Considering the premise of this research, it is not uncommon, especially when people are self-reporting their behaviour, to perceive themselves positively/negatively by answering strongly disagree and/or strongly agree in many instances.

Nevertheless, both univariate and multivariate outliers were assessed in this research in order to prevent wrong conclusions from the estimation process. As a result, Mahalanobis distance (d^2) which can be requested in AMOS and remains the most popular procedure compared to other techniques such as Leverage was conducted in AMOS (Arbuckle, 2016; Byrne, 2016) and in SPSS. The initial data screening for potential outliers was conducted as part of linear regression in SPSS where Mahalanobis distance estimation was requested, using the total scores on items of each construct in the hypothesised model.

According to Tabachnick and Fidell (2014), Mahalanobis distance measures the distance of a case from the centroid of other cases in a data set and the Chi-Square value

greater than the recommended value with regards to the number of independent variables is a multivariate outlier. Using this guideline, with regards to the number of the hypothesised constructs in the model, 7 respondents (Figure 12) were observed to be outliers and consequently removed from the dataset as a precaution. Although all respondents were used during the data cleaning process, only 360 respondents were considered for the analysis to reduce the effects of influencers on the final results. Also, it appears that these respondents were not paying attention or engaging with the questionnaire instrument because of their inconsistencies especially on the reverse coded (trapped) questions.



	ID	MAH_1	COO_1	Rec.H
1	Resp64	82.37580	.13002	
2	Resp16	54.28215	.00063	
3	Resp154	36.92802	.00084	
4	Resp153	36.32530	.01286	
5	Resp179	35.13130	.00004	
6	Resp6	34.68212	.00459	
7	Resp184	32.92053	.01052	
8	Resp102	32.00043	.00505	

Fig. 12: Potential Outliers in the Dataset

Having removed these respondents from the dataset, there are no other specific values to suggest the presence of outliers although a d^2 value that is distinctively different than other values of d^2 may indicate a potential univariate (and multivariate) outlier. Therefore, the review of the values from the AMOS output showed no indication of univariate and multivariate outliers in the dataset and the remaining 360 cases were admissible for the SEM analysis. According to the existing knowledge (Field, 2009; Pallant, 2016; Tabachnick & Fidell, 2014), outliers are more likely to affect the statistics from a small sample size, mainly less than 200 cases.

8.1.5 Assessing Data Normality

Normality is one of the important assumptions in SEM analyses and this is central to data analysis in AMOS. Therefore, a technique of assessing data normality is integrated into the AMOS software package (Arbuckle, 2016; Byrne, 2016). A test for normality provides information on the distribution of scores on the variables of interest and is assessed by obtaining skewness and kurtosis values in a dataset. Although the presence of skewness and kurtosis may suggest a potential problem, this has little to no effect on the analysis with a relatively large sample size, for instance, cases above 200 (Field, 2009; Pallant, 2016; Tabachnick & Fidell, 2014). According to Tabachnick and Fidell (2014), no deviation from normality should be expected in large samples, given that positive kurtosis disappears with over 100 samples while negative kurtosis disappears when samples are above 200.

Also, there is a lack of agreement in the literature on the acceptable values of skewness and kurtosis that could indicate a problem. For example, Field (2009) suggests that a z-score value below 3.29 ($p < .001$) is insignificant and demonstrates a normal distribution. On the contrary, Kline (2015) argued that a skewness index (SI) below 3 and kurtosis index (KI) of about 10 indicate normality. However, a conservative absolute value for SI (< 3) and KI (< 20) seems appropriate (Kline, 2015) while West, Finch and Curran (1995) suggest a kurtosis value that is greater than 7 indicates a departure from normality.

Nevertheless, many procedures including simple graphical methods (such Q-Q plots, P-P plots, and frequency distribution using histogram or Box plots) are available to examine data normality. Another approach is by comparing the sample scores to normally distributed scores having the same mean and standard deviation using either Kolmogorov-Smirnov test or Shapiro-Wilk test. A non-significant score indicates that the distribution is probably normal, otherwise the distribution is not normal (Field, 2009; Hair et al., 2010; Tabachnick & Fidell, 2014).

In this research, normality was assessed using skewness and kurtosis values using the thresholds discussed above as a guide although it is unclear whether the statistics should be performed at the item or construct levels. Nonetheless, the values of skewness and kurtosis are presented at the items (Appendix 7) and constructs levels (Appendix 8). As can be seen from the findings in Appendices 7 and 8, no extreme cases of skewness and kurtosis were suggested either at the item or construct levels. As a result, the obtained indices are expected to have no significant influence on the SEM analysis due to the insignificant kurtosis values including the relatively large sample size used in this research.

For each variable therefore, AMOS output provides information on the test for univariate normality, multivariate normality as well as outliers (Arbuckle, 2016) when requested. While these criteria are requirements for almost all statistical procedures, achieving these assumptions in AMOS only results in asymptotic conclusions (Arbuckle, 2016). As a result, these requirements are not absolute rather they are approximately true for a large sample size as obtained in this research. Nonetheless, deviation from normality was not considered to be a serious issue in this research, given that the observed skewness index (SI) was less than 3 and kurtosis index (KI) was less than 10.

In addition, data normality was assessed in SPSS using normal P-P plot (Figure 13) and Scatterplot (Figure 14) of the standardised residuals as part of the linear regression analysis conducted to detect outliers as mentioned above.

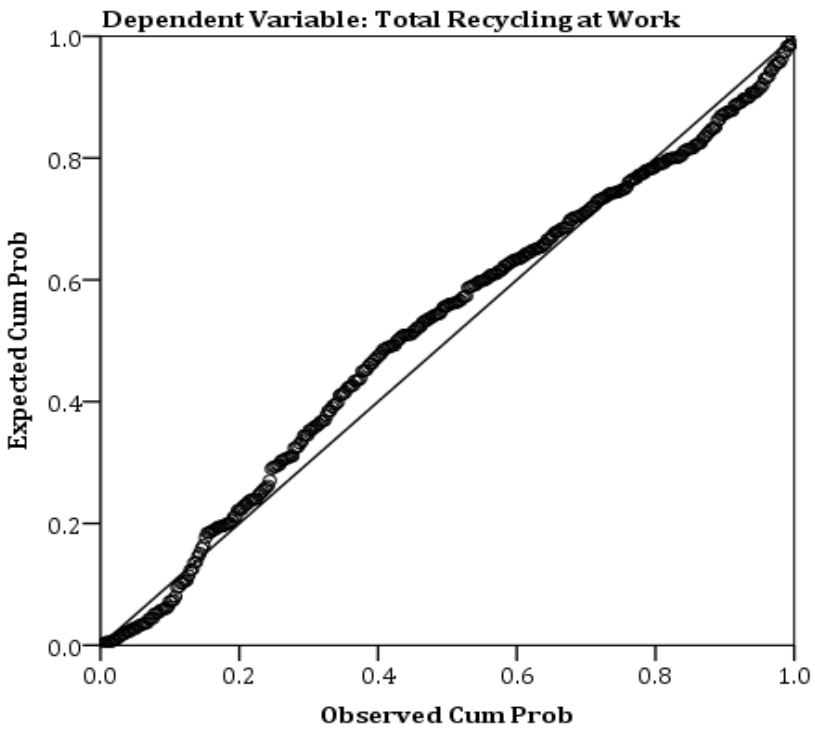


Fig. 13: The Normal P-P Plot of Regression Standardised Residuals

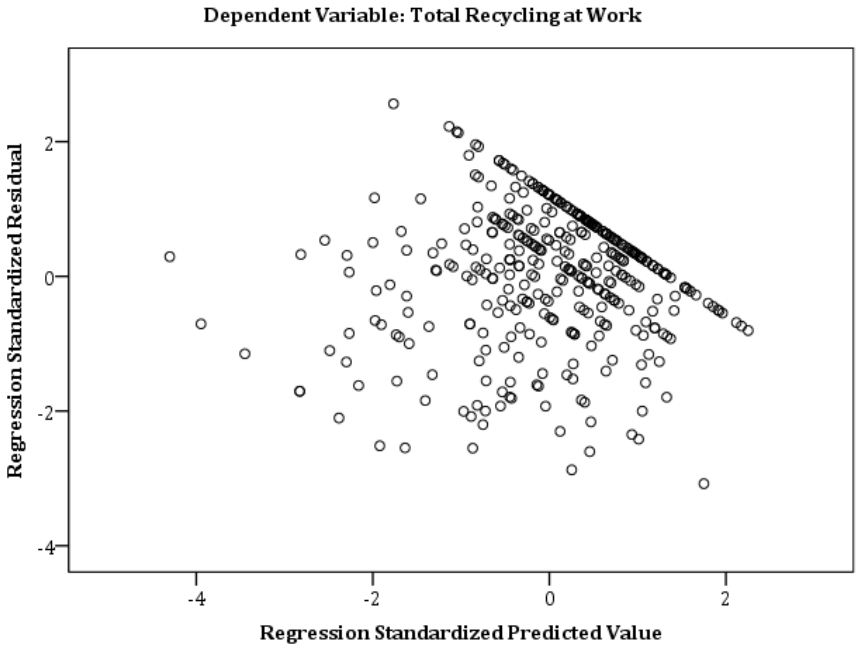


Fig. 14: The Scatterplot of Regression Standardised Residuals

From these plots, there was no indication of a serious deviation from normality to suggest that the normality assumptions have been violated in this research.

8.1.6 Detecting Multicollinearity Issues

Multicollinearity and singularity are other potential issues in parametric analyses including SEM and can occur when variables are strongly correlated. A correlation coefficient of > .90 suggests a multicollinearity issue while singularity occurs when variable(s) is a combination of two or more variables (Pallant, 2016; Tabachnick & Fidell, 2014).

In order to ensure that the variances of independent variables are unique and not overlapping in the explanation of dependent variables, a multicollinearity diagnostic test was performed in SPSS. This is often estimated using the "Tolerance" value that quantifies the variability of independent variables that is not explained by other constructs in the model (see Figure 15). A Tolerance value of < .1 signifies a potential multicollinearity issue. In addition, a multicollinearity issue can be detected by using the inverse of the Tolerance value, that is Variance Inflation Factor (VIF), and VIF > 10 suggests the presence of multicollinearity (Pallant, 2016; Tabachnick & Fidell, 2014).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	4.907	4.388		1.118	.264	-3.724	13.537					
	Total Recycling at Home	.377	.064	.256	5.853	.000	.250	.504	.326	.297	.230	.807	1.239
	Total Subjective Norms	.135	.082	.088	1.658	.098	-.025	.296	.381	.088	.065	.553	1.808
	Total Attitude	.108	.112	.059	.967	.334	-.112	.327	.131	.051	.038	.422	2.369
	Total Awareness of Consequences	-.217	.149	-.085	-1.463	.144	-.509	.075	.190	-.078	-.058	.461	2.170
	Total Ascription of Responsibility	.447	.234	.140	1.915	.056	-.012	.907	.439	.101	.075	.291	3.433
	Total Feedback	-.042	.131	-.015	-.322	.747	-.299	.215	-.057	-.017	-.013	.747	1.339
	Total Incentives	-.068	.119	-.032	-.577	.564	-.302	.165	-.292	-.031	-.023	.502	1.993
	Total Office Layout	-.077	.106	-.048	-.727	.467	-.286	.131	.429	-.039	-.029	.361	2.767
	Total Organisational Commitment	-.424	.072	-.436	-5.877	.000	-.566	-.282	-.525	-.298	-.231	.281	3.555
	Total Perceived Control	.375	.115	.183	3.248	.001	.148	.601	.495	.170	.128	.489	2.047
	Total Scheme Knowledge	.264	.101	.130	2.609	.009	.065	.463	-.216	.137	.103	.626	1.597
	Total Personal Norms	.006	.087	.006	.074	.941	-.165	.178	.344	.004	.003	.228	4.391

a. Dependent Variable: Total Recycling at Work

Fig. 15: Multicollinearity Diagnostic Test

In this research, the presence of multicollinearity issues was requested as part of the linear regression output in SPSS. The coefficients of Tolerance (> .1) and VIF (< 10) on each construct as presented in Figure 15 above suggest no potential multicollinearity issues.

8.2 Construct Reliability and Validity Test

Following the reliability and validity of the measuring instrument as explained in Chapter 7, this section focuses on the statistical procedure in testing for the reliability and validity of the constructs in the hypothesised model of this research.

8.2.1 Internal Reliability Test

Internal consistency (or reliability) using a Cronbach's Alpha is the most common measure of construct reliability in social and behavioural science research although many authors (DeVellis, 2017, Pallant, 2016; Sijtsma, 2009) have questioned its relevance in determining whether items measuring a construct are unidimensional. Internal reliability indicates that the items in a scale are homogeneous by establishing the extent to which the items of a scale are measuring the same underlying construct. Nevertheless, Cronbach's Alpha relies more on the number of items in the scale and it is a conservative value representing the lower bound of the items' actual reliability and not a best estimate of the actual reliability (DeVellis, 2017; Sijtsma, 2009).

Although the rules of thumb suggest a Cronbach's Alpha coefficient of equal or greater than .7 to be satisfactory, Lance, Butts and Michels (2006) argued against the use of a cut-off point (> .7) for reliability tests. The Cronbach Alpha of each construct (Appendix 9) in this research except "Attitudes", "Incentives", and "Perceived Control" exceeds the pervasive threshold of .7 and no negative values for the "Corrected-Item Total Correlation" were observed apart from an item on attitudes. From the table (Appendix 9), all items were correctly scored and the obtained alpha coefficients indicated a good internal consistency reliability. In order to enhance the reliability score, the last column of the table shows the

items that can be removed. No items were removed, given that all the remaining constructs exceed the acceptable Cronbach's Alpha coefficient.

However, "Incentives" and "Perceived Control" were completely removed from the model and not considered for further analysis, given that their "Corrected-Item Total Correlation" values were less than .3 coupled with their low reliability scores. Also, garden waste and textiles were removed from the materials that can be found around home and work. The intention to remove garden waste was based on the respondents' comments (as entered into the free text boxes in the questionnaire) that many people may not generate garden waste and that textiles are generally being re-used rather than being recycled.

8.2.2 Assessing Construct Validity

Following the analysis of internal consistency of the constructs, construct validity which indicates the degree to which an item is theoretically associated to other items (DeVellis, 2017; Kline, 2015; Spector, 1992) was conducted. It is a requirement in many statistical analyses and particularly in SEM due to the presence of measurement errors that can bias the research findings. Construct validity allows the analysis to account (and/or correct) for the possible effects of measurement errors as well as method variance (Bagozzi, Yi, & Phillips, 1991; Byrne, 2016) prior to the main analysis. To assess construct validity, convergent and discriminant validity tests are required and achieved by evaluating measures of the same construct against each other rather than against any external criterion. According to Spector (1992), these tests require the comparative analysis of strengths and patterns of intercorrelations among the measurement items to determine the extent of relations within and across constructs.

When assessing convergent/discriminant validity, the developed measurement model can be used to determine the extent to which each item is significantly estimated by the pattern coefficients on its underlying construct (Gerbing & Anderson, 1988; Bagozzi & Yi, 2012). As a result, confirmatory factor analysis (CFA) can be used to establish the factor

loadings of each construct in the measurement model (Kline, 2015) although item reliability, construct reliability, and average variance extracted (AVE) can also be considered (Hair et al., 2010).

For convergent validity to be confirmed, a set of items measuring the same construct are expected to intercorrelate strongly in a measurement model. In other words, convergent validity indicates the extent to which different items that are operationalised to measure the same construct relate to each other. There is an indication of convergent validity when the standardised factor loadings for the items on a similar construct are high in magnitude (Spector, 1992) such as >.50 or at least higher than the cross-factor correlations (Kline, 2015). On the other hand, the square root of the standardised factor loadings should be higher than their corresponding factor loadings. According to MacKenzie, Podsakoff and Podsakoff (2011), the average variance extracted >.50 is indicative of convergent validity (Figure 16 below). As presented in Figure 16, there is no indication of convergent and discriminant issues, given that all the composite reliability (CR) coefficients are greater than .70 and average variance extracted (AVE) of .50 (Hair et al., 2010).

	CR	AVE	Fedbk	Rec_H	Org_Com	Per_Nms	AC	AR	Subj_Nms	Off_Layout	Rec_W
Fedbk	0.79	0.67	**0.82**								
Rec_H	0.79	0.49	0.01	**0.70**							
Org_Com	0.78	0.54	0.15								
Per_Nms	0.88	0.64	0.01	0.29	-0.19						
AC	0.84	0.64	-0.08	0.13	-0.20	0.72					
AR	0.75	0.50	-0.05	0.29	-0.46	0.84	0.80				
Subj_Nms	0.75	0.60	-0.06	0.03	-0.78	0.21	0.16	0.34			
Off_Layout	0.85	0.75	-0.17	0.00	-0.93	0.27	0.29	0.48	0.59		
Rec_W	0.83	0.51	-0.05	0.26	-0.64	0.29	0.24	0.48	0.57	0.50	
Sch_Know	0.80	0.50	0.47	-0.11	0.74	-0.21	-0.30	-0.51	-0.54	-0.67	-0.41

Fig. 16: Construct validity

On the contrary, discriminant validity is the extent to which items purported to be measuring different constructs intercorrelate relatively low. In other words, the correlations between items of different constructs are expected to be significantly low, that is, <.50. By using CFA, Kline (2015) suggests that correlations between two constructs should be less

than .90 to indicate that the constructs discriminate against each other. Therefore, the set of indicators measuring the same underlying construct are expected to covary significantly to suggest convergent validity otherwise it indicates discriminant validity.

In order to examine construct validity, the Multitrait-Multimethod (MTMM) matrix was developed by Campbell and Fiske (1959) and based on the correlation matrix for different traits (that is, hypothetical constructs) when the traits are measured by different methods (Bagozzi et al., 1991; Byrne, 2016; Kline, 2015; Spector, 1992). According to Bagozzi et al. (1991), it undermines the significance of the magnitudes of differences (the degree of convergent and discriminant validity) between two correlations. They argued further that there is a lack of separate information on the amounts of variation due to traits, methods, and random errors. Therefore, the procedure was not considered in this research due to these shortcomings although it remains one of the prominent procedures in determining construct validity.

As a result of the caveats in the MTMM procedure, confirmatory factor analysis (CFA) that provides more diagnostic information about reliability and validity (Bagozzi et al., 1991; Kline, 2015; Lance et al., 2006) was used in this research. From the CFA output, the hypothesised model has no validity issues, given that each standardised factor loading is greater than the substantial value of .20 and correlations between the constructs are below .90 (Kline, 2015). However, the obtained correlation between Organisational Commitment and Office Layout in absolute value (.93) is just at the borderline and both constructs were retained. On the contrary, “Attitudes” were removed from the model, due to the correlations of attitudes with personal norms (.93); subjective norms (.82); and ascription of responsibility (.87). Also, the remaining 3 indicators were not internally consistent, given that their Cronbach’s Alpha coefficient was <.70 having removed 2 indicators as part of the model trimming for model fit.

8.3 Accounting for Common Method Bias

Common method bias (CMB) has been identified as a pervasive source of measurement errors in empirical research (Lindell & Whitney, 2001; MacKenzie & Podsakoff, 2012; Podsakoff et al., 2003), and argued to be more prominent in non-experimental research such as survey research (Buckley, Cote, & Comstock, 1990). As a result, measurement methods such as instruments, contexts, and contents, have a fundamental influence on the responses and are susceptible to common method variance (CMV). While CMV indicates a variance in observed scores, CMB suggests the extent to which the obtained correlations are influenced (inflated or deflated) due to a common methods effect (Spector, 2006). Therefore, measurement methods can either modify the underlying constructs or distort the measurement process without affecting the constructs and resulting in erroneous conclusions about research findings.

Nonetheless, CMV due to CMB has been widely attributable to the measurement methods rather than the constructs themselves, which has the potential to inflate or deflate the correlations between constructs of interest. Although its influence on findings validity, especially in self-report surveys, has been overstated (Spector, 2006) and may have an insignificant effect on the findings validity (Crampton & Wagner, 1994; Spector, 2006), it can lead to Type I and Type II errors if not properly addressed (Byrne, 2016; MacKenzie & Podsakoff, 2012; Podsakoff et al., 2003).

In order to address CMB, many approaches are identified in the literature although there is little or no clear practical guidance on how to control its effects, suggesting that many investigators often ignore its effects in their studies (MacKenzie & Podsakoff, 2012). However, the available techniques require the identification of the sources of CMB including a valid measure for controlling its sources through study design or statistical approach. While each of these approaches can reduce the effects, the combination of these techniques offers the best approach in addressing CMB in a study (Nederhof, 1985). As a result, a good starting

point is to understand the potential sources of CMB and how it can be controlled in empirical research, especially in self-report surveys.

Accordingly, the potential sources of CMB can be broadly classified into four different categories (MacKenzie & Podsakoff, 2012; Podsakoff et al., 2003). These include common source (or rater) effects, common measurement context effects, common item context effects, and item characteristics effects (Podsakoff et al., 2012; MacKenzie & Podsakoff, 2012). It is therefore necessary to evaluate how instruments are designed including when and how they are administered, given that all these sources are likely to be present in a study. As a result, there is a strong likelihood of CMB being present itself in this research, given that predictor and criterion were collected at the same time, in the same context, from the same respondents, using the same instrument.

Nevertheless, the potential effects of CMB were primarily addressed at the study design stage although a statistical approach was also adopted as suggested by Podsakoff et al. (2003) to avoid wrong and/or confounded conclusions in this research. For example, the instrument was carefully designed based on many recommendations (such as DeVellis, 2017; Spector, 1992) and piloting. Therefore, technical jargon and double barrel questions that could attract ambiguities and subjective interpretations were removed. In addition, the use of forced-choice items as used in this research may reduce the possible effects of social desirability bias (see Nederhof, 1985). Considering that a potential bias that could be introduced from using a single instrument (web-based survey) and in the same context (workplace), there is a need to perform a post-hoc test to control for the probable effects of CMB.

As a result, different approaches that can be found in previous studies are summarised and recommended by Podsakoff et al. (2003). These include Harman's single factor test, partial correlation procedures, a directly measured latent factor method, a single unmeasured latent factor method, multiple-method factors, a correlated uniqueness model,

and a direct product model. While these methods have their inherent pros and cons, the research context including the mode of instrument's administration were taken into consideration when selecting a technique for this research. In addition, the assumption that any control measure for CMB is expected to have effects at the item rather than at the construct level as argued by Podsakoff et al. (2003) was followed.

Therefore, a single unmeasured latent factor method that requires the addition of first-order common latent factor (CLF) with all the measures as indicator in the hypothesised model was used in this research. The technique offered the advantage of modeling the effects of CMB on the observed factors rather than on the latent variables in the theoretical model. It also allowed each indicator to load on their respective latent construct as well as on the common latent factor. In other words, the indicators in the measurement model were not only measuring the latent construct in the model but also served as a measure of the added CLF to detect variances. A CLF was created to capture the common variance among the observed variables in the model, given that there was no requirement for the prior identification of a specific factor responsible for CMB in the model.

The approach was considered suitable in this research based on the adopted reflective measurement model where the constructs were operationalised as predictors of the indicators. Therefore, it was logical to add a common latent factor to the model and connect it to each indicator rather than the constructs in the confirmatory factor analysis model. As a result, the test was conducted using a CLF model (Figure 17) and the full measurement model without CLF (Figure 18) although only the reliable items (see Appendix 9) were included in the two models.

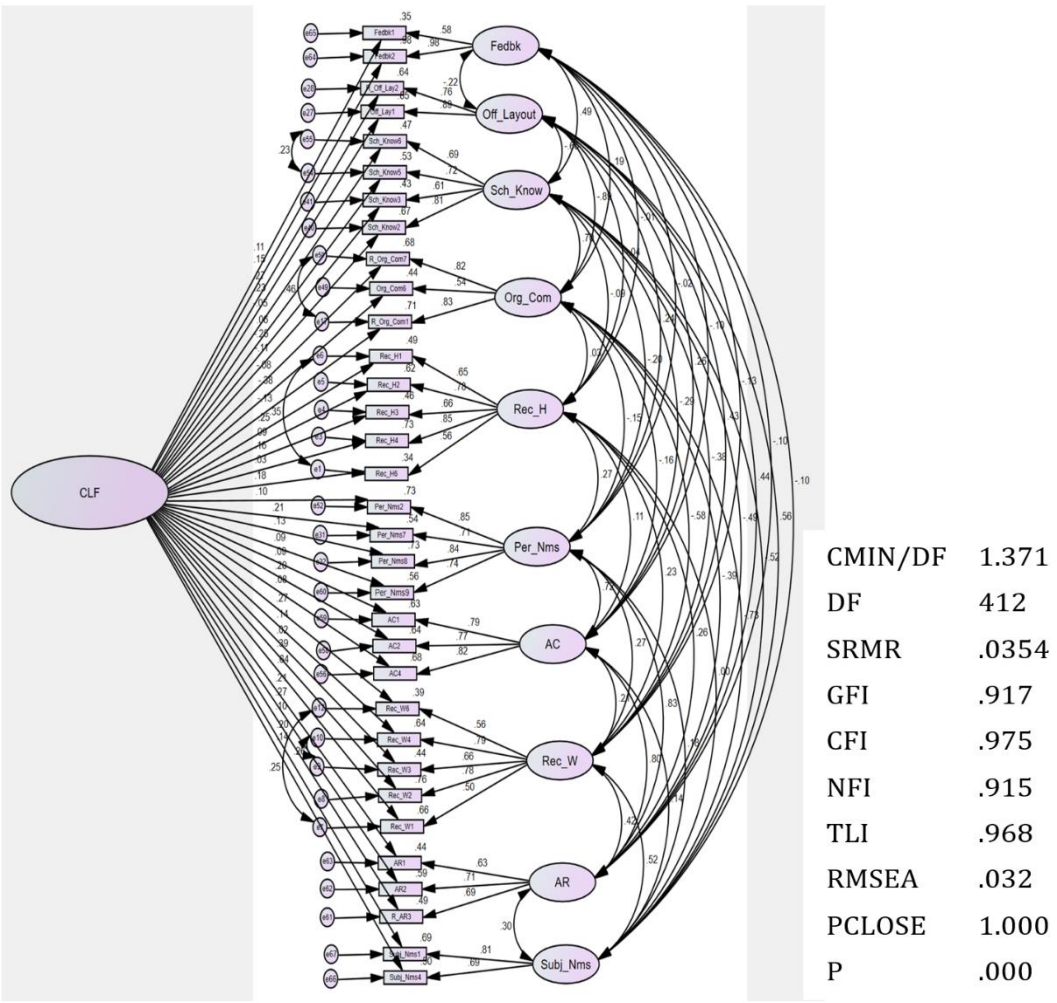


Fig. 17: Common Latent Factor Model (CLF)

The Chi-Square of the CLF model (*CMIN/DF = 1.371*) and the measurement model (*CMIN/DF = 1.485*) were later compared to test whether all the shared variance with all the indicators were significantly different to zero.

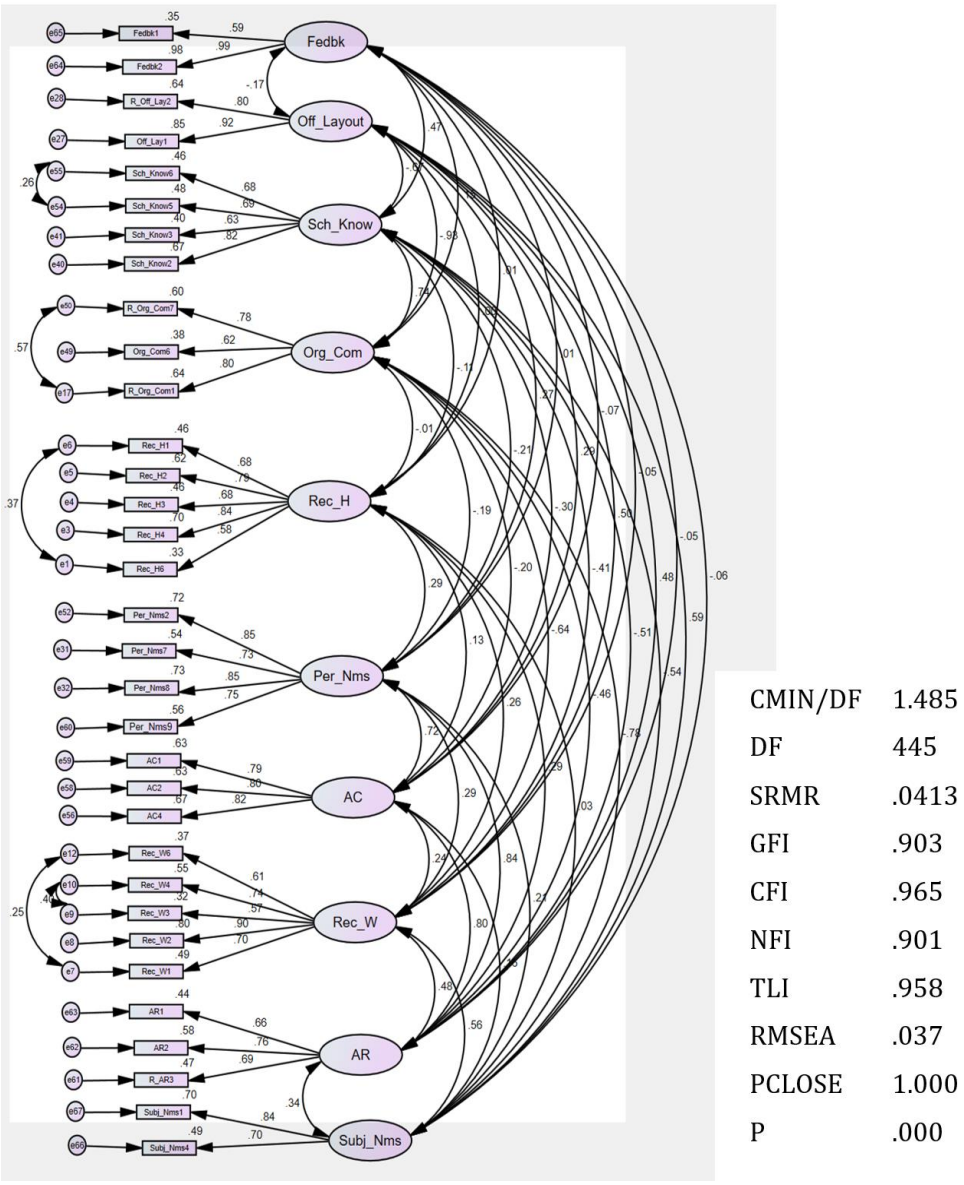


Fig. 18: Full Measurement Model

The difference (0.114) was not significant, suggesting no common method bias (see Bagozzi et al., 1991; Byrne, 2016). According to Byrne (2016), a large difference in Chi-Square (or a substantial difference in CFI values) suggests a lack of discriminant validity and hence the presence of CMB. In addition, the factor loadings on each construct were significantly higher than the correlations between the model constructs to suggest convergent validity. Therefore, there was no indication of common method bias in this research based on these findings, suggesting that the research has no discriminant validity issues.

8.4 Structural Equation Modelling (SEM) Technique

Structural Equation Modeling (SEM) is a generic term that represents a whole range of different statistical methods (Arbuckle, 2016; Bowen & Guo, 2011; Ullman & Bentler, 2003). It is often used as a standard technique to understand the interactions between different variables in theoretical models (Hu & Bentler, 1999), particularly multivariate models (Byrne, 2016; Wetson & Gore, 2006). The approach is an integration of factor analysis (as well as multivariate techniques) and path analysis that can offer parsimonious explanations for hypothesised correlations between constructs in a theoretical model (Arbuckle, 2016; Byrne, 2016; Wetson & Gore, 2006). The technique offers researchers/analysts a flexible approach to analyse experimental and non-experimental data (Kline, 2015) while simultaneously testing their hypotheses (Byrne, 2016; Edwards & Bagozzi, 2000).

As a result, the application of SEM statistical tools has grown in popularity in analysing complex relationships especially in social and behavioural sciences (Fan et al., 1999; Hooper, Coughlan, & Mullen, 2008) and psychology research to test the plausibility of hypotheses involving different constructs and their underlying indicators (Bollen, 2002; Ullman & Bentler, 2003). According to Hair, Ringle and Sarstedt (2011), the approach is a standard tool to probe cause-effect relationships between latent constructs especially in business research (including marketing and management). Nevertheless, SEM is not a magical statistical tool for hypotheses testing or theory confirmation; certain assumptions are to be fulfilled in order to achieve an acceptable model fit. When these assumptions are violated, models (including their hypotheses) may be wrongly accepted (or rejected) based on the estimation outcomes.

Considering that SEM is a family of related procedures, various names such as covariance structure modeling, covariance structure analysis, correlation structure analysis or causal modeling (Arbuckle, 2016; Kline, 2015) have been adopted by investigators. In order to modify (and/or develop) or confirm theoretical models, SEM techniques integrate different statistical models and encompass a range of multivariate statistical data analysis

methods. These include analysis of variance, analysis of covariance, multiple regression, factor analysis, path analysis, econometric models of simultaneous equation and non-recursive modeling, multilevel modeling, and latent growth curve modeling (Anderson & Gerbing, 1988). For example, a whole collection of general linear models (such as MANOVA and canonical correlation) is a typical restricted case of SEM (Arbuckle, 2016; Kline, 2015). According to Arbuckle (2016), SEM is a statistical technique with the capabilities to model both first (mean structure) and second (covariance matrix) moment structures (equation below) to make statistical inferences about the theoretical constructs and their interactions.

$$\overline{Y} = B_1X_1 + B_2X_2 + \ldots . + B_nX_n + A$$

In reference to the above equation, the predicted score ($\overline{\mathbf{Y}}$) is a composite term or a weighted linear combination of predictors ($\mathbf{X_1, X_2 \ldots X_n}$) while the covariance structure represents the unstandardised regression coefficients ($\mathbf{B_1, B_2 \ldots . B_n}$) and the intercept (constant A) corresponds to the mean structure.

Nevertheless, many researchers still consider the SEM approach to data analysis to be a complex endeavour (Arbuckle, 2016) although computer programs such as AMOS, EQS, LISREL, and Mplus have been developed to handle SEM analyses. Besides, some programming platforms such as SAS/STAT and STATISTICA are widely available for effective computation and advanced analysis of complex models. In this research, however, SPSS AMOS™ 24 is adopted based on its user-friendly graphic interface and its analytical capabilities for modeling home-work recycling behaviour interactions.

Generally, a structural equation model with latent constructs is usually sub-classified into two different components based on the relationships between latent constructs and between each latent construct and its indicators. These components include structural and measurement models (Arbuckle, 2016; Byrne, 2016; Hair et al., 2011) are further explained below.

8.4.1 Structural Model

The hypothesised relationships between latent constructs are depicted using a structural model when conducting SEM analyses. That is, a structural model defines hypotheses in terms of the events' priority (Kline, 2015) within a conceptual model. Accordingly, a structural model represents a significant part of a complete SEM model that specifies how latent constructs are connected together in a hypothesised model (Arbuckle, 2016; Hair et al., 2011; Kline, 2015).

Although the term structural model describes the structure of a model in terms of the association between latent variables, it is sub-categorised into recursive and non-recursive models. These sub-categories define the direction of causality of latent variables and how their disturbances are connected in a model, which is the direction of a single-headed arrow in the model. The knowledge of these classifications of an SEM model assists the investigator in identifying the flow of causality and how variables are aligned in the model while reducing the propensity of model misspecification.

A model is recursive when the causal flows are all in one direction (Weston & Gore, 2006), that is, there is a lack of either direct or indirect effect (or influence) from the outcome construct(s) on the predicting variable(s). For example, the hypothetical model in Figure 19 is recursive, given that recycling at home affects recycling at work while there is no feedback loop from work to home. In other words, there is no reciprocity of causality from workplace recycling to recycling at home and suggests that recycling at work is not explaining recycling at home in this hypothetical example. In this recursive model, workplace recycling is an endogenous latent variable and normally assumes an error term (disturbance in this case) in an SEM model. As a result, it suggests that workplace recycling is likely to be influenced by other extraneous factors (other than recycling at home) that are not accounted for in this model.

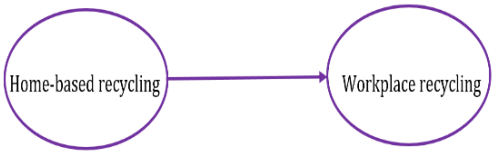


Fig. 19: Recursive Model

Therefore, there is an assumption that disturbances in recursive models are independent and there is no feedback loop among the dependent (endogenous) variables in the model.

In social and behavioural sciences however, it is unrealistic and impractical to assume that causation among factors influencing human behaviours would be unidirectional due to the complexity and heterogeneity of human behaviours. As a result, structural equation models are likely to be partly recursive or non-recursive in social and behavioural science research. According to Berry (1984), a non-recursive model is inevitable especially when it is implausible to represent a relationship between two or more constructs on a unidirectional scale. Unlike a recursive model, the direction of causality of a non-recursive structural equation model flows in more than one direction (multi-directional). That is, a model has at least a feedback loop (a two-way causation), especially when constructs are conceptualised as both cause and effect in a structural model to form a reciprocal causal relationship (Bentler & Chou, 1987).

In addition, an SEM model is described as non-recursive when errors associated with endogenous variables in the model are hypothesised to be correlated. On this basis, the presence of a feedback loop including the correlation between disturbances distinguish non-recursive from recursive models. For instance, in the hypothetical non-recursive model in Figure 20, there is a hypothesis that household energy use behaviour causes workplace recycling which consequently influences workplace energy use. The workplace energy use construct on the other hand is independently influencing both workplace recycling and household energy use.

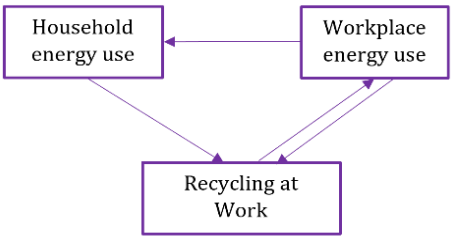


Fig. 20: Non-recursive Model

The conceptualisation of non-recursive causation models can be influenced by the integration of two or more different theories/models in a single model and/or when the data are cross-sectional.

8.4.2 Measurement Model

The portion of a full model that indicates a relationship between measures and their theoretical constructs in an SEM model is termed a measurement model (Arbuckle, 2016; Jarvis, MacKenzie, & Podsakoff, 2003). That is, a measurement model highlights the dependency of the observed variables (indicators) on the unobserved (or latent) variables in an SEM model. For example, Figure 21 shows a measurement model with the construct predicting three indicators. In hypotheses testing, studies have increasingly focused on structural models (paths between constructs) rather than addressing the relationship between constructs and their measures (Edwards & Bagozzi, 2000). The lack of attention to measurement models especially with regard to how constructs are related to their respective measures may lend itself to model misspecification (Jarvis et al., 2003).

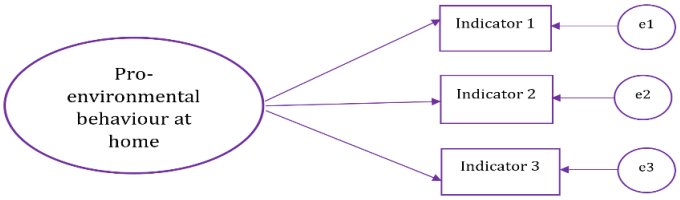


Fig. 21: Measurement Model

While the relationship between constructs and indicators is likely to result in Type I or Type II errors due to model misspecification, researchers often fail to justify how (and why)

constructs are mapped to their respective indicators (Petter, Straub, & Rai, 2007; Jarvis et al., 2003). For example, a review of marketing studies that were published in top four marketing journals between 1977 and 2000 (Jarvis et al., 2003) observed that a higher number of models were misspecified. This may be associated with the amount of effort already devoted to justifying the conceptual associations between constructs rather than how constructs and their indicators are related (Petter et al., 2007). Each construct including its corresponding indicators and how they are connected should therefore be explicitly identified and specified in a model as illustrated in Figure 21. This may require a clear understanding of the conceptual definitions and empirical attributes of each construct as well as their indicators.

Nevertheless, direction of causality may bias theoretical and empirical explanations of constructs in specific models and that of measurement models in general (Edwards & Bagozzi, 2000; Jarvis et al., 2003). Consequently, it may influence construct validity as well as study reliability as a result of model misspecification. Although there is a lack of consensus among researchers on their acceptability and applications (see Howell, Breivik, & Wilcox, 2007; Wilcox, Howell, & Breivik, 2008; Jarvis et al., 2003 for a review), two sub-categories of measurement models are available in the literature. These sub-categories include reflective and formative models (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000; Howell et al., 2007), otherwise known as effect and cause indicators respectively (Bollen & Lennox, 1991).

According to Howell et al. (2007), reflective and formative models are not only conceptually different but are also psychometrically distinct models. However, studies (such as Podsakoff et al., 2003; Jarvis et al., 2003) argued that some constructs are inherently formative and should be modelled formatively rather than using reflective models.

8.4.2.1 Reflective Measurement Models

In a reflective model (see Figure 21 for example), indicators are conceptualised as the manifestation of their theoretical constructs, that is, the direction of causality proceeds from constructs to items (or indicators). As a result, indicators are endogenous variables while

constructs are exogenous variables and are expected to covary or inter-correlate with other constructs in a model (Jarvis et al., 2003). Similarly, reflective measures are conceptualised to exhibit a common cause and may therefore inter-correlate through their measurement errors (error terms) which are exogenous variables.

For example, Figure 21 shows one unobserved variable (pro-environmental behaviour at home), three observed variables (indicators 1-3), and three measurement errors (e1-e3) that can be identified and specified in SEM. The causal effects in this hypothetical model are represented by a single-headed arrow from the construct to its indicators as well as from the error terms to their indicators. Although constructs are not directly measured, reflective measurement models suggest that indicators are caused by their constructs. In a similar manner, the indicators are assumed to be imperfectly measured and are likely to be influenced by their inherent measurement errors (or error term in SEM language).

However, the error terms in a reflective model are expected to correlate with any of the error terms in that model especially when examining the influence of social desirability bias. Whilst it is conceptually and empirical meaningful to adopt a reflective model in some cases, the indicators-constructs relationship can be better explained by formative models in other situations (Diamantopoulos & Winklhofer, 2001; MacKenzie et al., 2011).

8.4.2.2 Formative Measurement Models

The description of measurement models so far has explicitly focused on reflective measurement models, however, formative models (see Figure 22) are popular in marketing research (MacKenzie et al., 2011). Unlike reflective models, formative models hypothesise that indicators are causally affecting their underlying constructs and are often the case when composites or index variables are analysed (Diamantopoulos & Winklhofer, 2001; Petter et al., 2007).

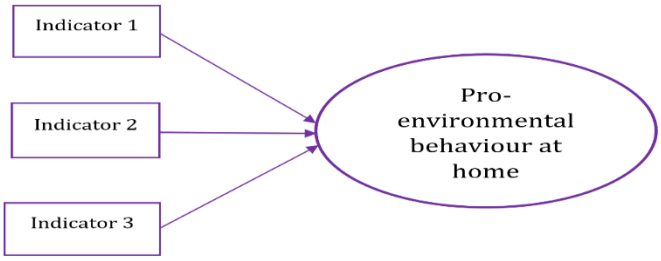


Fig. 22: Formative Model

In contrast to reflective models, the causal effects in formative models proceed from indicators to their respective constructs (Jarvis et al., 2003; MacKenzie et al., 2011; Petter et al., 2007). Although the indicators can covary, their covariances are not accounted for within a formative measurement model (Kline, 2015). An underlying assumption in formative models is that indicators (observed variables) are without measurement errors, suggesting that the indicators are assumed to be perfectly measured. However, this may not reflect the actual reality due to methodological issues coupled with the presence of human error (omission and inclusion) through data processing. As a result, it is problematic to assess the reliability and validity of causal indicators when analysing formative measurement models (Edwards, 2011).

With the assumption that a battery of indicators causes a construct in formative models, removing or dropping any of the indicators as found in factor analysis and reliability test may theoretically and empirically bias the interpretation of the construct as well as its validity. According to Bollen and Lennox (1991), this may lead to the reduction of explanatory validity of the construct as a significant aspect of the construct might have been removed. On the one hand, it is likely to bias the parameter estimates of a model with a misleading conclusion of the analysis. On the other hand, it may result in interpretational confounding (Howell et al., 2007) or misspecification bias (Bagozzi, 2007). However, the interpretation of formative constructs may be different from study to study (Edwards, 2011; Howell et al., 2007), given that each indicator of a formative construct is unique and independently measured as a distinct aspect of that construct.

Whilst there may be a strong correlation between formative indicators (Diamantopoulos & Winklhofer, 2001), conventional internal reliability tests such as Cronbach's Alpha, parallel tests, and split-half approaches are not appropriate in assessing formative measures. This is due to a lack of internal consistency in formative models (Howell et al., 2007). On this premise, formative measures remain a fallacy (Edwards, 2011), not a suitable alternative to reflective measures, and should be completely abandoned for hypotheses (and/or theories) testing (Edwards, 2011; Howell et al., 2007).

Nevertheless, the assumptions of reflective models are not in all cases appropriate for some research problems (Kline, 2015). As a result, there is a need for general rules that may assist researchers (and/or investigators) to determine whether a construct should be modelled formatively or reflectively. Considering the caveats in the use of formative models (see Table 12), a reflective model is adopted in this research to investigate the relationship between recycling at home and at work.

Table 12: Competing Measurement Models in SEM

Factors	Reflective	Formative
Dimensionality	**Unidimensional** 1. A construct is explained by its underlying constructs 2. Each indicator in a model is designed to fully explain the construct 3. Removing an indicator has no effect on the interpretation of the construct, indicators are conceptually substitutable.	**Multi-dimensional** 1. Each indicator is unique & measures distinct aspects of a construct 2. Each indicator cannot entirely capture the construct's meaning 3. Redundant measures are eliminated during development process 4. Removing a measure may undermine the true meaning of a construct 5. The underlying construct may be conceptually ambiguous due to distinct multi-indicators.
Internal Consistency	1. Measures are expected to correlate positively 2. Correlations among the indicators increase with an increase in factor loadings 3. Measures are expected to be internally consistent 4. When correctly designed & specified, covariances among the measures are predictable	1. Formative measures are not expected to correlate 2. Strong correlations may lead to a high standard error due the instability in factor loadings – similar to multi-collinearity in multiple regression 3. Low correlations suggest that each measure exhibits a unique aspect of a construct 4. Indicators in formative measures are not expected to be internally consistent 5. The covariances among the measures are not explained by a model, given that

		formative measures are exogenous variables.
Identification	To be identified, a reflective model should: 1. Has at least three indicators 2. Contain a set scale for latent variables (i.e. by fixing its variance to unity or by fixing a loading to a constant number – unity) 3. Includes independent measurement errors 4. Allow latent variables to covary 5. The loading & the variance of error terms may be fixed	1. The number of indicators has no effect on model identification 2. Addition of at least two reflective measures to the construct is required so as to achieve model identification 3. Reflective measures in a formative model may affect the loadings on the links between measures & constructs which may subsequently cofound the construct meaning 4. May lend a construct to different interpretations from a study to another due to misspecification issue.
Measurement Error	1. Ascribe a measurement error to each measure consistent with common factor model 2. The error terms are independent 3. The relationships among latent variables are corrected for measurement errors. Similar to correction for attenuation in classical measurement theory	1. Fail to account for measurement errors which is one of the prime advantages of structural equation modeling. Assume that measures are error free 2. Assign error terms as residuals (a portion of constructs not accounted for by their measures) to constructs 3. The lack of measurement error may introduce bias into coefficients (loadings) estimates.
Construct Validity	1. Focus on the extent at which constructs are represented by their measures 2. Conceptually, it examines whether the constructs definition is embedded in their measures 3. Empirically, the loadings estimate that explain the relationship between constructs 7 their measures are determined by the covariances among the measures	1. Conceived as the strength of the relationship between constructs & their measures 2. Can also be estimated in terms of the magnitude of variance in the construct associated to residuals – construct validity is higher when the variance as a result of residual is small 3. Relationships between constructs & other variables may further be expressed as construct validity – using the principles of nomological validity & criterion-oriented validity. **NB**: *The concept of heterogeneity in formative measures render these approaches implausible & may obscure the meaning of constructs.*

Causality	1. Specify constructs as causes of measures 2. Paths relating to constructs to their measures are often described in causal terms 3. Changes in constructs may lead to changes in their underlying measures 4. The causality suggests that constructs determine their measures 5. Explains the variances or covariances of the measures.	1. Constructs are specified as effects of measures – measures are causes of constructs 2. The direction of presumably causality flows from measures to construct 3. Measures determine the constructs **NB**: *Using causality to describe or determine the measures-construct relationship in formative measures is illogical, given that formative constructs are linear composites of their measures plus their disturbances*.
Adapted from Edwards (2011); Jarvis, MacKenzie and Podsakoff (2003)		

8.4.3 Higher Order Models

In SEM, there are instances where indicators may not fully capture (or adequately represent) the true meaning of their underlying constructs in measurement models. In that instance, a higher-order (such as a second-order) model may offer a better parsimonious and interpretable model although its usage should be consistent with theory (Byrne, 2016; Schumacker & Lomax, 2010). As a result, first-order models may not sufficiently explain the relationships between the measures and their constructs which may consequently obscure the true explanation or meaning of such constructs.

Although it has not been empirically established whether some constructs are inherently associated with higher-order attributes, many constructs in social and behavioural sciences are inherently complex and unstable latent variables that should be operationalised using a higher-order model (see Figure 23 for example).

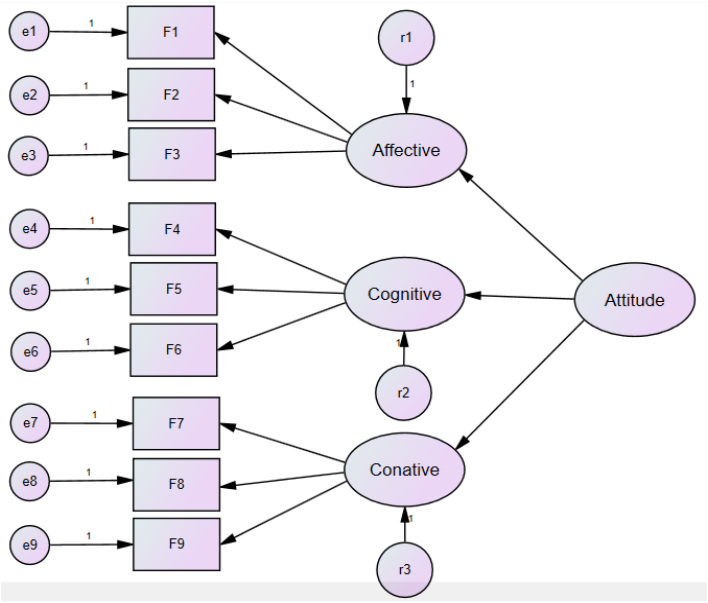


Fig. 23: Second-order Model

In Figure 23, the indicators (F1-F9) are expected to load on the first-order factors while the first-order (Affective, Cognitive, and Conative) factors are in-turn loaded on a second-order exogenous factor (Attitudes) while r1-r3 are disturbances given that the first-order factors in this hypothetical model are endogenous. In other words, a second-order factor is an exogenous latent variable without any indicators directly linked to it; rather, it is indirectly associated with the measuring items of the lower-order factors (Byrne, 2016). Although a second-order latent construct has no direct indicators, there should be an error term associated with it especially when the construct is an endogenous factor in a measurement model. The first-order factors are therefore the indicators of their second-order factors within a second-order model (Arbuckle, 2016; Byrne, 2016).

8.4.4 Nested Models

A certain model (η_2) is nested in another model (η_1) if η_1 which is considered a full model contains all the terms in η_2 (a reduced or restricted model) including at least one additional term. While parameters are constrained in η_2, these parameters including at least one additional parameter are freely estimated in η_1 (Anderson & Gerbing, 1988; Bentler &

Satorra, 2010). As a result, the free parameters in model 1 (η_1) are fixed in model 2 (η_2) leading to a larger degree of freedom in η_2 compared to that of η_1.

A restricted model is considered a special case of a full model given that the restricted model contains fewer free parameters albeit with the same number of fixed parameters as non-restrictive model (Byrne, 2016; Kline, 2015). That is, a model is nested when that model is a subset (or sub-model) of another model to the point that some free parameters in the first model are fixed to zero in the second model (Bentler & Chou, 1987; Bentler & Satorra, 2010). For example, the two models represented with equations 1 and 2 in Figure 24, where model 2 is a reduced or restricted model of a full model (model 1) including one additional term ($\alpha_5\chi_2^2$).

$$\eta = \alpha_0 + \alpha_1\chi_1 + \alpha_2\chi_2 + \alpha_3\chi_1\chi_2 + \alpha_4\chi_1^2\chi_2 + \alpha_5\chi_2^2 + \varepsilon \text{ ---------- (1)}$$

$$\eta = \alpha_0 + \alpha_1\chi_1 + \alpha_2\chi_2 + \alpha_3\chi_1\chi_2 + \varepsilon \text{ ---------- (2)}$$

Fig. 24: Nested Models

This approach allows researchers to compare and examine the fitness of alternative models (see Section 10.3.3) using the same data set (Bentler & Chou, 1987; Byrne, 2016) in a study by comparing their Chi-Square difference test or by using their modification indices (Arbuckle, 2016; Bentler & Chou, 1987; Byrne, 2016). This is achieved by increasing the degrees of freedom with more constraints in the restricted model with a subsequent influence on the goodness-of-fit (Chi-Square) value (Bentler & Chou, 1987). On the other hand, one can increase the number of free parameters in order to reduce the degrees of freedom by releasing some constraints in a more restricted model (Bentler & Chou, 1987; Byrne, 2016). As a result, it becomes empirically imperative to establish whether the full model contributes further information to the relationships between latent variables and their measures (indicators) than the reduced model.

8.4.5 Basic Process in SEM Analysis

To set-up an SEM model and to perform statistical analyses in SEM, five basic processes (Figure 25) are identified in the literature (see Arbuckle, 2016; Edwards, 2011; Kline, 2015).

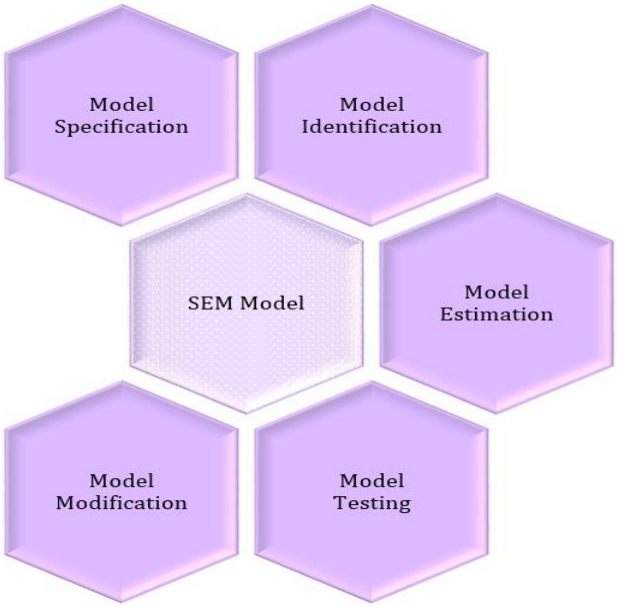


Fig. 25: Various steps in an SEM Analytical Framework

For the purpose of clarifications, each step (or process) in this analytical framework is further explained in the following sections.

8.4.5.1 Model Specification in SEM

Model specification is one of the building blocks (Byrne, 2016; Schumacker & Lomax, 2010; Ullman, 2006) of an SEM model. It involves a design of conceptual model(s) using relevant information such as findings of previous research and theories (Bowen & Guo, 2011; Jarvis et al., 2003; Kline, 2015). It determines the measured, latent, exogenous, and endogenous variables including their relationships in a hypothesised model.

Prior to data collection, a conceptual model that is likely to confirm the consistency of a true population model with an implied theoretical population model using variance-covariance data should be developed. The idea is to produce a best model that fits the data and is often achieved by defining all the relationships and parameters in the model (Arbuckle, 2016; Schumacker & Lomax, 2010). According to Ullman (2006), three stages are involved

when specifying a model – hypotheses development (including equation and path diagrams), identification of models using statistics, and estimation of the statistical assumptions underpinning the model.

Therefore, model specification describes an approach taken to formally present an SEM model by identifying and stating parameters that indicate relationships (including their nature) among the variables. A specified model is achieved when a true population model is consistent with an implied theoretical model, otherwise the implied theoretical is misspecified (Jarvis et al., 2003). In other words, model specification determines the extent to which the implied theoretical (hypothesised) model replicates the sample covariance matrix. This involves the translation of findings of prior research and/or theories into a structural model.

As a result, a model is misspecified when the true model deviates from the inferred hypothesised model. In order to avoid biased parameter estimates (specification error), this approach allows investigators to identify and decide on the variables to include and/or exclude including how the variables are connected (or related) in a model. In other words, it is common practice in an SEM analysis to select a model that best fits the data a priori from a family of distributions based on the principle of maximum likelihood. Nonetheless, standardised residuals and modification indices are two pieces of information required to detect misspecification issues in AMOS although they are not available as default in the AMOS output and should be requested.

8.4.5.2 Model Identification in SEM

In order to conduct a statistical analysis in SEM, a hypothesised model must be identified, which implies that the vector of unknown (free) parameters is expressed uniquely in relation to the elements of variance-covariance matrix. That is, there is an assumption that the hypothesised model can explain the variance-covariance matrix of an SEM model. In theory, a specified (hypothesised) model is potentially identifiable in SEM such that if a model

was true, there would be a possibility of a single set of parameters replicating the population variance-covariance matrix (Bagozzi & Yi, 2012; Bentler & Chou, 1987).

Although the available SEM software (such as AMOS) incorporates empirical testing of model identification, identification remains a key issue when using structural equation modeling (Bollen & Davis, 2009). Nevertheless, the identification process in SEM provides information on the theoretical possibility of achieving a unique solution for the hypothesised model. Therefore, model identification describes the relationship(s) between known parameters and the parameters to be estimated based on the available data points ({p*[p + 1]/2}) in the model where p is the observed variables. An SEM model is expected to have a unique estimate (or best value) of each unknown parameter in terms of known pieces of information. While the knowns consist of the variance-covariance matrix of the observed variables, the unknowns are model parameters. On this basis, models can be unidentified, just-identified (or saturated), or over-identified (Arbuckle, 2016; Bentler & Chou, 1987; Byrne, 2016; Kline, 2015) depending on the number of known and unknown parameters in a model.

In unidentified (or under-identified) models, there are more unknowns than the number of knowns in an SEM model making it impossible to obtain a unique solution for the model's parameters. For under-identified models, the number of data points (that is, variances and covariances of the observed variables) is less than the number of parameters (unknown) in the model, leading to a negative degree of freedom. An under-identified model has infinite solutions due to insufficient information being available to derive a unique solution for unknown parameters in the model. As a result, different sets of parameters rather than a single set of parameters are capable of equally reproducing the population variance-covariance matrix. In un-identified models, one or more parameters are not identified and is not possible to uniquely solve parameter estimates for observed variances and covariances (Bagozzi & Yi, 2012). In order to resolve un-identification issues, the number of degrees of freedom associated with the hypothesised model is determined (Byrne, 2016)

by imposing additional constraints on the model or by removing unknown parameters (Arbuckle, 2016).

To execute the matrix manipulations, it should be theoretically possible to estimate one parameter for each unique variance-covariance matrix in SEM (Byrne, 2016; Kline, 2015). As a result, the number of covariances and variances in the input matrix (data points or knowns) is expected to be more than the number of parameters (unknowns). With a positive number of degrees of freedom, this type of model is referred to as over-identified and is scientifically desirable (Bentler & Chou, 1987; Byrne, 2016) due to the possibility of testing (rejecting or accepting) a hypothesised model. According to Arbuckle (2016), this suggests plausible evidence that the hypothesised model is a true representation of a reality under investigation. In an over-identified model therefore, it is theoretically possible to estimate a unique solution (value) for every unknown parameter in the model.

On the contrary, a model where the number of unknown parameters equals the number of observations (or known pieces of information) with zero degrees of freedom is termed a just-identified model. In AMOS, a just-identified model may run, however, it is not possible to estimate the model fit and the reported Chi-Square statistics will be zero. As a result, a just-identified model is statistically meaningless as no model could be rejected (Byrne, 2016).

For an SEM model to be identified, a regression weight of each error term (measurement error) of observed variables is assigned (or fixed at) a non-zero (usually 1) value and results in the same estimates as conventional linear regression. On the other hand, an investigator may impose additional constraints on the model such as adding more known pieces of information (data points), or by removing unknown parameters. No matter the approach taken, model modifications for the purpose of identification should be theory-based.

While the Wald theory test provides a multivariate test for removing a set of free parameters, the Lagrange Multiplier theory offers a comparable information for adding free parameters (Bentler & Chou, 1987). As a result, constraining model parameters (factor loadings) may remove at least one unknown parameter from the model. Nonetheless, model identification is required for measurement model, path model, including the scaling of latent variables (Byrne, 2016; McDonald & Ho, 2002).

8.4.5.3 Model Estimation in SEM

After model specification and identification, the next step is to estimate the parameters of the identified model with reference to the collected data. This imposes proportionality constraints in order to assess whether the hypothesised model is consistent with the collected data (Bollen & Davis, 2009). As a result, the extent of model specification (formative or reflective) as well as model identification has a significant influence on the model estimation. The process involved is to identify estimation techniques or methods for the identified model so as to express parameter estimates in terms of their consistency with the sample covariance/correlation matrix. Irrespective of the model (such as effect indicators or causal indicators) under investigation, model estimation is normally conducted in SEM to assess the extent to which the model that best represents the collected data reflects the underlying theory.

Nevertheless, the estimation methods in most of the SEM programs are underpinned by different assumptions including the multivariate normality distribution of observed variables in terms of skewness and kurtosis coefficients (Ullman & Bentler, 2003). Accordingly, various techniques are available in AMOS including Maximum Likelihood (ML); Unweighted Least Squares; Generalized Least Squares; Browne's Asymptotic Distribution-Free (ADF) criterion; Scale-free least squares; and Bayesian estimation (Arbuckle, 2016). In most SEM programs, ML which is a statistical principle that presents a deviation of parameter

estimates and maximises the likelihood that the observed covariances represent the population remains a default for the estimation (Kline, 2015).

The approach is a full-information iterative process that estimates all the equations in a specified model at once to generate best estimates. For instance, AMOS adopts full information ML rather than ad-hoc listwise, pairwise deletion, or mean imputation when estimating missing data (Arbuckle, 2016). In addition, ML estimates are asymptotically unbiased with a large sample size as long as all statistical requirements (such as normality distribution, no missing values, independency of exogenous variables, and error terms) including model specification requirements (as discussed above) are achieved. As a result, various statistics are presented in AMOS when testing an SEM model and these indices are further discussed in the next session.

8.4.5.4 Model Testing in SEM: Model Fit and Fit Indices

Model evaluation in SEM is still controversial (Arbuckle, 2016; Kenny & McCoach, 2003) although the rationale is to establish the extent to which the hypothetical model fits the collected data having obtained the parameter estimates using one or all of the above discussed techniques. In order words, it is the capability of a hypothetical model to reproduce the data (such as variance-covariance matrix) and be consistent with the data. This is mainly achieved in SEM through model fit which may involve an assessment of the entire SEM model (a global model fit) or individual parameters in an SEM model.

Although many different fit indices (see Table 13) are available for estimating the fitness of SEM models (or when searching for more parsimonious models or comparing nested models), there is a lack of agreement among statisticians (and/or researchers) on the appropriate cut-off points as well as the nature of indices to report in empirical studies (Marsh, Hau, & Wen, 2004; McDonald & Ho, 2002; Yuan, 2005).

Table 13: Commonly Reported Model Fit Indices in SEM		
Indices	Cut-off Points	Explanation
Chi-Square Test	A nonsignificant alpha value (usually at p-values ≥.05) threshold represents a good (acceptable) model fit	Assesses divergences between the sample and fitted covariance matrices. The test is sensitive to sample size which may lead to Type 1 error (with larger samples) or Type II error (with small samples). Like other absolute fit indices, no alternative (or reference) model is required as a baseline for model comparisons when using Chi-Square test. The null hypothesis is rejected when the T statistic exceeds an alpha level of significance.
Comparative Fit Index (CFI)	≥ 0.95	This is an indicator of relative non-centrality between a theoretical model and a null model, where only error variances are estimated. It compares a baseline model and a hypothetical model in terms of their fitness. The measure is identical to RNI, however, CFI is truncated to fall between 0 & 1 while values close to 1.00 suggest a very good fit model
NFI	Value close to 1 is acceptable as a good model fit	It presents a proportion by which a model fit improves in relation to a null model and a value below .90 may suggest a need to modify the model
Non-Normed Fit Index or Tucker & Lewis Index (NNFI/TLI)	≥ 0.95	Penalises for model complexity, however, it rewards for model parsimony. May exceeds 1.00 by a small margin for a very good model fit
RNI		Model complexity is not penalised
Standardised Root Mean Square Residual (SRMR)	Values close to 0 reflects a very good model while a value ≤ 0.08 represents a good model fit.	It is the square root of the average squared residuals by which sample variances & covariances differ from their estimates obtained under the assumption that the model is correct. SRMR is sensitive to different sorts of misspecification compared to other goodness-of-fit indexes.
Root Mean Square Error of Approximation (RMSEA)	≤ 0.06 (a close fit) = 0.0 (represents an exact fit)	It is a practical fit index that produces an average amount of misspecification for a model per degree of freedom and compensates for the influence of model complexity. As a result, it favours models with many parameters rather than simple models. A value of about 0.08 represents a reasonable error of approximation while a value ≥ 0.1 represents a significant error of approximation. When used with a value of CFI ≥ 0.95, RMSEA of ≤ 0.06 a good model fit.
Hoelter's Critical N (CN)	No specific significance level is required; Amos reports a critical N for significance levels of 0.05 & 0.01.	Describes the largest sample size for which an investigator would accept the hypothesis that a model is correct. A value of CN exceeding 200 or better represents a good model fit.
Goodness of Fit Index (GFI)	≥ 0.95 represent a good fit although an	Designed as an alternative to Chi-Square test and estimates variances in reference to the estimated population covariances. The

	omnibus value of 0.90 is acceptable GFI has a minimum value of 0 and maximum value of 1.0	variance-covariance matrix illustrates how the model replicates the observed covariance matrix. GFI outperformed other stand-alone indices (such as AGFI and RMR) and underestimate its asymptotic value. Nevertheless, GFI is sensitive to the number of parameters as well as sample size.
Adjusted Goodness of Fit Index (AGFI)	Ranges between 0 & 1 while values ≥ 0.90 represents a good model fit.	AGFI is an adjusted GFI value in terms of degrees of freedom and increases with sample size just like GFI.
Adapted from Bagozzi and Yi 2012; Hu and Bentler (1998)		

As a result, fit indices are broadly classified into two categories – absolute and incremental (or relative) fit indices (Hu & Bentler, 1999; McDonald & Ho, 2002). Accordingly, absolute fit indices assume that the best model has a model fit of zero while incremental (or relative) fit indicates that the best model has a fit of 1. This section therefore focused on and discussed selected model fit indices that are commonly applicable in SEM and particularly in the AMOS software package.

Absolute Fit Indices

According to McDonald and Ho (2002), absolute fit indices establish the extent to which a model fits the sample data and indicate the relationship between the proposed theory and the collected data. The approach is often adopted to directly access the extent to which a pre-defined model replicates the sample data. An absolute fit measure assumes that a best fit model has a zero-fit index (Hu & Bentler, 1999; Kenny & McCoach, 2003). Although no reference model is used to estimate the increment in the model fit, its main rationale is to achieve the primary goals of an SEM analysis – assessment of goodness-of-fit and estimation of the hypothesised model's parameters (Hu & Bentler, 1999; Hooper et al., 2008).

In order to achieve these goals, the measures of absolute fit indices being used include Chi-Square test, RMSEA, GFI, AGFI, RMR, and SRMR (see Table 13). Although these measures have been used to assess the fitness of models, models are only abstractions of realities (Hu & Bentler, 1999). Nevertheless, the measures of fitness are primarily designed to address and

overcome the issues associated with sample size and model misspecification including model inadequacy. This suggests an attempt to maintain a balance between the model simplicity (parsimony) and its goodness-of-fit (Arbuckle, 2016).

Incremental Fit Indices

Incremental fit indices, comparative fit indices (Hu & Bentler, 1999; Miles & Shevlin, 2007) or relative fit indices (McDonald & Ho, 2002; Kenny & McCoach, 2003) are not relying on Chi-Square tests unlike the absolute fit indices. However, incremental indices compare the Chi-Square value to a reference (baseline) model where a null model in which all its observed variables are characterised with uncorrelated variances (McDonald & Ho, 2002). While several practical fit indices are available in the literature, the most popular incremental fit indices include Normed-Fit Index (NFI), Relative Non-Centrality Index (RNI), and Comparative Fit Index (CFI) (Bagozzi & Yi, 2012; Hu & Bentler, 1999).

In order to test a null hypothesis that implied variance-covariance matrix of indicators reproduces the observed variance-covariance matrix, Chi-Square statistics remain the fundamental goodness-of-fit indices (Bagozzi & Yi, 2012). This approach was originally framed on decisions to accept or reject hypotheses in terms of the observed differences between the original sample covariance matrix and the reproduced covariance matrix of the specified models (Fan et al., 1999). However, this method is sensitive to sample sizes, as a large sample size produces a higher Chi-Square value compared to a small sample size. As a result, the ratio of minimum discrepancy to its degrees of freedom (CMIN/DF) is often reported in empirical studies although it may not represent an acceptable (or good) model fit (Kenny & McCoach, 2003).

On the one hand, a goodness-of-fit is obtained when the Chi-Square statistic is non-significant (at a p-value of ≥ 0.05). On the other hand, researchers (see Marsh et al., 2004) have challenged its adequacy for establishing a model fit in terms of the collected data including the underpinning theory. However, a satisfactory model fit is difficult to achieve as

the sample size increases, due in part to the sensitivity of Chi-Square test to the sample size (McDonald & Ho, 2002). As a result, the larger the sample size, the larger the Chi-Square and this is likely to result in Type I error (incorrect rejection of acceptable model) while small sample size may likely result in Type II error (probability of accepting a null hypothesis when it is false).

While there is a lack of agreement in the literature concerning the appropriate sample size for SEM, Bagozzi and Yi (2012) recommend a sample size above 100 (preferably about 200). Despite the existence of different model fit indices, there is no general fit index, given that the available indices are based on different justifications (Fan et al., 1999) and mainly on intuition (Marsh et al., 2004). Therefore, the designated cut-off points are likely not to be consistent across different types of fit indices, sample sizes, estimators, or distributions (see Marsh et al., 2004).

8.4.6 Model (Improvement) Modification in SEM

To enhance models' goodness-of-fit, researchers often turn to modification indices, however, any modification should be theoretically justified and be theoretically consistent with the goals of the research. According to Byrne (2016), modification indices describe and capture the extent of an SEM model misfit and can be conceptualised by Chi-Square statistics with one degree of freedom. As a result, some of the assumptions of an SEM model may be relaxed in improving a model without creating identification problems (Arbuckle, 2016).

Nonetheless, modification indices provide an opportunity to improve and produce an expected overall model fit in relation to sample variance-covariance matrix. In AMOS, modification indices are available (and provided) to produce an acceptable overall model fit for freely estimated parameters (for each added or removed path) in the model (Byrne, 2016; Kline, 2015). As a result, all the parameters representing variances can be freely estimated, given that AMOS computes modification indices for the model parameters that are fixed to (or assumed to be) 0.0.

8.5 Chapter Summary

This chapter has presented the approach taken in ensuring that the data are free of errors and in achieving the minimum requirements in SEM analysis. Also, an overview of the SEM analysis and its underlying processes and principles, with specific reference to the AMOS analytical capability were discussed. In addition, different forms of models in SEM as well as approaches often used in testing for model fit including the process of model modification were presented.

Contrary to the perception that a larger sample size is required to run an SEM analysis, the issues of sample size as well as the effects of sample size on goodness-of-fit were presented. While there are various methods of model fit, only those that are directly relevant to the current research and available in AMOS were described.

Chapter 9 Quantitative Findings: Descriptive Statistics and Socio-demographics

9.0 Introduction

This chapter outlines the findings of the quantitative analysis of the questionnaire data starting with the descriptive statistics including the respondents' socio-demographics. Also, the questionnaire items that define each construct in the conceptual model of this research are presented.

9.1 Socio-demographics

9.1.1 Respondents' Age Profile

The composition of respondents' age reflects the ONS' (2017) age profile of people in work across UK workplaces, suggesting that the respondents are all within the admissible age of typical employees in the UK.

Table 14: Respondents' Age Range

	Frequency	Percent	Valid Percent	Cumulative Percent
Prefer Not Say	11	3.0	3.0	3.0
16-25	25	6.8	6.8	9.8
26-35	78	21.3	21.3	31.1
36-45	98	26.7	26.7	57.8
46-55	110	30.0	30.0	87.7
56-65	40	10.9	10.9	98.6
over 65	5	1.4	1.4	100.0
Total	367	100.0	100.0	

According to Table 14, the demographic breakdown indicates that the respondents' age profile is a representation of the wider population of people at work in the UK although the sample is dominated by people between the ages 26 and 55. 11 respondents, representing about 3% of the total 367 respondents that participated in the survey declined to identify with a particular age range while only 5 respondents (1.4%) are above 65 years old.

However, the lack of under 16s and the under-representation of people between the ages of 16 and 25 suggest that all the respondents are adults and are more likely to be a key player (such as sole or joint decision-maker) in their respective households. Also, the age composition suggests that the sample comprises people who are able to assume some levels of responsibility for their actions (and inactions), especially their recycling behaviour, at home and at work.

9.1.2 Gender Composition

The socio-demographic composition of the respondents shows that both male and female groups are well represented although there are more females than males in the sample. From Table 15 below, 126 males (over 34%) in comparison to 230 females (about 63%) in the sample participated in the survey. A further 3% representing 11 respondents out of the total sample preferred not to declare their gender category.

Table 15: Respondents Gender Composition

	Frequency	Percent	Valid Percent	Cumulative Percent
Prefer not say	11	3.0	3.0	3.0
Male	126	34.3	34.3	37.3
Female	230	62.7	62.7	100.0
Total	367	100.0	100.0	

This is contrary to the official data of UK labour force which suggests that UK workplaces are dominated by males at 17 million (53.1%) compared to around 15 million (46.9%) females (ONS, 2017). Nonetheless, the demographic breakdown of this research reveals that the sample is dominated by females.

9.1.3 Highest Qualifications

The demographic breakdown shows that the majority of the survey respondents have completed formal education and attained a specific educational qualification suggesting that

the respondents are all educated. From Table 16 below, 366 respondents representing 99.7% of the total respondents have completed a formal education while only 1 respondent (0.3%) has no formal qualification. Nevertheless, it cannot be established whether the respondent with no qualification (see Table 16) has another training/qualification that was not included in the survey instrument.

According to the table, a large proportion of the respondents (around 72%) has attained a university education (such as bachelor degree) while about 13% of the respondents have a school level qualification (such as GCSE).

Table 16: Highest Qualification Attained

	Frequency	Percent	Valid Percent	Cumulative Percent
None	1	0.3	0.3	0.3
School (such as GCSE)	48	13.1	13.1	13.4
College (such as HNC/HND/NVQ)	53	14.4	14.4	27.8
University Higher Education	265	72.2	72.2	100.0
Total	367	100.0	100.0	

Although the sample is dominated by respondents with a higher education qualification, the findings suggest that all the respondents could comprehend the questionnaire questions in relation to the research context. As a result, it can be suggested that all the respondents have strong cognitive capabilities and can appropriately answer all the questionnaire items with the possibility of reducing acquiescence bias, non-differentiated response style, and random measurement error (see MacKenzie & Podsakoff, 2012 for a review).

9.1.4 Employment status

As can be seen in Table 17, the number of people in full-time employment is very high which is proportionate to the age profile (see Table 14 and the educational qualifications (see

Table 16) of the respondents. It is also a reflection of the current employment status in the UK. According to ONS (2017), out of the total 32.07 million people in work in the UK, about 23.58 million (73.5%) are full-time workers compared to around 8.49 million people (26.5%) that are working on part-time basis.

Given that the number of respondents in full-time employment is higher than their part-time counterparts, it can be argued that the coverage of people at work as captured in this research is a true reflection of the national profile of employed (full-time and part-time) people in the UK. However, the sample data are over representation of full-time workers and under representation of part-time workers compared with the national average.

Table 17: Employment status

	Frequency	Percent	Valid Percent	Cumulative Percent
Employed, working full-time	315	85.8	85.8	85.8
Employed, working part-time	47	12.8	12.8	98.6
Self-employed	4	1.1	1.1	99.7
Working as a volunteer	1	0.3	0.3	100.0
Total	367	100.0	100.0	

As illustrated in Table 17, the statistics show that 315 respondents amounting to about 86% are working full-time compared to around 13% part-time workers (47) while only about 1% are self-employed (4 respondents). Although only 1 respondent (0.3%) was self-identified as a volunteer, the respondent failed to specify whether the volunteering is a full-time or part-time position.

In addition, it can be seen from Table 18 below that 203 respondents representing about 55% of the sample are from the public sector compared to 164 respondents (45%) from private sector. Interestingly, there is no single respondent from charity/voluntary organisations while one respondent reported to be working as a volunteer in a public institution.

Table 18: Category of Organisations				
	Frequency	Percent	Valid Percent	Cumulative Percent
Public	203	55.3	55.3	55.3
Private	164	44.7	44.7	100.0
Total	367	100.0	100.0	

According to the national data, about 5.42 million people (17%) are currently working in the public sector compared to around 26.53 million people (83%) in the private sector (ONS, 2017). These represent about 1:5 compared to about 1.3:1 in this research, suggesting that the sample data of this research were dominated by respondents from the public sector despite the population of 1:5 in the national data.

Nevertheless, the way the working hours are arranged is different from organisation to organisation. Although many organisations are offering more flexibility (such as working from home and varied working hours) for their employees to balance home and work demands, questions about where employees spend most of their working time were not included in the survey. Therefore, it can be assumed that employees are likely to spend a considerable amount of time at work as many respondents are working full-time.

9.1.5 Personal Income

In this research, data on respondents' personal annual income rather than the household income were collected. This decision was influenced by the goal of this research, that is, to understand and explain the individual rather than the household's recycling behaviour. As a result, asking for personal income rather than household income is useful to explain the likely relationship between the socio-economic status of the respondents and their recycling behaviour at home and at work.

Therefore, Table 19 shows that personal annual earnings between £25,000 and £49,999 dominated the sample with 155 respondents (42%) while 10 extreme cases (3%) of

people earning £100,000 and above per annum are observed. However, 62 respondents, representing about 17% of the sample, preferred not to declare their personal annual income.

Table 19: Personal Annual Income

	Frequency	Percent	Valid Percent	Cumulative Percent
Prefer not to answer	62	16.9	16.9	16.9
Less than £24,999	87	23.7	23.7	40.6
£25,000-£49,999	155	42.2	42.2	82.8
£50,000-£99,999	53	14.4	14.4	97.3
£100,000 or more	10	2.7	2.7	100.0
Total	367	100.0	100.0	

Nevertheless, the pattern of the respondents' personal annual income is a direct reflection of the type (or sector) of organisations where the respondents are working. For instance, those who are working in a private establishment are observed to be earning more than the respondents from the public sector, with those working in the energy (including oil and gas) industry being paid significantly more. The breakdown can also be attributed to the level of education including the employment status of the respondents as detailed in Tables 16 and 17 respectively.

9.1.6 Affiliation of the sample

The question on the respondents' affiliation to other organisations (such as community, environmental, and political groups) other than their formal organisations is to provide an overview of the extent to which respondents are involved in any voluntary activities, which may be relevant. It is assumed that the extent to which people are involved in other activities on their own volition apart from their paid-work may likely influence their participation in uncompensated activities such as recycling at work.

According to Table 20, only 66 respondents (18.0%) are affiliated to community, environmental, and/or political organisations outside their formal primary employers.

Table 20: Community, environmental, or political organisation affiliation

	Frequency	Percent	Valid Percent	Cumulative Percent
No	301	82.0	82.0	82.0
Yes	66	18.0	18.0	100.0
Total	367	100.0	100.0	

However, a further breakdown shows an overlap in membership between the organisations suggesting that those who belong to a particular organisation (such as a political-based group) are more likely to participate in another organisation (such as a community-oriented group). For instance, 42 respondents claimed to be members of community-based organisations, 34 respondents are members of environmental organisations and 30 respondents are affiliated to political organisations in the UK.

9.2 Description of Recycling Behaviour

All the questions highlighting recycling behaviour at home and at work were completed by all the 367 respondents without any missing values. Considering that this research is focusing on recycling behaviour at home and at work, the breakdown of the items being recycled in both contexts by respondents are presented. For recycling behaviour in each context, the observed trends in recycling of each item are classified into three behavioural patterns (Table 21) by creating a recycling index using the scores from the questionnaire items. These include "never", "occasional" (comprising "rarely and sometimes"), and "regular" (involving "often and always") recyclers at home and at work.

Table 21: Recycling Patterns			
Items	Never (n)	Occasional (n)	Regular (n)
Home			
Paper	2 (.5%)	21 (5.7%)	344 (93.7%)
Plastic	4 (1.1%)	18 (5%)	345 (94%)
Glass	5 (1.4)	22 (6%)	340 (92.6%)

Metals	9 (2.5%)	28 (7.7%)	330 (89.9%)
Food waste	70 (19.1%)	78 (21.3%)	219 (59.7%)
Cardboard	5 (1.4%)	13 (3.5%)	349 (95.1%)
Garden waste	51 (13.9%)	52 (14.2%)	264 (71.9%)
Textiles	31 (8.4%)	122 (33.3%)	214 (58.3%)
Work			
Paper	6 (1.6%)	23 (6.2%)	338 (92.1%)
Plastic	18 (4.9%)	45 (12.3%)	304 (82.9%)
Glass	52 (14.2%)	66 (18%)	249 (67.8%)
Metals	40 (10.9%)	58 (15.8%)	269 (73.3%)
Food waste	110 (30%)	48 (13.1%)	209 (57%)
Cardboard	19 (5.2%)	26 (7.1%)	322 (87.7%)
Textiles	223 (60.8%)	79 (21.5%)	65 (17.7%)

It is worth mentioning that the measured behaviour is self-reported and not actual recycling behaviour although the former provides an indication of the respondents' actual behaviour in both settings. Considering that the reported activities are not actual, there is a tendency for the behaviour to be influenced by common method bias (Lindell & Whitney, 2001; Podsakoff et al., 2003) and this will be examined in SEM analysis using the AMOS statistical package. However, in terms of the ability of the data to provide a comparison between recycling at home and work, there is no reason to suggest that any bias in the data would differ between contexts, allowing any comparison to be reasonably accurate. Whilst garden waste was excluded from the list of items that can be recycled at work, the questionnaire addressed the key recyclables and other waste materials (such as food and textiles) that can be found at home and at work.

9.2.1 Recycling at Home

As shown in Table 21 and specifically displayed in Figure 26, recycling is well practised at home, given that all the items are currently being recycled by majority of the respondents. As can be seen from the figure, all the items listed in the questionnaire, especially the key recyclables, are reported to be recycled by more than 50% of the respondents. The recycling pattern that emerges from these data suggests that the key recyclables are attracting more attention at home compared to other items such as food waste, garden waste, and textiles.

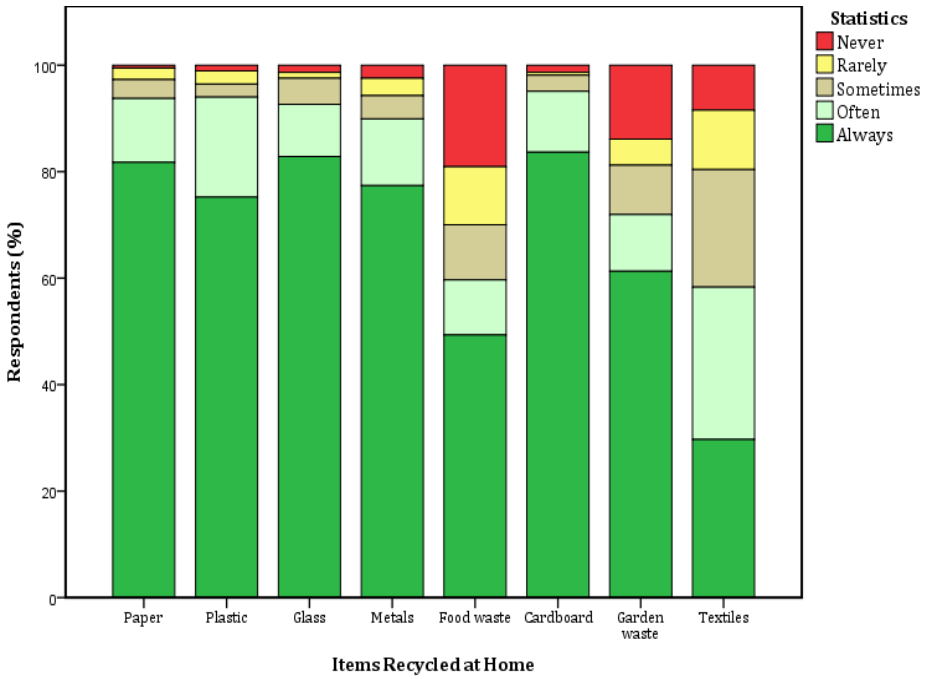


Fig. 26: Proportion of respondents with regards to materials being recycled

From Figure 26, cardboard (95.1%) is the most frequently recycled item at home followed by plastic (94%) and paper (93.7%) while food waste (59.7%) and textiles (58.3%) are less recycled on a regular basis. As a result, textiles are recycled occasionally by 122 respondents (33.3%), food by 78 (21.3%) while plastics are occasionally recycled at home by 18 respondents (5%) and paper by 21 respondents (5.7%). Further inspection shows that about 20% of the respondents representing around 70 people never recycled food waste and 51 respondents (13.9%) never recycled garden waste at home while only 2 respondents never took part in paper recycling and 5 respondents (1.4%) never recycled cardboard at home.

It can be seen from Table 21 that the proportion of people that regularly recycle food waste at home is higher in comparison to the percentage who never recycled. The breakdown shows that about 70 (19.1%) respondents never recycled food waste at home compared to about 52 (14.2%) people that occasionally engage in food waste recycling, and 219 (59.7%) people that always recycle food at home.

In addition, garden waste is being regularly recycled by almost 264 (72%) of the research respondents compared to 51 (14%) respondents that never recycled and 52 (14%) that occasionally undertake garden waste recycling at home.

For textiles, only about 31 (8%) of respondents claimed to have never recycled at home while around 58% (214 respondents) regularly recycle textiles at home and 33% that occasionally recycle their textile materials.

These findings show that the proportion of people who never recycled food waste, garden waste, and textiles is considerably higher than other items that can be found at home. Possible explanations for these findings might be that food waste can be composted by individuals at home and some respondents may not have a garden while textile materials can be donated to charity or sold (and reused) as used materials, which may not be regarded as recycling by respondents.

Surprisingly, more than 97% of the respondents claimed to be always recycling glass bottles and jars at home while around 94% reported to be participating in plastic recycling. The emphasis on dry recyclables (such as plastic, glass, and metals) as the key recyclables including the available opportunity to recycle these items may explain why the numbers of respondents that are regularly recycling these items are considerably higher.

In addition, it can be suggested that packaging waste is contributing significantly to the volume of waste being generated at home, given that more than 98% of the respondents are currently recycling cardboard on a regular basis. Whilst recycling behaviour is prevalent at home, recycling of textiles is less common among the respondents compared to other items.

These findings reflect and support the available national data on recycling at home including other facilities (such as household waste recycling centres) in the UK. According to the statistics, 92% (cardboard); 90% (paper); 90% (plastics); 90% (glass); 45% (food waste); and 85% (garden waste) of householders recycled at home in 2015 (Downing, Plumb, & Jones, 2016). These data are slightly higher than the findings observed in this research, given that

other facilities including household waste recycling centres were taken into consideration in the national data. Also, this research focused on the individual recycling behaviour rather than the households as used in the national data.

9.2.2 Recycling at Work

The pattern of recycling behaviour at work according to Table 21 and as presented in Figure 27 below is obviously different than the pattern obtained from home settings. From the figure, the percentage of respondents that occasionally and regularly recycle each item is lower than the percentage obtained for the same materials at home.

Nevertheless, food waste and textile materials are the two main items that the majority of the respondents reported they never recycled when at work. According to Figure 27, about 30% of people claimed that they never recycled food waste while almost 61% reported to have never recycled textile materials at work. The obtained figures for textiles are likely due to the low incidence of textile waste arisings in a work context.

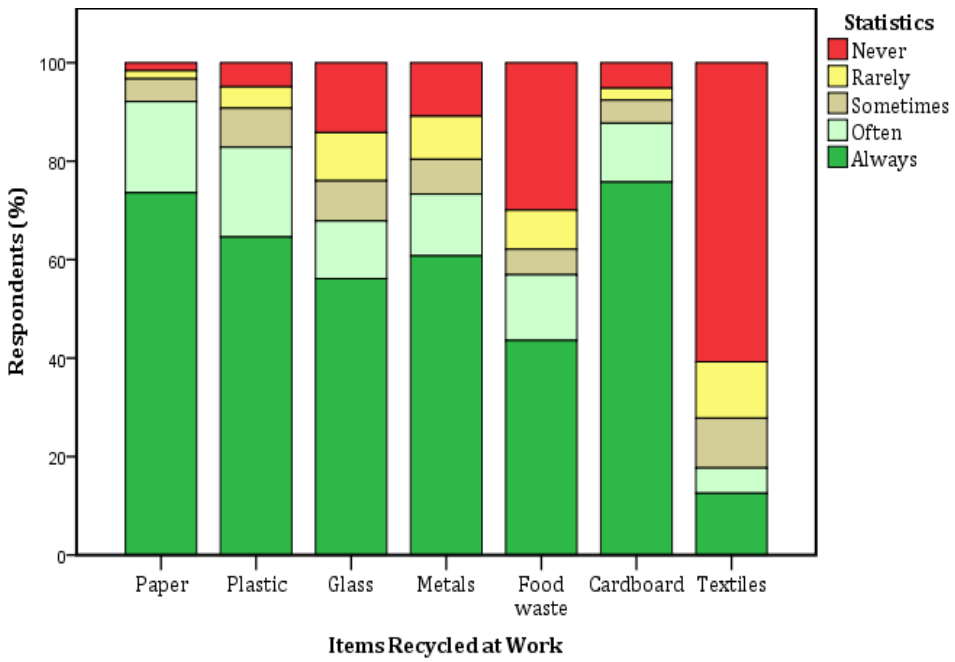


Fig. 27: Pattern of recycling at work

On the contrary, cardboard, glass, paper, plastics, and metals are regularly recycled by many people at work according to these findings. For example, Figure 27 shows that paper

is recycled regularly by more than 92% of the respondents while about 6% are occasionally recycling paper and only 2% never recycled paper at work.

The data on paper recycling are not unexpected, given that paper is the most used in an office environment apart from organisations that are operating a paperless regime. In order to restrict paper usage, some organisations are controlling how paper and paper related products are being used at work by password-protecting their printing/photocopy equipment.

In the same manner, cardboard is recycled regularly by about 88% of the respondents while about 7% are occasionally recycling cardboard and only about 5% never recycled cardboard at work. This is a surprising finding, given that a relatively similar pattern is obtained for cardboard recycling behaviour at home and may suggest that some people are using their workplaces for delivery when buying things online.

Contrary to the initial assumption from the exploratory findings that many people may have access to re-useable mugs at work which can prevent the use of plastic/glass bottles, plastics are regularly recycled by almost 83% of the respondents compared to about 5% that never recycled plastic at work. Also, about 68% reported to be regularly recycling glass and almost 73% are regularly recycling metals at work compared to 14% and 11% that never recycled glass and metals respectively.

Surprisingly, cardboard is regularly recycled in both contexts by the majority of respondents (Figures 26 and 27) while paper (including envelopes, magazines, and newspapers) emerged as another popular item in both settings. On the contrary, textiles are the least likely materials to be recycled, both at home and at work. In aggregate, the item-by-item analysis shows that paper (and paper products) is the most common item being recycled in both contexts, given that only a fraction of respondents claimed to have never recycled paper (.5% at home; 1.6% at work) or cardboard (1.4% at home; 5.2% at work).

9.2.3 Recycling Behaviour: Home-Work Comparison

The relationship between recycling at home and at work in terms of volume of materials, range of materials, and frequency of recycling were included in the instrument to compare recycling practices in both settings to draw a realistic conclusion. Respondents were asked to indicate whether they recycled more at home or work in terms of the volume, range of materials and frequency of their recycling habits.

Table 22 below shows that many respondents are recycling more at home in terms of the range of materials being recycled, the volume of materials being recycled, and the frequency of recycling.

As reported in Table 22, about 83% of respondents reported to be recycling a larger volume of items at home than in work settings while almost 86% are currently recycling a wider range of materials at home compared to about 14% that recycled more kinds of materials at work. In a similar manner, a higher number of the respondents (82%) claimed to be recycling more frequently at home in relation to 66 respondents (18%) that are recycling more frequently at work. Taken together, it is argued here that people are more active and engaging in recycling activities and efforts at home than at work.

Table 22: Home-Work Recycling Comparison

Recycling		Frequency	Valid Percent	Cumulative Percent
Volume of materials	Home	303	82.6	82.6
	Work	64	71.4	100.0
Range of materials	Home	315	85.8	85.8
	Work	52	14.2	100.0
Frequency of recycling	Home	301	82.0	82.0
	Work	66	18.0	100.0

Although the survey instrument used in this research did not include questions on the context where respondents are producing more waste, the observed patterns in terms of

volume, range, and frequency may likely be explained by people's waste generation behaviour. As a result, it could be suggested that people generate a higher volume of and a wider range of wastes at home than they do at work. On the contrary, the "free text box" comments of the questionnaire instrument suggest that many people are using another means, such as home, to recycle the waste being produced at work due to the lack of facilities in their workplaces. For instance, "*limited facilities at work, so easier to do at home; sometimes I take items home from work to recycle at home*" [Resp_018]. According to Resp_020, "*at work we have no recycling facilities, so I take what I can home to recycle i.e. not confidential information but bring home cans, tins glass etc. that I use in my own work as it's bad for environment to just throw it away in the waste and I feel Guilty!*". This may contribute to the observed differences between recycling at home and at work regarding the volume, the range, and the frequency of recycling.

While some disparities are observed in the way people recycle at home and at work, reasons why people recycle the way they do can be both be personal and situational. According to the "free text box" of the questionnaire, the respondents' comments show that personal factors include amount of materials and responsibility while the situational factors include facilities (availability and accessibility), time, and organisational commitment (such as policy). On the one hand, people are more likely to recycle less at work when producing more waste at home. According to the "free text box" of the questionnaire for example, "*I generate more waste at home by cooking, post mail received and everyday life, therefore there is more material to recycle*" [Resp_089]. On the other hand, many people would recycle more at work when there are opportunities in terms of support (such as scheme and presence of adequate facilities) at work. This is supported by the "free text box" comments for instance, "*currently the area I live in provides recycling facilities for cans and glass and paper, we do not have the option to recycle plastic (although I do try where possible to keep this and recycle due to space and the ability to store this is not always possible. I am also not in a position to recycle food waste due to space, although I do try to limit my food waste by eating left overs and*

purchasing only food I need rather than pre-packed multi purchases" [Resp_044]. Nevertheless, recycling at home is different than recycling at work and recycling is more established at home compared to work contexts.

9.3 Assessing the Relationships: Bivariate Analysis

9.3.1 Relationship between Recycling at Home and at Work

The relationship between recycling behaviour at home and at work with regards to recycling in general as well as how that may vary by materials have not been adequately established in empirical research. To examine the relationship between recycling at home and at work in general, a bivariate analysis using parametric (Pearson) and non-parametric (Kendall's tau b and Spearman's rho) tests were conducted on the aggregate scores of recycling behaviour in both contexts. According to Pallant (2016), these correlation coefficients indicate the direction (positive or negative) and magnitude (value) of the relationship between two or more variables.

As can be seen in Table 23, there is a significant positive correlation between recycling at home and at work at the $p = .01$ two-tailed. However, the strength of the estimated correlation between recycling at home and at work is considerably small ($r = .22$, $n = 367$, $p < .01$; Kendall's tau b) and medium ($r = .3$, $p < .01$, $n = 367$; Spearman's rho) based on Cohen's (1988) effect size recommendations. Based on these recommendations, the effect size for this analysis was estimated by calculating the difference between the means of recycling at home and at work divided by the standard deviation of either recycling at home and at work. Nonetheless, the positive association between the two contexts suggests that an increase in recycling at home is likely to increase recycling at work to a certain extent although is not an indication that recycling at home can predict recycling at work.

Therefore, these values translate to a shared variance of about 5% and 9% in the explanation of recycling at work respectively, suggesting a lack of significant overlap between the recycling practices at home and at work. Based on these findings, it can be argued that

recycling at home can only explain between 5-9% of the variance in respondents' recycling at work. While there is a relationship between recycling behaviour at home and at work, these results provide no indication that an individual will engage in recycling at work. Also, the understanding of whether an individual will be recycling each item at work in the same way as recycling at home is not certain due to the low effect sizes reported in this research. Put differently, recycling behaviour at work is not likely to follow the same pattern as recycling at home based on these findings.

Table 23: Relationship between Recycling at Home and at Work

		Statistics	Recycling Behaviour	
			Home	Work
Pearson	Recycling at home	Pearson Correlation	1	.329**
		Sig. (2-tailed)		.000
		N	367	367
	Recycling at work	Pearson Correlation	.329**	1
		Sig. (2-tailed)	.000	
		N	367	367
Kendall's tau_b	Recycling at home	Correlation Coefficient	1.000	.227**
		Sig. (2-tailed)		.000
		N	367	367
	Recycling at work	Correlation Coefficient	.227**	1.000
		Sig. (2-tailed)	.000	
		N	367	367
Spearman's rho	Recycling at home	Correlation Coefficient	1.000	.300**
		Sig. (2-tailed)		.000
		N	367	367
	Recycling at work	Correlation Coefficient	.300**	1.000
		Sig. (2-tailed)	.000	
		N	367	367

** Correlation is significant at the 0.01 level (2-tailed).

Although Table 23 above shows a significant positive correlation between recycling behaviour in both contexts, albeit small, the scatter plot (Figure 28) further confirms the existence of correlation between recycling in the two contexts. However, the relationship between recycling at home and at work is observed not to be perfectly linear. As a result, it is difficult to establish from these results that recycling at home is a predictor of recycling at home on the aggregate and particularly for each respondent.

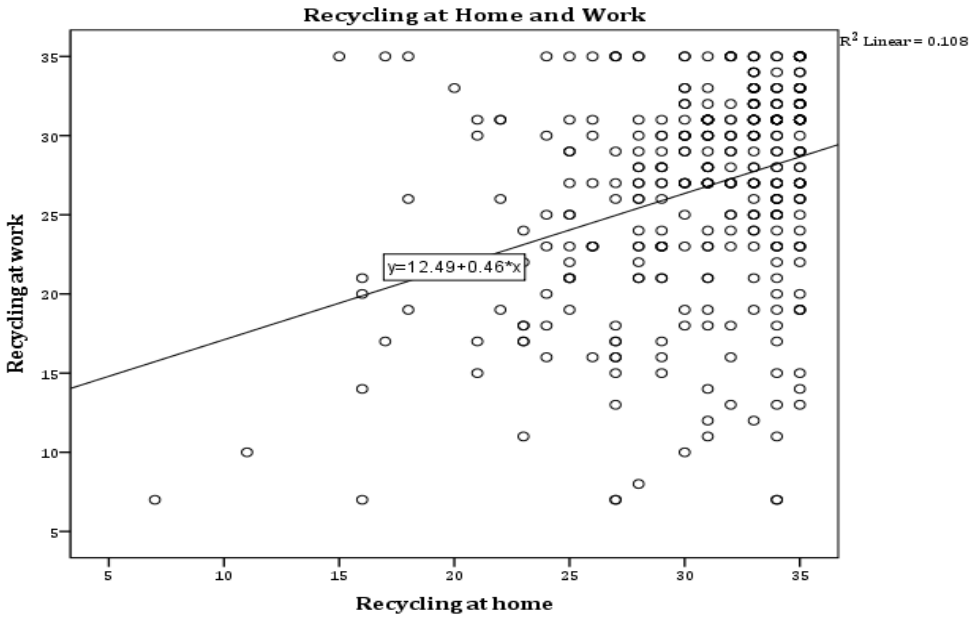


Fig. 28: Scatter Plot for the relationship between Recycling at Home and Work

Considering these findings, a further analysis was conducted to confirm whether the observed association extends to the individual items that can be recycled in both contexts. As a result, a bivariate analysis with Pearson, Kendall's tau b, Spearman's rho statistics was conducted using the item-by-item rather than the aggregate scores as previously used. As presented in Table 24 the association between the key (or dry) recyclables at home and at work is statistically significant. However, the association between recycling at home and work regarding food waste and textiles is not statistically significant although these two items are significantly correlated. While there is a positive insignificant association between recycling at home and at work with regards to food waste and other items, a negative association between recycling at home and at work regarding textiles and other items were observed.

From the obtained statistics, it can be concluded that recycling of each material at home is significantly similar to the recycling of same material at work. As a result, recycling behaviour at home and at work is not only similar on the aggregate but there are also significant similarities in the way each material is currently being recycled in both contexts based on the obtained p-value, < .05 (2-tailed).

Table 24: Bivariate Association between Items at Home and at Work

			Recycling at Home							
			Paper (including envelopes, magazines & newspapers)	Plastic (including bottles & food containers)	Glass (including bottles & jars)	Metals (including drinks cans & food tins)	Food waste	Cardboard	Garden waste	Textiles
Pearson Correlation	Paper (including envelopes, magazines & newspapers) at work	Correlation Coefficient	.337**	.213**	.214**	.233**	.232**	.273**	.190**	.172**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.001
	Plastic (including bottles & food containers) at work	Correlation Coefficient	.258**	.218**	.238**	.222**	.177**	.240**	.227**	.208**
		Sig. (2-tailed)	.000	.000	.000	.000	.001	.000	.000	.000
	Glass (including bottles & jars) at work	Correlation Coefficient	.159**	.137**	.201**	.194**	.112*	.155**	.220**	.208**
		Sig. (2-tailed)	.002	.009	.000	.000	.032	.003	.000	.000
	Metals (including drinks cans & food tins) at work	Correlation Coefficient	.213**	.167**	.189**	.271**	.200**	.209**	.203**	.216**
		Sig. (2-tailed)	.000	.001	.000	.000	.000	.000	.000	.000
	Food waste at work	Correlation Coefficient	.092	.099	.124*	.105*	.300**	.062	.238**	.135**
		Sig. (2-tailed)	.078	.057	.017	.044	.000	.235	.000	.010
	Cardboard at work	Correlation Coefficient	.237**	.166**	.187**	.174**	.116*	.248**	.211**	.218**
		Sig. (2-tailed)	.000	.001	.000	.001	.026	.000	.000	.000
	Textiles at work	Correlation Coefficient	-.044	-.017	.011	-.047	.104*	-.016	.120*	.175**
		Sig. (2-tailed)	.401	.749	.835	.374	.046	.765	.022	.001
Kendall's tau_b	Paper (including envelopes, magazines & newspapers) at work	Correlation Coefficient	.277**	.224**	.252**	.245**	.218**	.280**	.156**	.175**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.001	.000
	Plastic (including bottles & food containers) at work	Correlation Coefficient	.235**	.225**	.244**	.250**	.185**	.225**	.204**	.183**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Glass (including bottles & jars) at work	Correlation Coefficient	.167**	.164**	.240**	.218**	.111*	.175**	.193**	.176**
		Sig. (2-tailed)	.000	.001	.000	.000	.013	.000	.000	.000
	Metals (including drinks cans & food tins) at work	Correlation Coefficient	.214**	.204**	.232**	.284**	.183**	.228**	.180**	.177**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Food waste at work	Correlation Coefficient	.048	.095*	.095*	.115*	.249**	.083	.206**	.113**
		Sig. (2-tailed)	.305	.044	.045	.014	.000	.079	.000	.010
	Cardboard at work	Correlation Coefficient	.232**	.218**	.259**	.232**	.164**	.280**	.207**	.170**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Textiles at work	Correlation Coefficient	-.065	.008	.029	-.001	.104*	-.031	.125**	.129**
		Sig. (2-tailed)	.173	.866	.549	.987	.020	.515	.006	.004
Spearman's rho	Paper (including envelopes, magazines & newspapers) at work	Correlation Coefficient	.290**	.235**	.266**	.259**	.242**	.292**	.171**	.199**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.001	.000
	Plastic (including bottles & food containers) at work	Correlation Coefficient	.251**	.241**	.263**	.271**	.211**	.240**	.229**	.210**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Glass (including bottles & jars) at work	Correlation Coefficient	.183**	.182**	.264**	.239**	.129*	.192**	.220**	.205**
		Sig. (2-tailed)	.000	.000	.000	.000	.013	.000	.000	.000
	Metals (including drinks cans & food tins) at work	Correlation Coefficient	.233**	.222**	.255**	.309**	.213**	.247**	.204**	.206**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Food waste at work	Correlation Coefficient	.053	.105*	.104*	.127*	.286**	.092	.235**	.133*
		Sig. (2-tailed)	.311	.045	.047	.015	.000	.079	.000	.011
	Cardboard at work	Correlation Coefficient	.245**	.230**	.275**	.247**	.187**	.293**	.228**	.193**
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	Textiles at work	Correlation Coefficient	-.071	.009	.031	-.001	.119*	-.034	.145**	.149**
		Sig. (2-tailed)	.173	.867	.551	.988	.023	.516	.005	.004

**** Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed); N = 367.**

However, the consistency of each respondent in performing recycling with regards to a specific material across the two contexts was estimated to address the question of whether recycling behaviour is similar for each material and for the same individual between home

and work. This involved the calculation of the differences in the respondents' scores on each material in both contexts. As presented in the frequency distribution table (Table 25), the differences range from -4 (Work) to +4 (Home), given that 5-point rating scale was used to score each response in the questionnaire instrument. For instance, respondents who replied "often" will be scored 4 on paper recycling at home and if they answered "Always" for paper recycling at work, they would be scored 5, resulting in a score -1 on the frequency grid (that is home minus work).

While many respondents claim to recycle similarly in both contexts regardless of materials and supported by the comments from the "free box text" (such as "*it's pretty even really. . . I just recycle whatever I can anywhere*" [Resp_084]), it is common to recycle more at home than work and Figure 29 below highlights the differences in people's recycling behaviour between home and work. Where there is difference, it tends to be high for home contexts compared to workplace settings (see Figure 29).

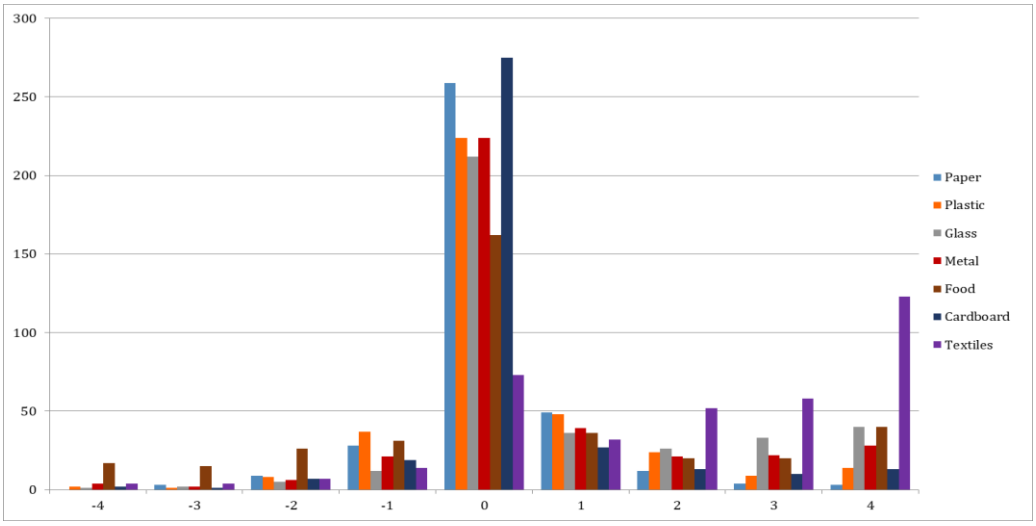


Fig. 29: Recycling at Home and at Work

According to the Figure, the positive x-axis indicates those who recycle more at home and the negative x-axis show respondents who recycle more at work while the zero represents those who claimed to be recycling similarly in both contexts. However, a further breakdown of the respondents' scores show some inconsistencies, given that a higher

percentage of respondents claim to be recycling more at home in terms of volume of materials, range of materials, and frequency of recycling. According to Table 25 below, it is plausible to suggest that many respondents practice more recycling at home than they do at work.

Table 25: Distribution of Materials at Home and Work

		Frequency	Percent	Cumulative Percent
Valid (N = 367)	Volume of materials recycled at **Home** & **Work**			
	A larger amount of material at Home	303	82.6	82.6
	A larger amount of material at Work	64	17.4	100.0
	Range of materials recycled at **Home** & **Work**			
	A wider range of material at Home	315	85.8	85.8
	A wider range of material at Work	52	14.2	100.0
	Frequency of recycling at **Home** & **Work**			
	More at Home	301	82.0	82.0
	More at Work	66	18.0	100

To confirm the significance level of these differences, a Chi-Square test for independence was conducted in SPSS with regards to the disparities between the recycling of each item at home and at work. From the Chi-Square test (Table 26), there is enough evidence to suggest that the differences between recycling at home and at work regarding the recycling of each material by individual respondent is statistically significant, since the obtained p-value is less than .05.

Table 26: Chi-Square Test for differences between recycling at Home and at Work

Recycling	Chi-Square	df	Asymp. Sig.
Difference in **paper** recycling	1170.330[a]	7	.000
Difference in **plastic** recycling	976.158[b]	8	.000
Difference in **glass** recycling	853.738[b]	8	.000
Difference in **metal** recycling	954.872[b]	8	.000
Difference in **food** waste recycling	419.973[b]	8	.000
Difference in **cardboard** recycling	1526.360[b]	8	.000
Difference in **textiles** recycling	315.406[b]	8	.000

a. 0 cells (0.0%) have expected frequencies < 5. The minimum expected cell frequency is 49.9
b. 0 cells (0.0%) have expected frequencies < 5. The minimum expected cell frequency is 40.8

9.3.2 Recycling Behaviour across Organisational Sectors

Given that recycling behaviour at home and at work is different with regards to the volume, the range, and the frequency of recycling (Tables 25 and 26 above), a further analysis was conducted to confirm whether recycling behaviour in the private sector is different from recycling in the public sector. The possible similarities (or differences) between private and public sectors were investigated using Mann-Whitney U test in SPSS. According to the findings in Table 27, no significant difference was observed in the way people from private (n = 164) and public (n = 203) sectors recycle each material at home.

Table 27: Differences in Recycling behaviour between Private and Public Organisations

	Organisation Category	N	Mean Rank	Sum of Ranks
Paper (including envelopes, magazines & newspapers) at home	Public	203	185.33	37621.50
	Private	164	182.36	29906.50
	Total	**367**		
Plastic (including bottles & food containers) at home	Public	203	186.97	37954.00
	Private	164	180.33	29574.00
	Total	**367**		
Glass (including bottles & jars) at home	Public	203	182.68	37084.00
	Private	164	185.63	30444.00
	Total	**367**		
Metals (including drinks cans & food tins) at home	Public	203	183.89	37329.00
	Private	164	184.14	30199.00
	Total	**367**		
Food waste at home	Public	203	191.73	38920.50
	Private	164	174.44	28607.50
	Total	**367**		
Cardboard at home	Public	203	187.04	37968.50
	Private	164	180.24	29559.50
	Total	**367**		
Textiles at home	Public	203	193.39	39259.00
	Private	164	172.37	28269.00
	Total	**367**		
Paper (including envelopes, magazines & newspapers) at work	Public	203	169.59	34426.50
	Private	164	201.84	33101.50
	Total	**367**		
Plastic (including bottles & food containers) at work	Public	203	168.38	34182.00
	Private	164	203.33	33346.00
	Total	**367**		
Glass (including bottles & jars) at work	Public	203	180.86	36714.50
	Private	164	187.89	30813.50
	Total	**367**		
Metals (including drinks cans & food tins) at work	Public	203	169.54	34417.00
	Private	164	201.90	33111.00
	Total	**367**		
Food waste at work	Public	203	176.19	35767.00
	Private	164	193.66	31761.00
	Total	**367**		
Cardboard at work	Public	203	173.30	35180.50
	Private	164	197.24	32347.50
	Total	**367**		
Textiles at work	Public	203	176.51	35831.50
	Private	164	193.27	31696.50
	Total	**367**		

From Tables 26 and 27, it is evident that people from different organisational sectors are similar in the way they recycle at home. However, the findings show a significant difference in recycling of items at work with people in the public sector more likely to recycle compared to their counterparts in the private sector. The only exception is the way glass, food waste,

and textiles are recycled. According to Table 28 below, there is no significant difference between private and public sectors in the recycling of glass, food waste, and textiles at work.

Table 28: Recycling behaviour between Private and Public Organisations

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Recycling at Home				
Paper (including envelopes, magazines & newspapers)	16376.500	29906.500	-.397	.692
Plastic (including bottles & food containers) at home	16044.000	29574.000	-.791	.429
Glass (including bottles & jars)	16378.000	37084.000	-.404	.686
Metals (including drinks cans & food tins)	16623.000	37329.000	-.031	.975
Food waste	15077.500	28607.500	-1.665	.096
Cardboard	16029.500	29559.500	-.949	.342
Textiles	14739.000	28269.000	-1.949	.051
Recycling at Work				
Paper (including envelopes, magazines & newspapers)	13720.500	34426.500	-3.752	.000
Plastic (including bottles & food containers) at work	13476.000	34182.000	-3.687	.000
Glass (including bottles & jars)	16008.500	36714.500	-.698	.485
Metals (including drinks cans & food tins)	13711.000	34417.000	-3.307	.001
Food waste	15061.000	35767.000	-1.665	.096
Cardboard	14474.500	35180.500	-2.863	.004
Textiles	15125.500	35831.500	-1.714	.087
a. Grouping Variable: organisation category				

9.3.3 Recycling Behaviour and Socio-Demographics

In addition to the analysis of recycling behaviour in different organisational sectors, a further analysis was performed to establish the extent to which recycling behaviour at home and at work can be explained in terms of respondent socio-demographics. For this purpose, a bivariate analysis using non-parametric, Kendall's Tau b and Spearman's rho tests, was performed to allow the comparisons of significance levels between these tests.

The findings from these tests are presented (Table 29). It can be seen in Table 29 that the association between recycling behaviour (home and work) in terms of socio-demographics is both significant and non-significant with positive and negative directions.

Table 29: Bivariate Correlations between Recycling Behaviour and Socio-Demographics										
Statistics			Recycling Behaviour		Socio-demographics					
			Home	Work	Respondents Gender	Age range	Highest qualification	Personal annual income	Employment status	Organisation category
Kendall's tau_b	Recycling at home	Correlation Coefficient	1.000	.227**	.064	.146**	-.044	.052	.117**	-.075
		Sig. (2-tailed)		.000	.161	.000	.308	.204	.009	.094
	Recycling at work	Correlation Coefficient	.227**	1.000	-.014	.046	-.064	.040	-.023	.108*
		Sig. (2-tailed)	.000		.762	.243	.130	.327	.601	.014
Spearman's rho	Recycling at home	Correlation Coefficient	1.000	.300**	.074	.185**	-.053	.069	.137**	-.088
		Sig. (2-tailed)		.000	.162	.000	.311	.187	.008	.094
	Recycling at work	Correlation Coefficient	.300**	1.000	-.016	.061	-.080	.051	-.027	.128*
		Sig. (2-tailed)	.000		.762	.240	.126	.331	.600	.014
**. Correlation is significant at the 0.01 level (2-tailed); *. Correlation is significant at the 0.05 level (2-tailed); N = 367										

For example, the findings show that the association between age and recycling at home (Kendall tau b = .146**; Spearman's rho = .185**) is statistically significant compared to the positive association between age and recycling at work (Kendall tau b = .046; Spearman's rho = .061) that is not statistically significant. According to these findings, the Kendall's tau b and Spearman's rho coefficients indicate that age is likely to play a significant role in the way people recycle at home but not in the way recycling is being set up at work. As a result, age is not a potential candidate for profiling people that engage in recycling at work.

Also, the association between recycling behaviour in the two contexts and the respondents' educational qualification as presented in Table 29 is not statistically significant. However, there is a negative association between recycling behaviour (**Home**, Kendall tau b = - .044 and Spearman's rho = - .053; **Work**, Kendall tau b = - .064 and Spearman's rho = - .080) and educational qualification. These findings suggest that the extent of educational qualification is likely to reduce recycling (at home and at work), given that about 99% of respondents of this research have attained a higher education level.

On the contrary, the association between recycling behaviour (at home and at work) and personal annual income is observed to be positive although not statistically significant.

According to Table 29, the association between recycling behaviour (**Home**, Kendall tau b = .052 and Spearman's rho = .069; **Work**, Kendall tau b = .040 and Spearman's rho = .051) and personal annual income is positively insignificant. These results suggest that recycling at home and at work is not likely to be differentiated and determined by personal income although personal annual income contributes positively to recycling behaviour at home and at work.

In addition, the people's employment status, either as full-time or part-time employees has a significant association with recycling at home. However, the association between employment status and recycling at work is not significant. From the findings in Table 29, Kendall's tau b (.177) and Spearman rho's (.137) show a significant association at .01 (2-tailed) between recycling at home and employment status. However, the association between recycling at work (Kendall's tau b, -.023; Spearman's rho, -027) and employment status is not statistically significant. This is an interesting finding considering that more than 85% of the research respondents are currently working full-time and are expected to be spending a considerable amount of time at work. Although the association between employment status and recycling at work is not significant, the negative correlation coefficients suggest that the more people stay at work, the less they recycle.

However, the association between organisational sector and recycling behaviour at home follows a similar pattern to the association between educational qualifications and recycling at home. The findings show a mixed association between recycling (**Home**, Kendall tau b = -.075 and Spearman's rho = - .088; **Work**, Kendall tau b = .108*and Spearman's rho = .128*) and organisational category, with regards to private and public sector. While there is a negative association between recycling at home and organisational sector, a positive significant association between recycling at work and organisational category is obtained.

These corroborate the findings presented in Table 28 that recycling behaviour in the public sector is different than the recycling practices in the private sector. These findings

suggest that work settings are more likely to influence the way people recycle at work but not on how they recycle at home despite the observation that recycling is more popular at home based on respondents' replies.

To find any relationship between gender and recycling behaviour, the composition of gender (with Female = 230; Male = 126; and 11 respondents that preferred not to declare their gender) was included in the bivariate analysis. From Table 29 above, there is no significant association between gender and recycling behaviour suggesting that both males and females are not different in their recycling behaviour. As a result, people, in terms of their gender, are not significantly different in their recycling behaviour between home and work and particularly with regards to the items that can be found in both contexts.

This bivariate analysis suggests that socio-demographics are not likely to play any significant role in the way people recycle, especially in the workplace settings. While some socio-demographics such as age have a significant association with recycling at home, only organisational category has a significant association with recycling at work. These findings indicate that socio-demographics are more likely to play no significant role in the way people recycle at work compared to how they recycle at home. In addition, this analysis suggests that recycling in both contexts is similar in aggregate, however, recycling at home is different from recycling at work in terms of volume of materials, range of materials, and frequency of recycling.

Following these findings, the next Chapter is focusing on the inferential statistics by testing the research hypothesis using many statistical techniques, especially structural equation modeling.

9.4 Chapter Summary

In this chapter, the descriptive statistics of the collected data including the demographics of respondents were presented. The findings, with regards to the volume of materials, the range of the materials, and the frequency of recycling, suggest that recycling is

more popular at home compared to work settings. However, the dry recyclables such as paper, glass, and plastics are obvious materials in both contexts. For instance;

- Respondents (83%, volume of waste; 86%, wider range of materials; and 82%, frequency of recycling) reported to be recycling more at home compared to respondents (17%, volume of waste; 14%, wider range of materials; and 18%, frequency of recycling) claiming to be recycling more at work;
- Also, 95%; 94%; 94%; 92%; and 90% of respondents are currently recycling cardboard; paper; plastics; glass; and metals respectively at home compared to 88% (cardboard); 92% (paper); 83% (plastics); 68% (glass); and 73% (metals) of respondents at work;
- Food waste and textiles are the only materials that fewer respondents are currently preparing for recycling in either contexts

In addition, a series of bivariate analyses was performed to understand the relationship between recycling behaviour and the respondents' socio-demographics. However, it was observed that the bivariate relationships between the socio-demographic factors and recycling at home and recycling at work are mixed. For example,

- Respondents' age range has a positive significant association with recycling at home but not with recycling at work;
- Also, respondents' employment status has a positive significant relationship with recycling behaviour at home but has a negative insignificant association with recycling at work;
- On the contrary, organisational category, (whether they work in the private, public, or voluntary sectors), has a significant positive association with recycling at work but a negative association with recycling at home;

- Furthermore, the bivariate analysis suggests that men and women are not different in the way they recycle at home and at work, suggesting that gender is not an obvious socio-demographic factor in profiling people with regards to their recycling behaviour.

Having established the bivariate relationships between recycling behaviour at home, at work, and socio-demographics, Chapter 10 shows the findings of further statistical analyses that were performed to confirm the factors that can affect recycling at work with regards to the hypothesised relationships as presented in Chapter 6.

Chapter 10 Quantitative Findings: Inferential Statistics and Hypotheses Testing

10.0 Introduction

In addition to the descriptive analysis, the findings of the analysis performed using the PROCESS macro, SPSS, and SEM are presented in this Chapter to establish the extent to which the hypothetical model is described by the data. As a result, this Chapter is focusing on the testing of the research hypotheses as presented in Chapter 6, given that the collected data have been assessed for validity, normality, multicollinearity, internal reliability, and for possible common method variance. From the reliability test in Chapter 8, the obtained Cronbach's Alpha coefficient for "Perceived Control" and "Incentives" were reported to be less than the recommended .7 threshold. These two constructs were subsequently removed from the hypothesised model and are not considered for further analysis.

10.1 Assessing the Measurement Model

As discussed in Chapter 8, a reflective measurement model was used in this research and the confirmatory factor analysis is required prior to the analysis of the structural model that involves the hypotheses testing. As a result, it is necessary to assess and accept the measurement model with reference to the recommended fit indices as described in sub-section 8.5.4. Also, from the common method bias test, "Attitudes" were observed to be strongly correlated with other independent constructs in the model such as "Ascription of Responsibility"; "Personal Norms"; and Subjective Norms. Consequently, "Attitudes" are not considered in the subsequent analysis while the remaining constructs are used to assess the measurement model prior to the hypotheses testing.

That the measurement model in Figure 18 as reproduced in Figure 30 below was used in assessing common method bias (CMB) based on Maximum Likelihood (ML) with acceptable fit indices and suggested no discriminant validity issues. It is reasonable to retain the measurement model although model trimming as a form of model re-specification (Byrne, 2016; Chou & Bentler, 2002; Kline, 2015) by removing non-significant paths could improve

the model fit. This step was undertaken during CMB analysis where attitudes were removed and no further improvement to the measurement model is required, given that all the factor loadings are significantly higher than the appropriate loading of .20 (Kline, 2015). Nevertheless, model trimming is data-driven and not dependent on any theory (Chou & Bentler, 2002), this reduced the number of indicators per construct in the measurement model.

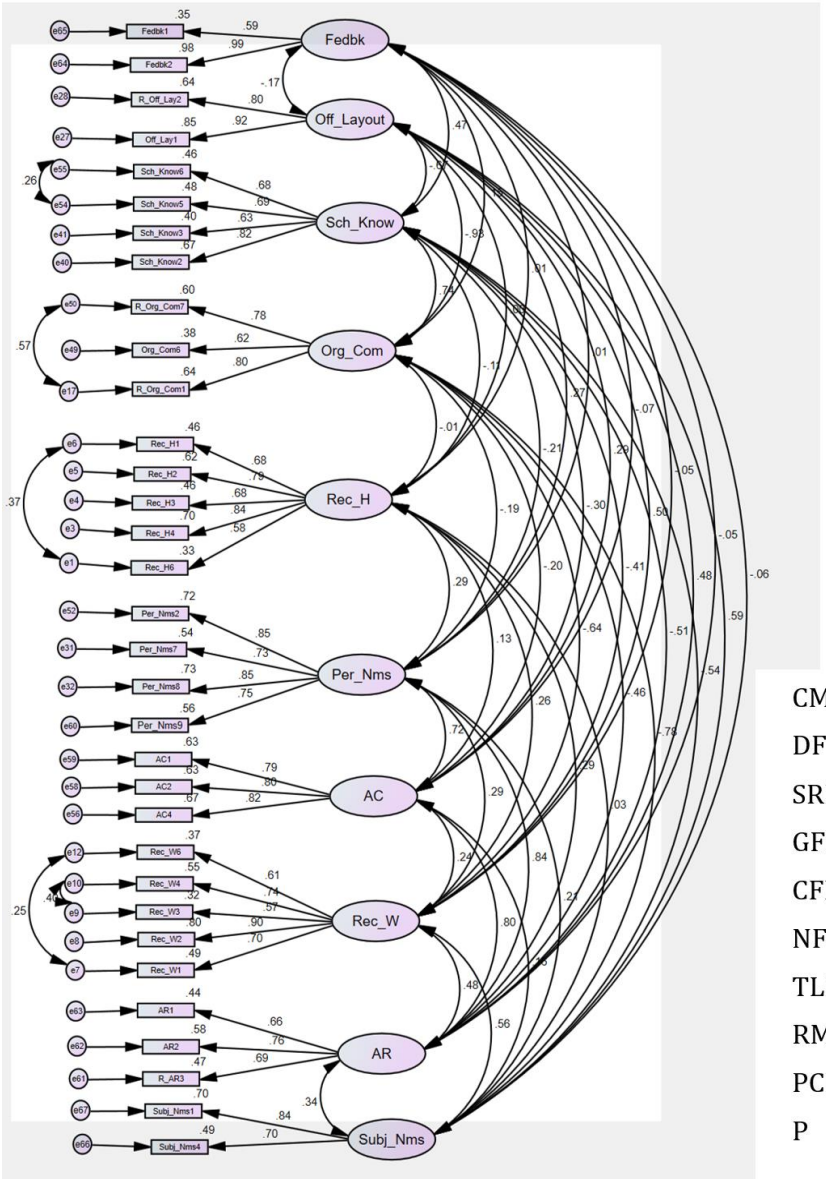


Fig. 30: Full Measurement Model

As a result, the model (Figure 30) is considered acceptable without any additional modifications based on the recommended acceptable fit indices (Hooper et al., 2008) used in this research. These include goodness-of-fit (GFI), Comparative Fit Index (CFI), PCLOSE, Minimum Discrepancy per Degrees of Freedom (CMIN/DF), Normed Fit Index (NFI), Root Mean Square Error of Approximation (RMSEA), Standardised Root Mean Square (SRMR), and Turker-Lewis Index (TLI). Following the confirmation of the measurement model, the next step is to assess the structural model that involves the testing of the research hypotheses.

10.2 Assessing the Structural Model

As discussed in Section 8.4.1, a structural model highlights the structural paths (or causal relationships) between latent constructs in a hypothesised model. In this research, the structural model (Figure 31) represents the part of a full model that shows the structural connection between the latent constructs. Given that the measurement model in Figure 30 above is retained, this can be converted into the structural model as presented in Figure 31 below. Although the hypotheses in this research involve both direct and indirect effects, only direct causal effects are depicted in the structural model below. However, the model fit must be estimated whenever the model is modified (either by addition or removing of connecting arrows or variables).

In the structural model, only the exogenous latent variables can be correlated, and the disturbances can covary if their endogenous latent constructs are not predicting each other (that is, they are not directly linked by a single headed arrow) in the model to improve the model fit. For ease of presentation and illustration, all the correlations paths between the endogenous constructs are removed in Figure 31 below. In addition, the causal paths from one construct to another can be added without testing such paths in achieving a reasonable model fit although all the causal paths are examined in this research.

Nevertheless, the structural model illustrates the relationships (and/or effects) between the latent variables in the model and the main hypotheses that are later assessed

using the same model. For the SEM analysis, it is a requirement to specify and identify a structural model prior to the testing of direct and indirect causal effects in the model (Kline, 2015). It is worth mentioning that the paths in the structure are informed by the review of relevant literature including the findings of the qualitative phase of this research.

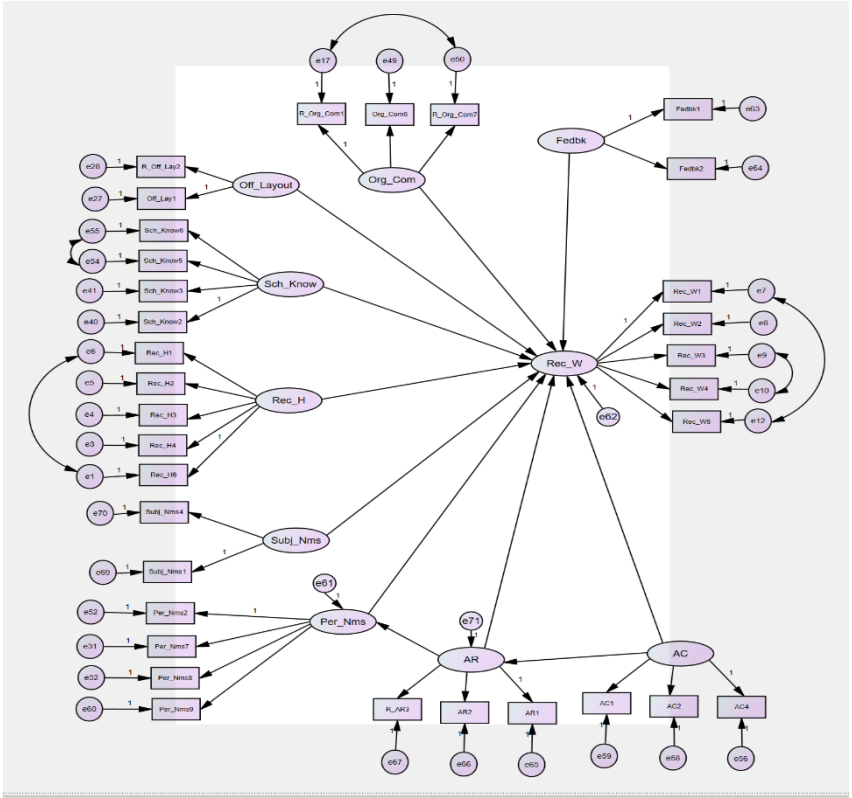


Fig. 31: Structural Model

According to Figure 31, the structural model includes 3 endogenous latent constructs (Ascription of responsibility, Personal norms, and Recycling at work) and 7 exogenous latent constructs (Awareness of consequences, Feedback, Office layout, Organisational commitment, Scheme knowledge, Subjective norms, and Recycling at home). Each of these endogenous latent constructs comprise their corresponding measurement items (indicators) including their measurement errors as depicted in the model.

In addition to the latent constructs (3 endogenous and 7 exogenous) in the model, 36 exogenous latent variables including 3 disturbances and 33 error terms were attached to all endogenous constructs and 33 indicators respectively. The inclusion of disturbances or residuals in the model allows the model to account for the possible effects of omitted causes

due to interference from the external construct(s) in the model. According to Byrne (2016), the residuals, which are latent variables show the likely discrepancies (errors) in the prediction of endogenous constructs from exogenous constructs in the model. For example, awareness of consequences is an endogenous construct to personal norms and e61 represents the imperfection in the prediction of personal norms by ascription of responsibility and awareness of consequences.

To assess the model fit, a combination of fit indices similar to the ones used in the measurement model was adopted in order to maintain consistency, given the sensitivity to some of the fit indices that penalise for large sample size and model complexity. While the reporting of a combination of fit indices is a good practice, the use of Chi-Square test, RMSEA, CFI, and SRMR have been suggested (Byrne, 2016; Hooper et al., 2008; Kline, 2015). As a result, the SEM model fit output, CMIN/DF (1.621); RMSEA (.042); GFI (.891); NFI (.888); TLI (.946); CFI (.953); PCLOSE (.995); and SRMR (.0575) suggests that the structural model has achieved the required minimum threshold. Although the obtained Chi-Square test is not significant at $p < .001$, its use provides little indication of the extent of model misfit (Byrne, 2016). Nonetheless, it can be concluded that the structural model is consistent with the sample data, adequately explained the underlying constructs, and is admissible for the hypotheses testing. Having confirmed the plausibility of the structural model in explaining the relationships among the constructs, the next stage of the analysis is to test each hypothesis for direct and indirect effects in the hypothesised model.

10.3 Hypotheses Testing

As previously mentioned, the confirmation of both measurement and structural models is a prerequisite in an SEM analysis prior to the hypotheses testing. This is to confirm the extent to which the hypothesised model fits the sample variance-covariance data. As a result, the hypothesised model can be tested simultaneously to determine the consistency of the model with the data (Byrne, 2016; Kline, 2015). As the hypotheses in this research are

grounded in empirical research including the qualitative phase of this research, only the plausibility of the causal links between the relevant constructs in the structural model (Figure 31) are examined. The new hypothesised model (Figure 32) is developed from the structural model presented above with the addition of moderation factors. However, "Feedback" is dropped from the model, given that the variance in one of the indicators measuring feedback was negative, causing the SEM solution not to be admissible.

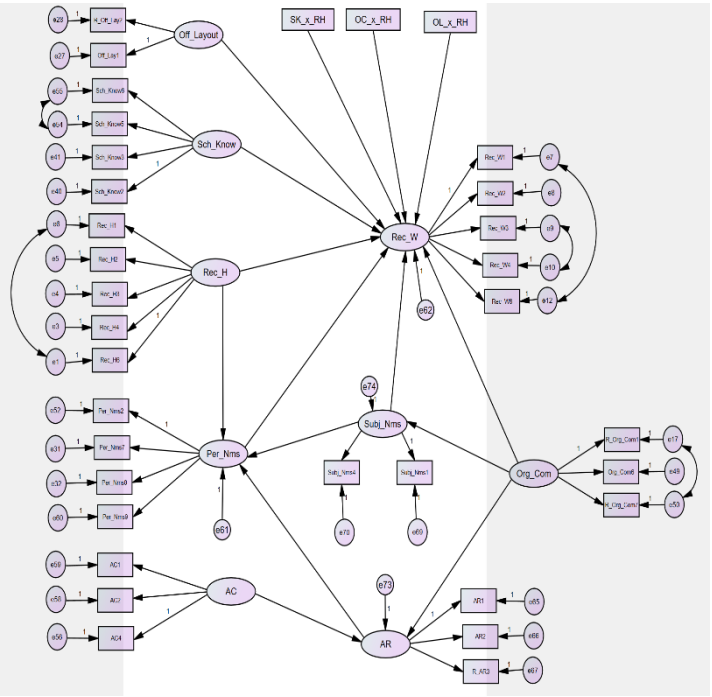


Fig. 32: The New Hypotheses Model

To assess the hypotheses, standardised and unstandardised regression weights were requested in the AMOS output. The output (Table 30) includes the regression estimates, standard errors, the critical ratio (ratio of regression weight estimates and their corresponding standard errors), and the p-values (the approximate probability of attaining a Chi-Square statistic as large as the Chi-Square statistic obtained from the current dataset). In other words, the p-values represent the measure of the significant level in the prediction of the endogenous construct by its predictor and explain the departure of the data from the hypothesised model.

Table 30: Hypothesised Relationships, Regression Weights (Group Number 1 - Default Model)					
	Estimate	S.E.	C.R.	P	Notes
Direct Effects					
AR <--- AC	.751	.068	11.041	***	*Confirmed*
Subj_Nms <--- Org_Com	-.621	.052	-12.038	***	*Confirmed*
AR <--- Org_Com	-.133	.025	-5.226	***	*Confirmed*
Per_Nms <--- AR	1.238	.108	11.476	***	*Confirmed*
Per_Nms <--- Subj_Nms	-.101	.043	-2.359	.018	*Confirmed*
Per_Nms <--- Rec_H	.234	.087	2.704	.007	*Confirmed*
Rec_W <--- Rec_H	.305	.087	3.525	***	*Confirmed*
Rec_W <--- Org_Com	-.388	.138	-2.813	.005	*Confirmed*
Rec_W <--- Sch_Know	.085	.056	1.506	.132	*NS*
Rec_W <--- Off_Lay	-.086	.091	-.948	.343	*NS*
Rec_W <--- Per_Nms	.106	.042	2.496	.013	*Confirmed*
Rec_W <--- Subj_Nms	.139	.061	2.290	.022	*Confirmed*
Interacting Effects					
Rec_W <--- Rec_H_x_Off_Lay	.008	.037	.226	.821	*NS*
Rec_W <--- Rec_H_x_Org_Com	.049	.044	1.103	.270	*NS*
Rec_W <--- Rec_H_x_Sch_Know	.015	.029	.501	.617	*NS*
NS, Not Significant; S.E, Standard Estimates; C.R., Critical Ratio; P, Significant level					

From the SEM output in Table 30, not all the hypothesised relationships are significant at $p < .001$ and $p < .005$. While the initial examination of the analysis output in Table 30 provides a general overview on the hypothesised relationships between the constructs, each hypothesis (direct and indirect) is further discussed below.

10.3.1 Assessing Individual Hypothesis: The Direct Effects

H3a: *The relationship between personal norms and recycling behaviour at work is expected to be positive*.

To assess the influence of personal norms (Per_Nms), 4 items were included in the model as a measure of "Per_Nms" following their internal reliability test using the Cronbach's Alpha coefficient. As a result, the predictive relationship between personal norms and

recycling at work was examined by specifying a regression path from "Per_Nms" to "Rec_W" in the structural model in Figure 31. From the SEM output (Table 30), the unstandardised estimate of .106 with the standard error (S.E.) of .042 and critical ratio (C.R.) of 2.496 with a p value of .013 were achieved. Also, the obtained standardised estimate of .141 suggests that recycling at work increases by .141 standard deviations when personal norms increase by 1 standard deviation.

The obtained estimates suggest that the probability of achieving a C.R. as large as 2.496 in absolute value is .013. As a result, the regression weight for "Per_Nms" in the prediction of "Rec_W" is significantly different from zero at the .05 level (two-tailed). Therefore, the hypothesised causal relationship between personal norms and recycling at work is supported and confirmed in this research, suggesting that the sample data support the hypothesised relationship between people's sense of moral obligation and recycling at work, and it is subsequently accepted.

As a result, these findings are consistent with the Schwartz's Norm-Activation-Model (Schwartz, 1977; Schwartz & Howard, 1981), which predicts personal norms as a proximal antecedent of behaviour and that people tend to act consistently according to their already formed norms. The findings also support Van der Werff et al.'s (2013) assertion that a lack of engagement in pro-environmental behaviours is a moral issue. This sense of moral obligation can be explained in terms of people's personal values (Balderjahn, 1988; Thøgersen, 1999, 2006) and commitment (Lee et al., 1995) to recycling.

H3b: *It is expected that awareness of consequences (AC) will exert a positive influence on ascription of responsibility (AR).*

With this hypothesis, it is expected that awareness of consequences will lead to the ascription of responsibility to engage in recycling at work. This hypothesis was proposed to establish the proposition that the responsibility of recycling is formed when people are aware of their behavioural consequences based on the Schwartz's Norm-Activation-Model.

In order to estimate the extent to which the ascription of recycling responsibility to self is dependent on the predictive capability of the awareness of recycling consequences, a regression path from "AC" to "AR" was specified in the structural model. As a result, the hypothesis was to test a direct causal relationship between "AC" and "AR" in performing recycling at work.

According to the SEM output (Table 30), unstandardised estimate (.751), standard error (.068), C.R (11.041), and standardised estimate (.777) were obtained. Based on the output, the probability of attaining a C.R. as large as 11.041 in absolute value is less than 0.001 significant level. Therefore, the regression weight for AC in the prediction of AR is significantly different from zero at the 0.001 level (two-tailed) and shows that a unit change in standard deviation of AC is likely to cause an increase of about .777 standard deviations in AR.

From these estimates, awareness of behavioural consequences contributes significantly to the explanation of people's ascription of responsibility to recycle waste at work to themselves rather than to their organisations. As a result, people are more likely to ascribe the responsibility of recycling at work to themselves when they are aware of the consequences of their recycling behaviour. These findings are consistent with the Norm-Activation-Model which argued that awareness of consequences is a necessary requirement and an important antecedent of ascription of responsibility towards recycling behaviour. According to Schwartz (1974), awareness of the outcomes of performing a pro-social behaviour including the ascription of responsibility to perform the behaviour are required for the formation/activation of a sense of moral obligation towards that behaviour. In addition, the findings support other studies (such as De Groot & Steg, 2009; Onwezen et al., 2013; Zhang et al., 2013) that reported a tendency of employees to ascribe the responsibility of reducing energy consumption to themselves when made aware of the negative consequences of energy use behaviour.

H3c: *A positive causal association between ascription of responsibility (AR) and a sense of moral obligation (Per_Nms) towards recycling is expected.* In other words, ascription of responsibility is expected to have a positive direct effect on personal norms.

For people to activate their sense of moral obligation towards recycling at work, there is a need to be aware of their behavioural consequences as well as ascribing the responsibility of recycling to self. In other words, the more people ascribe the responsibility of recycling to themselves rather than to their organisations is more likely to activate their personal norms.

According to the outputs of the regression path from "AR" to "Per_Nms" as presented in Table 30, the regression weights of 1.238 with a standard error of .108 and critical ratio of 11.476 suggest that Per_Nms increase by a value of 1.238 with a unit increase in AR. Also, the standard estimate shows that Per_Nms increase by .849 standard deviations when AR increases by 1 standard deviation.

Based on these estimates, the probability of achieving a critical ratio as large as 11.476 in absolute value is less than .001, suggesting that regression weight for AR in the prediction of Per_Nms is significantly different from zero at the .001 level (2-tailed). As a result, the Norm-Activation-Model that posits that people enact their sense of moral obligation when they ascribe the responsibility of recycling at work to themselves is well supported by the sample data of this research.

As proposed, the prediction of personal norms by ascription of responsibility is statistically significant and confirmed in this research, suggesting that people are most likely to activate their personal norms in engaging in recycling at work when ascribing the recycling responsibility to themselves. The ascription of responsibility may be associated with the feelings of guilt or pride (Bissing-Olson, Fielding, & Iyer, 2016; Onwezen et al., 2013; Thøgersen, 2009) and/or satisfaction (Lee et al., 1995) derived from recycling. To remove the feelings of guilt or enhance the sense of pride, people may activate their personal norms or feel committed to recycling at work.

H3d: *Past behaviour (recycling at home) is expected to contribute significantly to the formation of personal norms.* In other words, a positive direct effect of recycling at home on personal norms is expected.

With this hypothesis, it was expected that people will be more likely to form a sense of moral obligation when there is an established pattern of recycling at home. In other words, the extent to which recycling at home becomes normative will have a direct positive effect on people's formation of moral obligation (personal norms) towards recycling at work. This hypothesis was proposed to explain the contribution of past behaviour with regards to recycling at home in the formation of personal norms towards recycling.

According to the analysis, the reported scores on recycling at work are causally related to their corresponding scores on personal norms. From Table 30, the unstandardised estimate of .234 indicates that personal norms are likely to increase by .234 when recycling at home goes up by 1 with a S.E. of .087, and C.R. of 2.704. Similarly, the standardised estimate of .119 suggests an increase in personal norms by about .119 standard deviations when recycling at home changes by 1 standard deviation.

The results indicate that the probability of obtaining a C.R. as large as 2.704 in absolute value is less than .01 and imply that the regression weight for recycling at home in the prediction of personal norms is significantly different from zero at the .01 level (two-tailed). As a result, these findings confirm the hypothesis that personal norms towards recycling at work can be formed and explained by the level of past behaviour (recycling at home). Based on the sample data of this research, the extent of people's involvement in recycling at home is a significant determinant of their sense of moral obligation (personal norms) towards recycling at work.

Although little is known about the relationship between past recycling behaviour and personal norms, a meta-analytic review of different studies (Lo et al., 2012) have shown that past behaviour is the most consistent personal factor influencing pro-environmental

behaviours. Therefore, past behaviour (such as recycling at home) can bring a sense of pride/guilt (see Bissing-Olson et al., 2016; Thøgersen, 2009) towards recycling at work. With regards to these feelings (pride/guilt), it is likely that people will develop a sense of moral obligation towards recycling at work to maintain consistency accordance with their feelings. In order to remove the feeling of guilt or enhance the sense of pride, people may be morally obliged or feel committed to engage in recycling at work. Put differently, people who normally participate or who have engaged in recycling at home might have derive intrinsic satisfactions (Lee et al., 1995) towards recycling such that recycling behaviour becomes normative irrespective of the contexts.

H4a: A *positive causal effect of subjective norms on recycling at work is expected. In other words, the perception of colleagues with regards to their recycling behaviour is likely to have a positive influence on recycling at work.*

Given that people can be more cautious in their behaviour at work with regards to the perceptions of significant others, it is plausible to establish the extent to which subjective norms causally influence recycling at work. As a result, this hypothesis was proposed to estimate whether subjective norms are determinants of recycling behaviour at work.

This hypothesis is depicted in the structural model using a regression path between subjective norms and recycling at work. The findings of the path analysis in the SEM output show the unstandardised regression weight of .139 with an S.E. of .061. According to these findings, recycling at work will increase by about .139 when subjective norms increase by 1. The C.R. of 2.290 suggests that the obtained regression estimate is 2.29 S.E. above zero. Similarly, the standardised regression estimate indicates that recycling at work increases by .214 standard deviations when subjective norms as perceived by people at work increases by a unit standard deviation.

Based on these findings, the probability of achieving a C.R. as large as 2.29 in absolute value is .022 and the regression estimate for subjective norms in the prediction of recycling

at work is significantly different from zero at the .05 level (two-tailed). The findings suggest that the hypothesis that the perception of the expectation of colleagues as well as their recycling behaviour can have a positive influence on recycling at work is statistically significant and supported by the sample data in this research. As a result, subjective norms have a causal positive effect on people's recycling at work and are consistent with the sample data of this research.

However, the findings of this research contradict previous studies (such as Andersson et al., 2012; Tudor et al., 2007b) that subjective norms are not a major predictor of recycling behaviour at work. According to Tudor et al. (2007b), the observed lack of significant effect of subjective norms on recycling at work may be attributed to the effects of organisational norms/culture that prioritise a quality health service delivery over sustainable/waste management issues.

H4b: *Subjective norms are expected to have a significant positive effect on the formation of personal norms.* In other words, a positive effect of subjective norms on personal norms is expected to the extent that subjective norms are internalised.

Having established a causal relationship between subjective norms and recycling at work, this hypothesis examines the extent to which subjective norms are internalised as personal norms in influencing recycling behaviour at work. Therefore, the perception of recycling as a social norm in organisations will be more likely to translate to a sense of moral obligation, especially when there is an established pattern of recycling at work. In other words, the extent to which the expectation and recycling behaviour of colleagues are perceived as normative will have a direct positive effect on people's formation of moral obligation towards recycling.

According to the analysis, the reported scores on subjective norms are causally related to their corresponding scores on personal norms. From Table 30, the unstandardised estimate of -.101 indicates that personal norms decrease by .101 when subjective norms

increase by 1 with a S.E. of .043, and C.R. of -2.359. Similarly, the standardised estimate of -.116 suggests a decrease in personal norms by about .116 standard deviations when subjective norms increase by 1 standard deviation.

The results indicate that the probability of obtaining a C.R. as large as 2.359 in absolute value is less than .05 and imply that the regression weight for subjective norms in the prediction of personal norms is significantly different from zero at the .05 level (two-tailed). As a result, these findings suggest that the way the recycling behaviour of colleagues is perceived may likely have a negative effect on people's personal norms although personal norms can be explained by the perception of recycling behaviour of colleagues. Based on the sample population of this research, subjective norms are significant determinants of personal norms.

Nevertheless, the recycling behaviour of colleagues in UK workplaces as perceived by respondents (subjective norms) is most likely to reduce their propensity to form a sense of moral obligations towards recycling. While people are likely to recycle at work due to how they evaluate their colleagues (H4a), it is unlikely to have any positive effect on people's personal norms. Therefore, recycling at work can be influenced by subjective norms without necessarily affecting people's sense of moral obligation towards recycling at work, suggesting that people will not be morally committed to recycling if behaviour of significant others is taken into consideration.

H5a: *There will be a direct positive influence of office layout on recycling at work*. In other words, the physical layout including how recycling is perceived to be easy/difficult to perform is expected to have a significant effect on recycling at work.

The hypothesis was proposed to estimate the causal relationship between recycling at work and office physical layout with regards to how it facilitates or inhibits recycling at work. In other words, the hypothesis seeks to establish the extent to which the perception of convenience at work, based on the office layout, is contributing to recycling at work.

This hypothesis is depicted in the structural model using a regression path from office layout (Off_Lay) to recycling at work. From the path analysis in the SEM output, the unstandardised regression weight shows a decrease in recycling at work by .086 when office layout increases by 1 with S.E. of .091, C.R. of -.948 and p value of .343. In addition, the standardised regression estimates indicate that recycling at work decreases by .175 standard deviations when office layout increases by 1 standard deviation.

Based on these findings, the probability of achieving a C.R. as large as .948 in absolute value is .343 and the regression estimate for "Off_Lay" in the prediction of "Rec_W" is not significantly different from zero at the .05 level (two-tailed). The findings suggest that the present office layout in UK workplaces is not contributing positively to recycling at work, given that the obtained estimates are negative. Therefore, the hypothesis is not supported by the sample data of this research and consequently rejected. As a result, the current office layout with regards to how people perceive recycling to be easy/difficult to perform when at work is not a significant predictor of recycling at work according to the findings of this research. Although the estimates are not statistically significant, it is evident from the qualitative data that the current office arrangement in UK workplaces is inconvenient and may likely reduce recycling behaviour at work.

These findings support previous studies (such as Lee et al., 1995) who reported an insignificant relationship between office layout and recycling behaviour at work. On the contrary, the Cronbach's Alpha of office layout as a measure of perceived convenience emerged strongly in this research than Lee et al.'s (1995) study. However, the findings on the effects of perceived convenience on recycling at work for both studies were not statistically significant and the direction of association were observed to be negative. According to Lee et al. (1995), the lack of objective measures of how recycling at work is facilitated by office layout may be responsible for the lack of significant relationship between office layout and recycling at work.

H6a: *A positive association between perceived organisational support (commitment) for recycling and recycling at work is expected.*

To explain recycling at work, it is plausible to estimate the extent to which the perception of organisational support in terms of commitment to recycling is contributing to recycling behaviour at work. It was hypothesised in this research that the possibility of people to engage in recycling at work can be determined by the way they perceive the support/commitment of their organisations to the idea of recycling. In other words, this hypothesis seeks to examine the causal relationship between perceived organisational support and recycling at work.

Although the central focus of recycling is people who are producing and preparing materials at work for recycling, organisations are expected to provide the essential facilities (such as the correct bins) to facilitate recycling at work. However, the measure of the existing organisational support in UK workplaces is subjective and difficult to establish objectively in this research. Therefore, the way this commitment is perceived by people at work can have a significant effect on their recycling behaviour at work.

From the findings in Table 30, the unstandardised outcomes of the path analysis show a decrease in recycling at work by .388 with S.E. of .138 and C.R. of -2.813 when perceived organisational commitment increases by 1. The obtained C.R. suggests that the regression weight is 2.813 standard errors (S.E.) below zero. Also, the standardised estimates of -.695 indicate that recycling behaviour at work decreases by .695 standard deviations when perceived organisational commitment increases by 1 standard deviation.

According to these findings, the likelihood of obtaining a C.R. as large as 2.813 in absolute value is .005 suggesting that the regression coefficient for the perception of the current organisational commitment of UK workplaces in the prediction of recycling at work is significantly different from zero at the .01 level (two-tailed). Therefore, the hypothesis that

recycling at work can be explained in terms of people's perception of their organisations' commitment is statistically significant and supported by the sample data.

However, the obtained estimates suggest that the commitment of organisations in the UK to the idea of recycling, as perceived by respondents, is insufficient and most likely to be reducing people's likelihood to engage in recycling when at work. In other words, organisational commitment as operationalised in this research, that is when perceived as inadequate, reduces the possibility of recycling at work and it is a significant predictor of whether people will recycle (or not) at work.

H6c: *A positive causal effect of perceived organisational commitment on ascription of responsibility is expected.* In other words, people are more likely to ascribe the responsibility of recycling to themselves rather than to their organisations when it is perceived that the commitment of organisation to recycling is high. Therefore, a causal relationship between organisational commitment and ascription of responsibility will be positive when the perception of organisational commitment is positive.

From Table 30, the unstandardised regression estimate of -.133 with an S.E. of .025, and a C.R. of -5.226 suggest that for every unit increase in perceived organisational commitment, ascription of responsibility decreases by .133. Also, it shows that the estimated regression weight is 5.226 standard errors below zero. Similarly, the standardised regression estimates suggest that ascription of responsibility is likely to decrease by .260 standard deviations when perceived organisational commitment increases by 1 standard deviation.

Therefore, the probability of achieving a C.R. as large as 5.226 in absolute value is less than .001 suggesting that the regression weight estimates for perceived organisational commitment in the prediction of ascription of responsibility is significantly different from zero at the .001 level (two-tailed). From these findings, there is evidence that perceived organisational commitment is a determinant of the extent to which people ascribe the responsibility of recycling to themselves. Although the regression estimates are negative, the

causal association between perceived organisational commitment and ascription of responsibility is statistically significant and supported by the sample data of this research.

The significant causal effect between perceived organisation commitment and ascription of responsibility suggests that the current level of organisational commitment as perceived by research respondents has a negative effect on their responsibility towards recycling at work. This corroborates the initial findings (H6a) that suggest that the current organisational commitment in UK workplaces is perceived to be insufficient. Therefore, these findings suggest that the responsibility of recycling at work is more likely to be ascribed to organisations when their employees perceived the commitment of the organisations as inadequate.

H6d: *Perceived organisational commitment is expected to have a positive causal influence on subjective norms.* Put differently, the perception of organisational commitment will have a significant effect on the way the recycling activities of colleagues are perceived. As a result, if the perception of organisational commitment is positive, it is most likely that the perception of recycling activities of colleagues is also positive.

As can be seen in Table 30, the unstandardised regression estimate of -.621 with an S.E. of .052, and a C.R. of -12.038 were achieved through this analysis. The estimates suggest that for every unit increase in perceived organisational commitment, subjective norms decrease by .621. Also, it shows that the estimated regression weight is 12.038 standard errors below zero. Similarly, the standardised regression estimates suggest that subjective norms decrease by .722 standard deviations when perceived organisational commitment increases by 1 standard deviation.

With these findings, the probability of achieving a C.R. as large as 12.038 in absolute value is less than .001 suggesting that the regression weight estimates for perceived organisational commitment in the prediction of subjective norms is significantly different from zero at the .001 level (two-tailed). Therefore, the hypothesis that the perception of

organisational commitment is a determinant of subjective norms is statistically significant and supported by the sample data of this research.

Although the regression estimates are negative, the significant causal effect between perceived organisational commitment and subjective norms indicate that the current commitment of UK workplaces has a negative influence on the normative view of recycling at work.

H7a: *A positive association between the knowledge of recycling scheme and recycling at work is expected.*

The hypothesised relationship between recycling knowledge and recycling at work was proposed to determine whether the knowledge of recycling scheme being implemented at work with regards to what, where, and how to recycle at work has an incremental effect on recycling at work. Put differently, the hypothesis seeks to estimate the extent to which people's knowledge of their workplace recycling scheme is a determinant of their recycling behaviour at work.

To assess this hypothesis, a regression path from scheme knowledge (Sch_Know) to recycling at work (Rec_W) was identified and specified in the structural model to measure the proposed causal relationship between the two constructs. As presented in Table 30, the SEM output reveals that the unstandardised regression weight of .085, S.E. of .056, C.R. of 1.506, and p value of .132 suggest that the hypothesised causal influence of recycling scheme knowledge on recycling at work is not statistically significant at $p < .05$. From the unstandardised estimates, a unit increase in knowledge results in a positive change in recycling at work by .085. In addition, the standardised regression estimates show that when knowledge increases by 1 standard deviation, it is more likely to result in an increase of about .147 standard deviations in recycling behaviour at work.

As a result, the probability of obtaining a C.R. as large as 1.506 in absolute value is .132 and the regression weight for scheme knowledge in the prediction of recycling at work

is not significantly different from zero at the .05 level (two-tailed). These findings suggest that recycling knowledge has a positive effect on people's ability to perform recycling at work although the obtained estimates are not statistically significant. Therefore, the hypothesis that recycling knowledge has a causal effect on recycling at work is not statistically significant and not consistent with the sample data of this research.

The obtained findings may be associated with the existing level of recycling information and awareness in the UK, suggesting that people may likely require no additional information about the scheme in their workplaces. According to Kelly et al. (2006), there is a tendency for recycling information to be ineffective especially when the present knowledge about recycling is perceived to be sufficient.

H10: *The relationship between recycling at home and recycling at work is expected to be positive.*

This hypothesis is the main crux of this research and it was proposed to establish the extent to which recycling at home translates to recycling behaviour at work. According to this hypothesis, people are more likely to recycle at work when they recycle at home, indicating that the past behaviour is expected to predict the propensity of the target behaviour. However, similar materials that can be found in both contexts were assessed based on the qualitative phase of this research that suggests that the measure of recycling at home should be similar to that at work to achieve correspondence. As a result, a direct positive relationship between recycling at home and what they do at work is expected using a structural path from recycling at home to recycling at work as presented in the structural model (Figure 31).

From the findings in Table 30, the SEM output based on the unstandardised regression weight of .305, S.E. of .087, and C.R. of 3.525 indicate that recycling at work is likely to increase by .305 with S.E. of about .087 when recycling at home increases by 1. The corresponding standardised estimates show that recycling at work will go up by 0.206 standard deviations when recycling at home increases by 1 standard deviation.

Taken together, the probability of obtaining a C.R. as large as 3.525 in absolute value is less than .001, suggesting that the regression coefficient for recycling at home in the prediction of recycling at work is significantly different from zero at the .001 level (two-tailed). Therefore, there is a positive relationship between recycling behaviour at home and recycling behaviour at work as operationalised in this research.

In addition, a further breakdown in the items that can be recycled in both settings show that those who are recycling at least 2 items (such as paper and plastics) at home are more likely to recycle all items at work and are most likely to recycle the same materials (paper and plastics) at work. Therefore, there is a direct correspondence between recycling at home and recycling at work based on the sample data, suggesting that the thesis of spillover of recycling at home to work is confirmed and supported in this research.

Having confirmed the presence of direct (both significant and insignificant) relationships between recycling at work and its antecedents using the SEM analysis as presented above, it is incumbent on this research to examine the data for the evidence of indirect (mediation and moderation/interaction) effects of recycling at home in predicting recycling at work. An indirect (moderation/mediation) analysis is a type of regression analysis where the effect of independent variable(s) on dependent variable(s) is transmitted through another variable in the equation. As a result, the next section is designed to achieve this goal by testing the indirect effects of recycling at home (independent variable) in the explanation of recycling at work (dependent variable).

In order to achieve this goal, mediation and interaction analyses were conducted in SPSS and AMOS. In AMOS, the mediation analysis was performed using its indirect, direct, and total effects functionality based on a bootstrapping approach with 5000 resampling procedures while the moderation analysis was conducted by creating new interaction variables. The bootstrapping approach with 95% bias-corrected confidence intervals provides a robust estimate for moderation analyses, as it makes no normality assumption

about the shape of the distribution, especially when original data are available for the analysis (Hayes, 2013; Hayes & Montoya, 2017). The bootstrap confidence interval is accessible and can be requested in AMOS. However, the computation of new moderation variables by multiplying the total score of the independent variable by the total score of the moderator(s) is necessary in AMOS due to its inability to perform a moderation analysis without including the interaction variable(s) in the model.

In addition, the analysis was conducted in SPSS using the PROCESS macro for mediation/moderation analysis (Hayes, 2013) based on a pre-specified model among the 74 integrated models in the macro. This approach is more robust for estimating a moderation model without any requirement to calculate the products of independent variable(s), X(s) and moderator(s), M(s) prior to the analysis as currently being performed in SPSS and AMOS. In addition to this advantage, the PROCESS allows for the determination of the unique moderation effect of M(s) on X that explains the variance in dependent variable (Y) in a causal model (Hayes, 2013). In the PROCESS output, this is often labelled as "R-square increase due to interaction" and the release of PROCESS in 2016 has rendered earlier approaches to mediation/moderation analysis obsolete based on the statistical ability of the PROCESS to perform analyses beyond the normal theory approach. According to Hayes (2013), the Sobel's (normal theory) test that estimates the magnitude of an indirect effect of independent on dependent variables through a moderator/mediator is now considered to be statistically inferior to the PROCESS.

10.3.2 Assessing the Interaction (Moderation) Effects in AMOS

In order to assess the indirect effects in AMOS, the hypothesised model in Figure 32 above was used, given that SEM is a robust statistical technique with the capability to analyse all the hypotheses within a model simultaneously. The rationale was to account for the unique influence of moderators on the relationship between recycling at home and at work, given that it is plausible to include the predictors and moderators in the model.

In the model (Figure 32), 3 moderators (recycling at home and organisational commitment; recycling at home and office layout; recycling at home and scheme knowledge) were hypothesised and tested.

H5b: *Office layout is expected to have a positive moderation effect on the causal relationship between recycling at home and recycling at work.*

This hypothesis estimates the possible interaction effect of people's perception with regards to their office layout on the causal relationship between recycling at home and at work. As a result, a new variable was computed using the product of the total score on recycling at home and the total score on office layout.

As reported in Table 30, the interaction model is not statistically significant, given that the obtained p-value is considerably higher than .05. From the standardised estimates, a unit increase in the interaction of recycling at home and office layout will result in an increase in recycling at work by .017 standard deviations.

Therefore, the hypothesised moderation effect of office layout on the positive relationship between recycling at home and at work is not statistically significant and the moderation model is not consistent with the sample data of this research.

H6b: *Perceived organisational commitment is expected to positively moderate the effect of recycling at home on recycling at work.*

This hypothesis was proposed to estimate the extent to which the causal effect of recycling at home on recycling at work is contingent on people's perceptions of their organisation's commitment. In order to assess this hypothesis, a new moderation variable was also created by multiplying the total score on recycling at home by the total score on perceived organisational commitment as shown in the structural model. This step was necessary, given the inability of AMOS to analyse moderation effects although the program has the capability for producing direct and indirect effects when requested as part of the SEM output.

As can be seen in Table 30, the findings from the path analysis show an estimate of .049, S.E. OF .044, C.R. of 1.103, and p-value of .270. These findings indicate an increase of about .049 in recycling at work due to a unit increase in the interaction of recycling at home and perceived organisational commitment. Also, the obtained standardised estimate suggests that recycling at work increases by .093 standard deviations due to the contribution of 1 standard deviation based on the interaction of recycling at home and perceived organisational commitment.

According to these estimates, the likelihood of obtaining a C.R. as large as 1.103 in absolute value is .270 and suggests that the regression weight for the interaction effect of recycling at home and perceived organisational commitment in the prediction of recycling at work is not significantly different from zero at the .005 level (two-tailed). Although there is a positive contribution to recycling at work as result of the interaction, the interaction effect actually reduces the predictive power of recycling at home on recycling at work. Nevertheless, the interaction effect is not significant in determining whether people will engage in recycling when at work. It is therefore plausible to conclude that the interaction/moderation hypothesis of recycling at home and perceived organisational commitment in predicting recycling at work is not statistically significant and not supported by the sample data of this research. The interaction effect is more likely to decrease the propensity of spillover of recycling behaviour from home to the workplace context based on the obtained estimates in relation to the findings of H10.

H7b: *It is expected that the effect of recycling at home on recycling at work will be moderated by the positive effect of scheme knowledge.*

This hypothesis seeks to examine whether the knowledge of the recycling scheme at work can enhance the causal effect of recycling at home on recycling at work. From the initial findings, the presence of adequate knowledge about the recycling scheme at work is likely to contribute positively but is not significant in predicting recycling at work. As already

confirmed, people are more likely to recycle at work when there is sufficient knowledge of their organisations' recycling scheme in terms of what, where, and how to recycle.

From the SEM output in Table 30, the findings of the path analysis show an increase of .015 in recycling at work due to a unit increase in the interaction effect of recycling at home and scheme knowledge with a S.E. of .029 based on the unstandardised estimates. Also, the obtained critical ratio indicates that the regression weight is .501 S.E. above zero. Similarly, the standardised estimates indicate that recycling at work increases by .031 standard deviations when the interaction of recycling at home and scheme knowledge increases by 1 standard deviation.

According to these findings, the likelihood of obtaining a C.R. as large as .501 in absolute value is .617 suggesting that the regression coefficient for the interaction effect of recycling at home and scheme knowledge in the prediction of recycling at work is not significantly different from zero at the .05 level (two-tailed). Therefore, the moderation effect of scheme knowledge on the positive causal relationship between recycling at home and at work as hypothesised is statistically insignificant and not supported by the sample data. In other words, scheme knowledge with regards to what, where and how to recycle at work contributes marginally to the prediction of recycling at work by recycling at home although the obtained moderation effect is not statistically significant.

10.3.3 Alternative Model without the Norm-based Factors

Regarding the obtained findings about the moderation effects of scheme knowledge, organisational commitment, and office layout on the causal relationship between recycling at home and at work, an alternative structural model was assessed for a possible evidence of moderation effects. Using the structural model in Figure 33, a nested model (see Section 8.4.4) was created by removing the norm-based constructs (ascription of responsibility, awareness of consequences, personal norms, and subjective norms) from the model. In the model, each

construct was causally linked to recycling at work while the interactions are the products of the total score on recycling at home and total score on each independent construct.

The obtained model fit indices (CMIN/DF; 1.634, SRMR; .0397, GFI; .932, CFI; .971, NFI; .930; TLI; .963, RMSEA; .042, PCLOSE; .937, and P; .000) indicate that the model is fit.

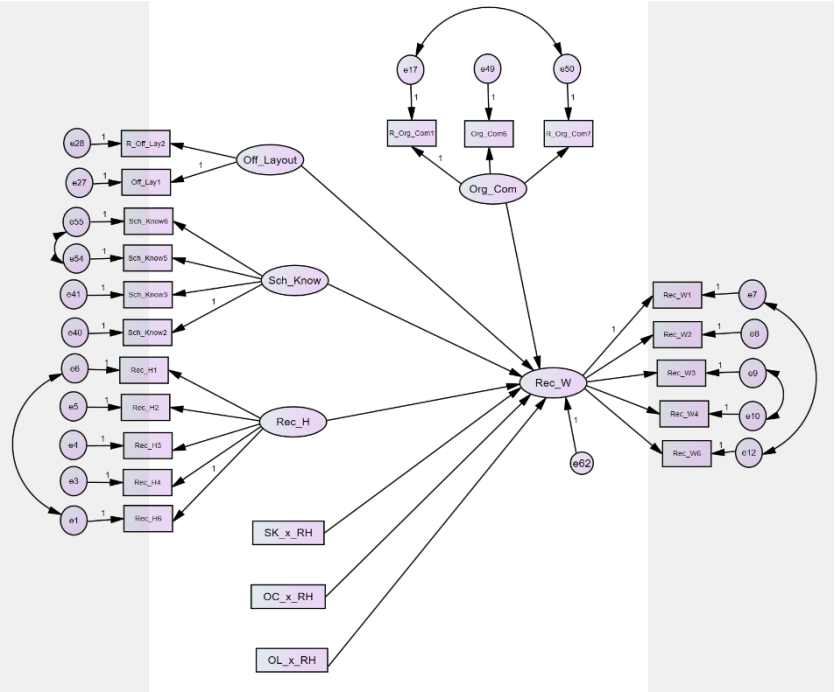


Fig. 33: Alternative Model for the Interacting effect

Therefore, the alternative model (Figure 33) without the norm-based constructs is the nested model of the full structural model presented in Figure 32. The model investigated the interaction effect as well as the direct effects of the independent variables on recycling at work to assess the plausibility of the structural model as well as the robustness of the sample data. Recall that none of the interactions were statistically significant in the full structural model. The nested model supports the initial findings and indicates that none of the interactions are significant in both models. Also, none of the direct effects in the nested model are statistically significant.

However, the causal relationship between recycling at home and recycling at work remains significant in both models. Although none of the situational-based factors as

perceived by respondents are statistically significant, the relationships follow a similar pattern as the main hypothesised model.

Table 31: Hypothesised Alternative Model, Regression Weights (Group Number 1 – Default Model)					
	Estimate	S.E.	C.R.	P	Notes
Direct Effects					
Rec_W <--- Rec_H	.412	.122	3.375	***	*Confirmed*
Rec_W <--- Org_Com	-.905	.517	-1.750	.080	*NS*
Rec_W <--- Sch_Know	.146	.119	1.228	.219	*NS*
Rec_W <--- Off_Lay	-.382	.361	-1.058	.290	*NS*
Interacting Effects					
Rec_W <--- Rec_H_x_Org_Com	.116	.079	1.466	.143	*NS*
Rec_W <--- Rec_H_x_Sch_Know	-.001	.049	-.019	.984	*NS*
Rec_W <--- Rec_H_x_Off_Lay	.057	.056	1.012	.312	*NS*
NS, Not Significant; S.E, Standard Estimates; C.R., Critical Ratio; P, Significant level					

From these results (Table 31), the hypothesised moderation effects of perceived office layout, organisational commitment, and scheme knowledge in the prediction of recycling at work by recycling at home are not statistically significant and not supported by the sample data of this research.

10.3.4 Assessing Mediation Effects in AMOS.

Based on the direct and interaction effects of recycling at work on recycling at home as presented above, it is empirically plausible to investigate how recycling at home transmits its effect to recycling at work. As a result, there is a need to conduct a mediation analysis using the components of Schwartz's norm-activation-model. Although the hypotheses are not part of the main hypotheses, they are sub-classified under the main hypotheses as presented in Section 6.2.

To assess the mediation effects of ascription of responsibility (AR), awareness of consequences (AC), and personal norms (Per_Nms) in the prediction of recycling at work, the structural model in Figure 34 below is used for the mediation analysis. In the model, three different mediation models that are tested in this research are illustrated: a path from recycling at home through "AR" to recycling at work; through "AC" to recycling at work, and

a path through “Per_Nms” to recycling at work. In all the three mediation models, recycling at home is the predictor and recycling at work is the outcome variable. It is worth mentioning that the significance level is based on the bootstrap approximations obtained by constructing 2-sided bias-corrected confidence intervals based on 5000 bootstrapping samples with 95% bootstrap bias-corrected confidence intervals.

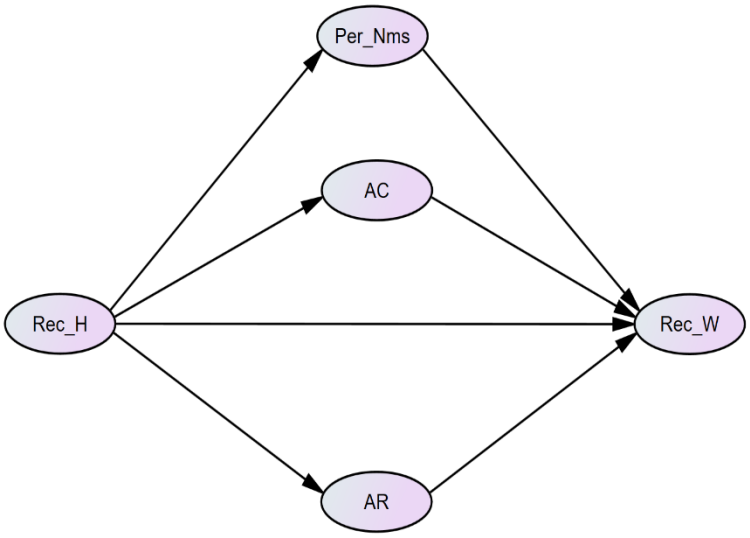


Fig. 34: The hypothesised model for the mediation effects

H11: *The relationship between recycling at home and recycling at work is expected to be mediated by the positive effect of personal norms.*

Based on this hypothesis and the structural path analysis in Figure 34, the proposed causal relationship between recycling at home and recycling at work is expected to be mediated by personal norms. As a result, personal norms are hypothesised as a mechanism through which recycling at home transmits its effect to recycling at work. In other words, the more people recycle at home, the more likely they are to engage in recycling at work, however, their likelihood of participating in recycling at work is contingent on their sense of moral obligation. The mediation model with personal norm as mediator is fit (CMIN/DF; 1.954, DF; 71, GFI; .949, CFI; .971, NFI; .943, TLI; .963, PCLOSE; .403, RMSEA; .052, and P; .000) and observed to exceed the minimum threshold. The rationale for the mediation model is to

account for both the unique direct and indirect effects of personal norms on recycling behaviour at work (see section 3.4, pg. 61).

From the standardised direct estimates, the unmediated effect of recycling at home on recycling at work is .190. In other words, recycling at work will increase by .19 standard deviations with a unit standard deviation increase in recycling at home due to the direct effect of recycling at home on recycling at work. Therefore, the standardised direct effect of recycling at home on recycling at work is significantly different from zero at the .001 level (p = .004, 2-tailed) based on the bootstrap approximation obtained by constructing 2-sided bias-corrected confidence intervals.

For the mediated (indirect) estimates, the standardised indirect effect of recycling at home on recycling at work through personal norms is .072, suggesting that a unit standard deviation increase in recycling at home causes an increase of .072 standard deviations in recycling at work. As a result, the standardised indirect effect of recycling at home on recycling at work through personal norms is also significantly different from zero at the .001 level (p = .000, 2-talied).

Considering that both the standardised direct and indirect paths are statistically significant, the causal relationship between recycling at home and recycling at work is partially mediated by the positive effect of personal norms (Table 32). Therefore, the hypothesised mediation effect is consistent with the sample data and supported in this research indicating that people are more likely to recycle at work when their personal norms are activated.

Table 32: Mediating Effects of Norm-based Constructs			
Hypotheses	Effects		Comment(s)
	Direct	Indirect	
Rec_H ⟶ Per_Nms ⟶ Rec_W	.190**	.072**	*Partial mediation*
Rec_H ⟶ AC ⟶ Rec_W	.232**	.028**	*Partial mediation*
Rec_H ⟶ AR ⟶ Rec_W	.133**	.129**	*Partial mediation*
*** Significant at .001 (2-tailed)*			

H12: *The causal relationship between recycling at home and recycling at work is expected to be mediated by awareness of consequences.*

In addition to the hypothesised mediation effect of personal norms in the causal relationship of recycling at home and at work, this hypothesis examines the causal effect of recycling at home on recycling at work through the mediation effect of awareness of consequences. The mediation model involving "AC" as a mediator is admissible due to its fit indices (CMIN/DF; 1.677, DF; 59, GFI; .961, CFI; .980, NFI; .953, TLI; .974, PCLOSE; .756, RMSEA; .043, and P; .000) and the fit indices are observed to achieve the minimum thresholds.

According to the estimates of the hypothesised model in Figure 34, the standardised direct effect of recycling at home on recycling at work is .232. That is, recycling at work increases by .232 standard deviations when recycling at home goes up by 1 standard deviation due to the unmediated effect of AC. The obtained standardised direct estimates suggest that the direct effect of recycling at home on recycling at work is significantly different from zero at the .001 level (p = .000, 2-tailed) based on the bootstrap approximation by constructing a two-sided bias-corrected confidence interval.

In addition, the standardised indirect effect of recycling at home through awareness of consequences shows that recycling at work will go up by .028 standard deviations when recycling at home increases by a value of 1 standard deviation. Therefore, the standardised indirect effect of recycling at home on recycling at work due to the mediation effect of

awareness of consequences is significantly different from zero at the .001 level (p = .019, 2-tailed).

Based on the bootstrap approximation of the two-sided bias-corrected confidence intervals, the hypothesised model is statistically significant and consistent with the sample data of this research. However, the effect is only partially mediated through awareness of consequences (Table 32), given that both the direct and indirect causal paths are significant at .001 level (2-tailed).

H13: *It is expected that the causal relationship between recycling at home and recycling at work to be mediated by ascription of responsibility.*

To assess the mediation of ascription of responsibility in the causal relationship between recycling at home and at work, a model reflecting only the constructs of interest was examined for model fit. According to the obtained fit indices for the mediation model (CMIN/DF; 2.021, DF; 59, GFI; .951, CFI; .968, NFI; .939, TLI; .958, PCLOSE; .329, RMSEA; .053, and P; .000), the model is observed to achieve the minimum thresholds.

Therefore, the standardised direct effect of recycling at home on recycling at work without the mediation effect of ascription of responsibility is .133. That is, recycling at work is likely to increase by .133 standard deviations when recycling at home goes up by 1 standard deviation due to the unmediated effect of "AR". According to the estimates, the direct effect of recycling at home on recycling at work is significantly different from zero at the .001 level (p = .029, 2-tailed) based on the bootstrap approximations by constructing a two-sided bias-corrected confidence interval.

In addition, the standardised indirect effect of recycling at home through the mediation effect of "AR" indicates that recycling at work is likely to increase by .129 standard deviations when recycling at home goes by 1 standard deviation. As a result, the standardised indirect effect of recycling at home on recycling at work due to the mediation effect of

ascription of responsibility is significantly different from zero at the .001 level (p = .000, 2-tailed).

Although "AR" is partially mediating the effect of recycling at home on recycling at work, the hypothesised model is statistically significant and consistent with the sample data of this research with regards to the bootstrap approximations of the two-sided bias-corrected confidence intervals. The partial mediation effect is due to the obtained significant estimates at .001 level (2-tailed) for both the direct and indirect causal paths in the mediation model.

10.4 Assessing the Mediated-Moderation Effects Using the PROCESS Macro

From the above analyses, the factors influencing recycling at work have been identified and the extent (significant and non-significant) to which they can predict recycling at work has been confirmed. Also, the direct and indirect effects of antecedent behaviour on recycling at work through the interaction and mediation effects of these factors were presented in the previous section.

However, those analyses provided little/no information about the circumstances or conditions under which these factors are likely to influence recycling at work, given that previous studies have investigated personal and context-based factors in isolation (Manika et al., 2015). Rather than reducing the effects of these factors to a single number, it is plausible to identify various conditions or levels at which the effects of recycling at home can significantly influence recycling at work. As a result, the next section is designed to achieve this goal by using the PROCESS macro in SPSS with the selection of an appropriate model from the 74 PROCESS model templates in Hayes (2013). Its rationale is to provide a robust explanation for the influence of recycling at home on recycling at work either through the moderators and/or the mediators in a mediated-moderation model.

As a result, the following hypotheses are proposed:

1. The direct effect of recycling at home on recycling at work will be contingent on the context-based factors (office layout, organisational commitment, and scheme knowledge).

2. It is expected that the indirect effect of recycling at home on recycling at work through the norm-based constructs (personal norms, ascription of responsibility, awareness of consequences, and subjective norms) will be moderated by the context-based factors in predicting recycling at work.

Although Figure 35 shows a simple moderation model where the effects of an independent variable, IV on the outcome variable (Dependent Variable, DV) are influenced by another variable(s) in the model, the conditional hypotheses in this research are presented in Figure 37. Also, the statistical diagram of the hypothesised (moderation and mediation) model is presented in Figure 36. As previously mentioned, the PROCESS macro has an inbuilt capability for analysing moderation models (such as Figures 35 and 36) without creating a new interaction variable as it is currently being performed in AMOS and SPSS.

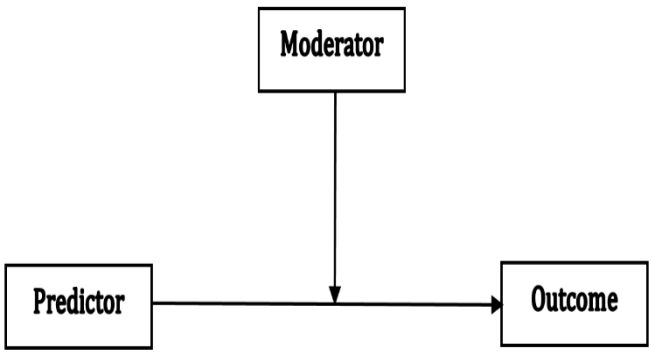


Fig. 35: A simple Moderation Model used in this Research

In addition, the PROCESS macro estimates and specifies the condition(s) under which the moderation effect is significant by partitioning the effect into low, medium, and high conditions using the "pick-a-point" procedure, Johnson-Neyman technique, or percentiles of the distribution. Based on the "pick-a-point" procedure, the low condition represents one minus standard deviation from the mean value, the medium condition equals the mean while

the high condition indicates one plus standard deviation from the mean (Hayes, 2013; Hayes & Montoya, 2017).

Contrary to the "pick-a-point" procedure that involves an arbitrary selection of moderator points, the Johnson-Neyman technique addresses this shortcoming by selecting value(s) at a point along a continuum where the effect of IVs on DVs is precisely significant at a specified p-value (Hayes & Montoya, 2017). Although the approach is similar to the "pick-a-point" procedure, it does not rely on the arbitrary selection of moderator values and allows for the identification of the point at which the effect of IVs on DVs is statistically significant.

Contrary to these two approaches, the percentiles of distribution technique allow the values of moderators at different levels of percentile to be selected. The shortcomings of the "pick-a-point" such as regression (mean) centering is eliminated when using the Johnson-Neyman or the percentiles of distribution techniques (Hayes, 2013). The output from the analysis includes the overall model fit, the interaction model, and the conditional effect for different values (conditions) of moderators. For instance, the overall interaction effect may not be significant although it may be significant when the value of moderator is either low or high based on a point on the moderator continuum.

This provision is not available in SPSS or AMOS when testing for moderation effect between independent and dependent variables in a moderation model and the type of model in Figure 35 cannot be assessed in AMOS without creating a new interaction variable. The choice of an approach is mainly influenced by the complexity of the PROCESS model being used in a research. Therefore, the percentiles of distribution approach is used in this research due to the complexity of the selected model (Model 15) from the Hayes (2013) templates.

10.4.1 The Mediated-Moderation Analysis

From the full hypothesised model (Figure 32), the findings (Table 30) showed that norm-based constructs are statistically significant in predicting recycling at work. On the contrary, contextual-based constructs apart from perceived organisational commitment were

reported to have no significant causal relationships with recycling at work. Also, recall that none of the interaction effects (Table 30) were statistically significant in moderating the causal effect of recycling at home on recycling at work whilst norm-based constructs were reported to mediate the causal relationship between recycling at home and at work.

To probe the obtained relationships further, a conceptual "PROCESS" model (Figure 36) was developed based on the Model 15 of the PROCESS model templates (Hayes, 2013). In path analysis, the indirect effect can be described as the product of the effect of causal variable on mediators and the effect of mediators on outcome variables while keeping the causal variables constant (Hayes, 2013; Preacher et al., 2007). In the context of this research, the path analysis for the indirect effect involves the product of the effect of recycling at home on norm-based constructs and the effect of norm-based constructs on recycling at work which is contingent on the context-based factors while holding recycling at home constant.

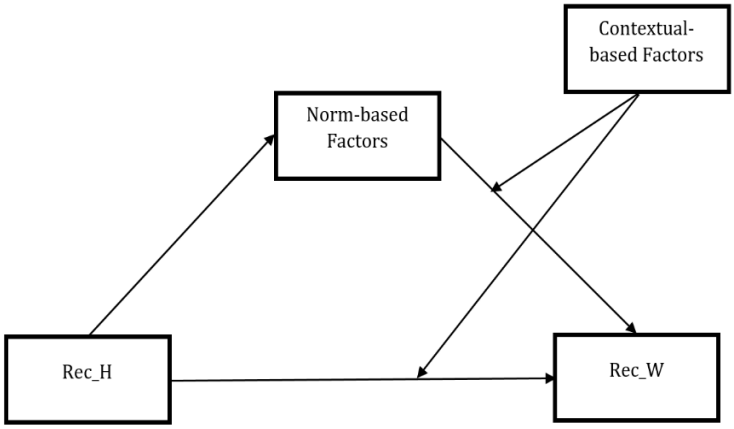


Fig 36: Conceptual Mediated-Moderation Model (Adapted from Hayes, 2013)

The statistical diagram of the conceptual model including its corresponding equations that the PROCESS macro can interpret and analyse is presented in Figure 37.

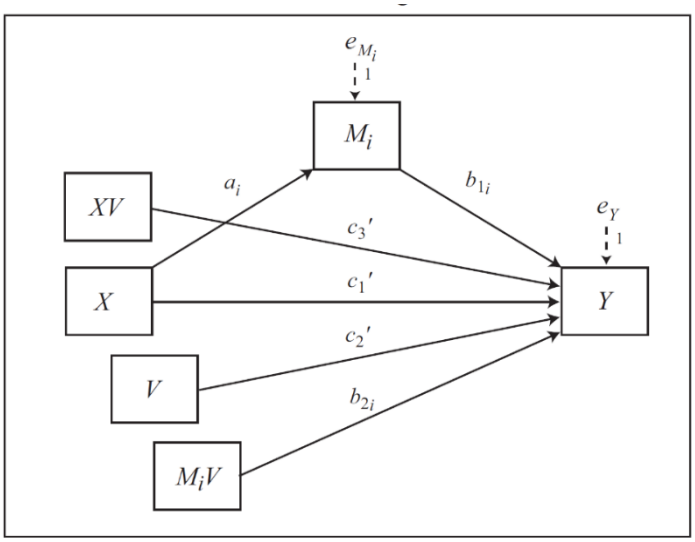


Fig. 37: Statistical representation of the Conceptual Model (Hayes, 2013)

From the diagram, the conditional indirect effects of recycling at home on recycling at work through the norm-based constructs are estimated using $a_i*(b_{1i} + b_{2i}V)$ while the conditional direct effect of recycling at home on recycling at work is examined using $c_1' + c_3'*V$. The parameters in the statistical diagram in Figure 37 as used in this research are described in Table 33 for a better understanding.

Therefore, the conceptual model in Figure 36 consists of three mediation models with each norm-based construct representing a model (Model A = "Personal Norms" as a mediator; Model B = "AC" as a mediator; and Model C = "AR" as a mediator). Each of these models comprises three sub-models reflecting the moderation effects of the context-based constructs on the direct and indirect relationships between recycling at home and at work.

Table 33: Description of the Parameters in the Statistical Diagram	
Parameters	**Description**
X	Recycling at Home
Y	Recycling at Work
M	Mediators (Norm-based constructs)
V	Moderators (Context-based constructs)
a_i	Regression coefficient of the effect of recycling at home on norm-based constructs
b_{1i}	Regression coefficient of the effect of norm-based constructs on recycling at work
b_{2i}	Regression coefficient of the interaction of norm-based and context-based constructs in predicting recycling at work
c_1'	Regression coefficient of the direct effect of recycling at home on recycling at work
c_2'	Regression coefficient of the predicting effect of context-based constructs on recycling at work
c_3'	Regression coefficient of the interaction of recycling at home and context-based constructs in predicting recycling at work
Adapted from Hayes (2013)	

By analysing the model using the sample data of this research, the complete findings generated from the PROCESS output are presented in Appendix 10 although the summary of key findings is described below. From the PROCESS output, the conditional direct effect of recycling at home on recycling at work is presented in the fifth column of Table 34 using different values of the context-based factors. According to Hayes (2013), these values correspond to the 10th, 25th, 50th, 75th, and 90th percentiles of the distribution of the context-based factors, and represent “very low”, “low”, “moderate”, “high”, and “very high” values respectively.

In addition, the conditional indirect effect of recycling at home on recycling at work is presented in the last column of Table 34. These findings are based on the estimate of each of the coefficients in a conditional PROCESS model (Figure 36). With regards to the PROCESS model in Figure 36, the direct and indirect effects of recycling at home on recycling at work are contingent on the interacting effect of context-based factors, suggesting that both effects are conditional.

However, the conditional indirect effect of recycling at home on recycling at work quantifies the extent to which two people with a given value of the context-based factors are

estimated to differ on recycling at work through the effect of recycling at home on the norm-based factors, which subsequently influences recycling at work. In "Model A" for instance (Table 34), people with higher values on scheme knowledge also scored the highest weights on the indirect effects of recycling at home on recycling at work. In statistical terms, a unit higher in recycling at home is estimated to result in an increase of about .054 units in recycling at work due to the interaction effect of personal norms and scheme knowledge at about 1.393 values (90th percentile) of scheme knowledge. As a result, there is evidence of an indirect effect of recycling at home on recycling at work for people that have positive personal norms irrespective of their scheme knowledge.

From the last column of Table 34, the indirect effect of recycling at home on recycling at work through the effect of norm-based factors is higher (or positive) for people with the positive perceptions of context-based factors. As a result, the more the recycling at home for people with strong norm-based attributes and positive context-based perceptions (from "high to very high"), the more the recycling at work.

Table 34: The Conditional Effects of Recycling at Home on Work at values of Moderators (V)

M	**V**		**a_i**	**$c_1' + c_3'$**	**Direct Effect ($c_1' + c_3'$*V)**	**Indirect Effect (a_i*($b_1 + b_{2i}$V))**
Model A						
Per_Nms	Sch_Know	-1.421	0.248	0.211	0.066	.048
		-0.858			0.100	.049
		-0.295			0.133	.050
		0.549			0.184	.052
		1.393			0.235	.054
	Org_Com	-1.361	0.248	0.238	0.120	0.045
		-0.625			0.157	0.044
		-0.257			0.175	0.043
		0.848			0.230	0.041
		1.216			0.249	0.041
	Off_Lay	-1.638	0.248	0.202	0.173	0.053
		-0.688			0.183	0.046
		0.261			0.194	0.038

		0.736			0.199	0.034
		1.211			0.204	0.031
Model B						
AC	Sch_Know	-1.421	0.12	0.249	0.094	0.017
		-0.858			0.130	0.017
		-0.295			0.166	0.017
		0.549			0.220	0.016
		1.393			0.274	0.016
	Org_Com	-1.361	0.12	0.277	0.138	0.023
		-0.625			0.181	0.019
		-0.257			0.203	0.017
		0.848			0.268	0.011
		1.216			0.290	0.009
	Off_Lay	-1.638	0.12	0.231	0.194	0.020
		-0.688			0.207	0.016
		0.261			0.221	0.012
		0.736			0.227	0.010
		1.211			0.234	0.008
Model C						
AR	Sch_Know	-1.421	0.238	0.204	0.064	0.067
		-0.858			0.096	0.065
		-0.295			0.129	0.063
		0.549			0.178	0.060
		1.393			0.227	0.057
	Org_Com	-1.361	0.238	0.214	0.146	0.033
		-0.625			0.167	0.038
		-0.257			0.178	0.041
		0.848			0.210	0.049
		1.216			0.220	0.052
	Off_Lay	-1.638	0.238	0.209	0.135	0.081
		-0.688			0.162	0.061
		0.261			0.188	0.042
		0.736			0.202	0.032
		1.211			0.215	0.022
Model D						
		-1.421			0.126	0.005
		-0.858			0.154	0.006

Subj_Nms	Sch_Know	-0.295	0.023	0.247	0.182	0.008
		0.549			0.224	0.010
		1.393			0.267	0.012
	Org_Com	-1.361	0.023	0.308	0.129	0.000
		-0.625			0.184	0.002
		-0.257			0.212	0.004
		0.848			0.296	0.008
		1.216			0.324	0.009
	Off_Lay	-1.638	0.023	0.201	0.288	0.013
		-0.688			0.257	0.009
		0.261			0.225	0.006
		0.736			0.210	0.004
		1.211			0.194	0.002

Similarly, the conditional direct effect of recycling at home on recycling at work quantifies the extent to which two people that differ in recycling at home by one unit are estimated to be different in recycling at work through the conditional effect of the context-based factors. Using "Model A" as an example, people that differ by one unit in their recycling at home are estimated to be .184 higher up in their recycling at work due to the value of .549 (75th percentile) scheme knowledge. On the contrary, people with a moderate (-.295) value (50th percentile) scheme knowledge are lower in their recycling at work by .133 compared to people with 1.393 units (90th percentile) scheme knowledge that are higher by .235 in their recycling at work.

From these findings as presented in Table 34, the PROCESS techniques provide a means to differentiate people with lower perceptions of the context-based factors from those with higher context-based views as estimated using the percentiles of the distribution. While Table 34 provides the description of the conditional (direct and indirect) effects (Hayes, 2013; Preacher & Kelley, 2011) of recycling at home on recycling at work, the focus of the analysis is to explain recycling at work with regards to recycling at home. In other words, the estimation of the direct and indirect effects of recycling at home on recycling at work and

whether that effect is through the norm-based factors and/or the extent to which the effect is contingent on the context-based factors.

The next section inspects the obtained estimates for a robust and plausible conclusion about the mediated-moderation relationships to eliminate the views that the effects are due to chance and to allow the generalisation of the findings.

10.4.2 Statistical Inference using Bootstrap Confidence Intervals for Conditional Effects

To further probe the conditional direct and indirect effects including the extent to which the effects are contingent on the context-based factors as presented in Table 34 above, bootstrap confidence intervals (Preacher & Selig, 2012; Preacher & Hayes, 2004; Mackinnon, 2008) were generated using 5000 bootstrapping resampling with 95% confidence intervals. This approach was considered rather than the Normal theory approach (such as Sobel test) because it does not penalise for the presence of non-normality issues (Hayes, 2013; Tabachnick & Fidell, 2014).

Although the findings are tabulated for ease of understanding, the conditional direct and indirect effects are presented in different tables using each of the model nomenclatures in Table 34 above as the unique identifier for clarity and brevity. The conditional direct and indirect effects of recycling at home on recycling at work at different values of the context-based factors (scheme knowledge, organisational commitment, and office layout) are presented in Tables 35, 37, 39, and 41. In the tables, the "p" values represent the significance level from the Normal theory test estimated for the corresponding values of the context-based factors in the model while LLCI and ULCI indicate lower and upper confidence intervals respectively. From the estimates, there is no difference between the Normal theory test and bootstrap confidence intervals techniques, suggesting that the normality assumption is not violated.

In addition, the conditional indirect effects of recycling at home on recycling at work through the norm-based factors at values of context-based factors are presented in Tables 36, 38, 40, and 42 below. The significance level for the indirect effects is estimated using the obtained values of the lower-level (BootLLCI) and the upper-level (BootULCI) of the bootstrap confidence intervals. Using the bootstrap confidence intervals, "NS" in the Tables indicates a non-significant estimate, given that the confidence intervals (from lower to upper) straddle zero (Hayes, 2013). That is, the estimates where there is no zero value between the lower and upper confidence intervals, meaning that the obtained estimates are statistically significant and deviate well enough from zero to rule out the possibility that the effects are due to chance.

Identifier: Model A

Table 35: Conditional direct effect(s) of recycling at home on work at values of the moderator(s)

Context-based factors	Effect	SE	t	p	LLCI	ULCI	Level
Sch_Know							
-1.421 (10th)	.066	.088	.748	.455	-.108	.240	*NS*
-.858 (25th)	.100	.068	1.465	.144	-.034	.233	*NS*
-.295 (50th)	.133	.054	2.487	.013	.028	.239	
.549 (75th)	.184	.054	3.420	.001	.078	.289	
1.393 (90th)	.234	.078	3.006	.003	.081	.387	
Org_Com							
-1.361 (10th)	.121	.078	1.549	.122	-.033	.274	*NS*
-.625 (25th)	.157	.053	2.942	.003	.052	.262	
-.257 (50th)	.176	.047	3.762	.000	.084	.267	
.848 (75th)	.230	.062	3.707	.000	.108	.352	
1.216 (90th)	.249	.075	3.303	.001	.101	.396	
Off_Lay							
-1.638 (10th)	.174	.090	1.928	.055	-.003	.351	*NS*
-.688 (25th)	.184	.058	3.191	.002	.070	.297	
.261 (50th)	.194	.050	3.846	.000	.095	.293	
.736 (75th)	.199	.060	3.286	.001	.080	.318	
1.211 (90th)	.204	.076	2.678	.008	.054	.353	

NS = Not Significant; a confidence interval that is not overlap with zero signifies a significant effect

Table 36: Conditional indirect effect(s) of recycling at home on work at values of the moderator(s)

Mediator	Moderators	Effect	Boot SE	BootLLCI	BootULCI	Level
	Sch_Know					
	-1.421 (10th)	.048	.021	.012	.099	
	-.858 (25th)	.049	.017	.021	.089	
	-.295 (50th)	.050	.015	.024	.086	
	.549 (75th)	.052	.019	.021	.098	
	1.393 (90th)	.054	.028	.008	.121	

Per_Nms	**Org_Com**					
	-1.361 (10th)	.045	.022	.008	.098	
	-.625 (25th)	.044	.015	.020	.079	
	-.257 (50th)	.043	.014	.021	.075	
	.848 (75th)	.041	.022	.004	.094	
	1.216 (90th)	.041	.027	-.006	.102	*NS*
	Off_Lay					
	-1.638 (10th)	.053	.038	-.010	.141	*NS*
	-.688 (25th)	.046	.023	.008	.100	
	.261 (50th)	.038	.013	.016	.068	
	.736 (75th)	.034	.014	.011	.065	
	1.211 (90th)	.031	.018	-.003	.069	*NS*
NS = Not Significant; a confidence interval not overlapping with zero signifies a significant effect						

Identifier: Model B

Table 37: Conditional direct effect(s) of recycling at home on work at values of the moderator(s)							
	Effect	SE	t	p	LLCI	ULCI	Level
Sch_Know							
-1.421 (10th)	.094	.089	1.053	.293	-.081	.269	*NS*
-.858 (25th)	.130	.068	1.902	.058	-.004	.264	*NS*
-.295 (50th)	.166	.053	3.115	.002	.061	.271	
.549 (75th)	.220	.053	4.160	.000	.116	.325	
1.393 (90th)	.275	.078	3.543	.000	.122	.427	
Org_Com							
-1.361 (10th)	.138	.077	1.788	.075	-.014	.290	*NS*
-.625 (25th)	.181	.053	3.431	.001	.077	.285	
-.257 (50th)	.203	.046	4.414	.000	.113	.293	
.848 (75th)	.268	.061	4.399	.000	.148	.388	
1.216 (90th)	.290	.074	3.922	.000	.144	.435	
Off_Lay							
-1.638 (10th)	.193	.088	2.183	.030	.019	.367	
-.688 (25th)	.207	.057	3.647	.000	.095	.318	
.261 (50th)	.220	.049	4.469	.000	.123	.317	
.736 (75th)	.227	.059	3.852	.000	.111	.343	
1.211 (90th)	.234	.074	3.159	.002	.088	.379	

Table 38: Conditional indirect effect(s) of recycling at home on work at values of the moderator(s)						
Mediator	Moderator	Effect	Boot SE	BootLLCI	BootULCI	Level
	Sch_Know					
AC	-1.421 (10th)	.017	.013	.000	.053	
	-.858 (25th)	.017	.011	.002	.047	
	-.295 (50th)	.017	.010	.003	.042	
	.549 (75th)	.016	.010	.002	.044	
	1.393 (90th)	.016	.013	-.003	.053	*NS*
	Org_Com					
	-1.361 (10th)	.023	.016	.001	.064	
	-.625 (25th)	.019	.011	.002	.047	
	-.257 (50th)	.017	.010	.002	.041	
	.848 (75th)	.010	.011	-.004	.041	*NS*
	1.216 (90th)	.008	.013	-.011	.043	*NS*
	Off_Lay					
	-1.638 (10th)	.019	.017	-.004	.067	*NS*

	-.688 (25th)	.016	.011	.000	.047	
	.261 (50th)	.012	.008	.001	.034	
	.736 (75th)	.010	.008	-.001	.033	*NS*
	1.211 (90th)	.008	.010	-.006	.035	*NS*

Identifier: Model C

Table 39: Conditional direct effect(s) of recycling at home on work at values of the moderator(s)							
Context-based factors	Effect	SE	t	p	LLCI	ULCI	Level
Sch_Know							
-1.421 (10th)	.064	.088	.731	.465	-.109	.237	NS
-.858 (25th)	.097	.067	1.433	.153	-.036	.229	NS
-.295 (50th)	.129	.053	2.441	.015	.025	.233	
.549 (75th)	.178	.053	3.321	.001	.072	.283	
1.393 (90th)	.226	.078	2.882	.004	.072	.380	
Org_Com							
-1.361 (10th)	.146	.078	1.863	.063	-.008	.300	NS
-.625 (25th)	.167	.053	3.130	.002	.062	.272	
-.257 (50th)	.178	.047	3.818	.000	.086	.269	
.848 (75th)	.210	.063	3.333	.001	.086	.333	
1.216 (90th)	.220	.076	2.884	.004	.070	.370	
Off_Lay							
-1.638 (10th)	.136	.088	1.545	.123	-.037	.309	NS
-.688 (25th)	.162	.057	2.865	.004	.051	.273	
.261 (50th)	.189	.050	3.790	.000	.091	.286	
.736 (75th)	.202	.059	3.394	.001	.085	.319	
1.211 (90th)	.215	.074	2.888	.004	.069	.361	

Table 40: Conditional indirect effect(s) of recycling at home on work at values of the moderator(s)						
Mediator	Moderators	Effect	Boot SE	BootLLCI	BootULCI	Level
	Sch_Know					
AR	-1.421 (10th)	.067	.028	.025	.138	
	-.858 (25th)	.065	.023	.028	.125	
	-.295 (50th)	.063	.021	.030	.116	
	.549 (75th)	.060	.021	.026	.113	
	1.393 (90th)	.057	.026	.016	.120	
	Org_Com					
	-1.361 (10th)	.033	.022	-.004	.087	*NS*
	-.625 (25th)	.038	.016	.012	.077	
	-.257 (50th)	.041	.015	.017	.077	
	.848 (75th)	.049	.022	.014	.102	
	1.216 (90th)	.052	.026	.010	.116	
	Off_Lay					
	-1.638 (10th)	.081	.035	.025	.164	
	-.688 (25th)	.061	.022	.025	.115	
	.261 (50th)	.042	.015	.017	.078	
	.736 (75th)	.032	.016	.006	.071	
	1.211 (90th)	.022	.019	-.012	.067	*NS*

Identifier: Model D

Table 41: Conditional direct effect(s) of recycling at home on work at values of the moderator(s)							
Context-based factors	Effect	SE	t	p	LLCI	ULCI	Level
Sch_Know							
-1.421 (10th)	.125	.082	1.534	.126	-.035	.286	*NS*
-.858 (25th)	.154	.063	2.443	.015	.030	.278	
-.295 (50th)	.182	.049	3.685	.000	.085	.279	
.549 (75th)	.225	.049	4.576	.000	.128	.321	
1.393 (90th)	.267	.071	3.753	.000	.127	.408	
Org_Com							
-1.361 (10th)	.129	.074	1.751	.081	-.016	.273	*NS*
-.625 (25th)	.185	.051	3.658	.000	.085	.284	
-.257 (50th)	.213	.044	4.845	.000	.126	.299	
.848 (75th)	.297	.057	5.176	.000	.184	.410	
1.216 (90th)	.325	.069	4.681	.000	.188	.462	
Off_Lay							
-1.638 (10th)	.288	.081	3.568	.000	.129	.446	
-.688 (25th)	.257	.052	4.948	.000	.155	.359	
.261 (50th)	.226	.046	4.932	.000	.136	.316	
.736 (75th)	.210	.055	3.840	.000	.103	.318	
1.211 (90th)	.195	.069	2.841	.005	.060	.330	

Table 42: Conditional indirect effect(s) of recycling at home on work at values of the moderator(s)						
Mediator	Moderators	Effect	Boot SE	BootLLCI	BootULCI	Level
	Sch_Know					
Subjective Norms	-1.421 (10th)	.005	.012	-.014	.035	*NS*
	-.858 (25th)	.006	.014	-.020	.036	*NS*
	-.295 (50th)	.008	.017	-.027	.041	*NS*
	.549 (75th)	.010	.021	-.034	.051	*NS*
	1.393 (90th)	.012	.026	-.043	.061	*NS*
	Org_Com					
	-1.361 (10th)	.000	.004	-.010	.007	*NS*
	-.625 (25th)	.002	.006	-.007	.018	*NS*
	-.257 (50th)	.004	.008	-.012	.023	*NS*
	.848 (75th)	.008	.017	-.025	.043	*NS*
	1.216 (90th)	.009	.020	-.029	.051	*NS*
	Off_Lay					
	-1.638 (10th)	.013	.028	-.042	.072	*NS*
	-.688 (25th)	.009	.020	-.030	.052	*NS*
	.261 (50th)	.006	.012	-.018	.032	*NS*
	.736 (75th)	.004	.009	-.011	.025	*NS*
	1.211 (90th)	.002	.006	-.005	.023	*NS*

From the findings in Model D, it is surprising that the indirect effect of recycling at home on recycling at work through subjective norms is not contingent on any of the context-based factors. Given that subjective norms are a significant direct predictor of recycling at

work as presented in Section 10.3.1, it was expected to mediate the effect of recycling at home on recycling at work. However, it can be suggested that the moderation effect of the context-based factors is more likely to eliminate the predicting effect of subjective norms on recycling at home, such that their mediation effect is neutralised. As a result, the estimates for the indirect effect through subjective norms with the interaction of the context-based factors (scheme knowledge, organisational commitment, and office layout) are not statistically significant at 95% confidence intervals at all levels of context-based values.

Taken together, there is enough evidence to suggest that recycling at home is not only predicting recycling at work directly but it also transmitting its predictive effect through the norm-based factors at the various values of the context-based factors. Therefore, people who recycle at home and have a positive norm-based attribute are most likely to transfer their recycling behaviour from home to workplace settings especially when the perception of the context-based traits is positive.

10.5 Assessing the "Free text box" Comments

From Chapter 9, it can be seen that recycling at home is different from recycling at work regarding the volume and the range of materials as well as the frequency of recycling. However, the chapter offered little or no explanation on the emergence of this behavioural pattern. As a result, this section seeks to address that shortcoming by providing further information using respondents' comments from the "free text box" of the questionnaire instrument. As already mentioned in section 7.1.1, some sections of the questionnaire instrument provided the respondents the opportunity to supply their personal views regarding the way they currently recycle at home and at work using open questions. With the use of forced entry in the questionnaire design (see sub-section 7.3.1), all the questionnaire respondents (N = 367) were made to comment on their recycling behaviour at home and at work. To complement the qualitative (Chapter 5) and quantitative findings (sections 10.3 and 10.4) of this research, this section presents an analysis of the data entered into the "free text

box" by respondents. The intention of this section is to provide a robust and complete narrative of people's recycling behaviour at work including how it is being framed in relation to how they recycle at home.

To make sense of the respondents' comments and to present a coherent argument about the respondents' views, each comment was read through to identify common themes underlying recycling at home and at work. These themes are identified and classified separately for recycling at home (Table 43) and recycling behaviour at work (Table 44), representing the two behavioural contexts investigated in this research. This categorisation will not only assist in understanding why people engage in recycling but may also offer a further explanation on the similarities/disparities between recycling at home and recycling behaviour at work.

Table 43: Why People Recycle more/less at **Home**

Themes	Respondents Comments
Available Scheme	Some of the waste segregation routes *(at work)* make it more difficult to recycle all recyclable material [Resp_106] Good local kerbside and community collection systems and availability of recycling centres for home recycling [Resp_169] Strict Council ran refuse collection - bins do not get collected otherwise [Resp_219]
Buying (consumer) behaviour	Just cause I am buying more stuff that could be recycled [Resp_004] I don't buy items unless absolutely necessary [Resp_183] I consume more at home [Resp_202] Most items from supermarkets and home deliveries come in packets, trays, cardboard etc [Resp_268]
Company policy	Paperless office, less hard copies [Resp_141] The office I work in recycle as little as possible [Resp_244] Because work have changed what you can put in the recycling bins and so more goes in the normal bins now [Resp_250]
Consciousness/Habit	Habit and convenience, I don't have to go to the bin area [Resp_002] We're more conscious of recycling at home [Resp_006]
	I can manage the materials more efficiently than what is available under the work environment [Resp_001] It's easier to control your own environment than it is to control another. I recycle more items at home regularly because there is literally more there to do [Resp_032]

Control		I am in charge at home [Resp_092] I am in control, there is convenient provision for it [Res_188] Because I have more control on what can be done [Res_196] I have control over recycling and know where and how to recycle [Resp_243] Easier to arrange my own house to make recycling as easy as possible [Resp_262] Because I mainly have control at home, so I can determine what needs to be done [Resp_277]
Effort/time		It's easier as I have recycling bins for everything within easy access. In the office, waste collects until I have time/enough waste to make a trip to the bins, and so sometimes it's just easier and quicker to not separate this out (and the bins are often full to take more) [Resp_081]. lack of facilities or time [Resp_105] The recycling bins are harder to find at work, especially for food waste, and it's more convenient to use disposable items [Resp_134]
Facilities	Availability	Limited facilities at work, so easier to do at home [Resp_018] Because I have the appropriate bins to recycle [Resp_181] Availability of recycling facilities and uplift of separated waste. I also produce more waste at home [Resp_025] No facilities for recycling at work [Resp_313]
	Ease/Convenience /Proximity	There isn't the ease of recycle bins in some places at work [Resp_326] More convenient, system set up to personal requirements [Resp_355]
	Accessibility/bins Identification	Easy availability of bins and local recycling skips clearly labelled [Resp_060] Easier access to recycling facility (i.e. council run) [Resp_066] our work does not have easy access to recycling bins especially glass and metal [Resp_091] The systems are in place [Resp_145]
Household Composition		I generate more waste at home - there's much more to recycle at home in family of 5 [Resp_100] Household of 4 produces more recyclable material than single worker [Resp_217] Household responsibility [Resp_249] There are 4 of us so more waste generated [Resp_296]

Job requirements/role		I have a job that requires me to do my entire work on the computer [Resp_183] I generate less waste at work - most of my work is electronic rather than on paper [Resp_231] Because of the nature of our work, electrical goods have to be securely disposed of, not recycled [Resp_260] Working on a computer at work most of the time so not generating same volume of waste [Resp_284]
Materials	Type (waste/recyclable)	Because my work doesn't involve many recyclable materials [Resp_008] Broader range of recyclables, e.g. more plastics. Some lab material is not suitable for recycling [Resp_062] I have more recyclable materials to dispose of at home. At work it is mainly just paper. I don't dispose of many food containers at work and certainly no textiles! [Resp_097] I generate more recyclables at home (e.g. packaging) and print rarely at work [Resp_197] more waste there e.g. veg peelings, junk mail, garden waste, food containers etc [Resp_302] Significantly more limited number of items that can be recycled at work [Resp_329]
	Volume	I don't generate as much recycling at work as I do at home [Resp_053] Simply because I create more waste at home. I don't use bottles, jars or metal cans at work [Resp_331] I use more materials which can be recycled at home [Resp_259] I have more items to recycle at home [Resp_339] I generate more waste at home, and of a wider range of materials [Resp_362]
	Range	I have a wider variety of recycling collected from my home [Resp_021] At home I use a wider range of items like food, groceries, toiletries, clothes, etc, hence I recycle more [Resp_183] Wider range of recycling options vs. what I actually use (i.e. no glass to recycle at work [Resp_234] Don't use any metal/textiles at work. No junk post either [Resp_254] There is more variance in the items I use at home [Resp_358]
		More opportunity. Recycling at work, other than paper, is fairly new, plus I cook from scratch at home, including for work time, so sadly more packaging [Resp_075]

Opportunity	Because I have more options. The recycling at work is limited and misleading [Resp_206] More options; most notably, glass cannot be recycled at work [Resp_260] More opportunities given to recycle [Resp_304]
From another context	. . . sometimes take items home from work to recycle at home [Resp_018] At work we have no recycling facilities, so I take what I can home to recycle i.e. Not confidential information but bring home cans, tins glass etc that I use in my own work as it's bad for environment to just throw it away [Resp_020] I take glass home from work to recycle as I can't recycle glass at work [Resp_145]
Responsibility	I am responsible for this [Resp_041] Because at home I am responsible for the functioning of the entire home, whereas in the office other people (e.g. facilities management) look after certain functions [Resp_314]
Scheme Knowledge	Easier to know what can be recycled [Resp_208] I know where to put it and the council has an "all in recycling bin" policy. No such bin exists at work [Resp_257] I understand how the domestic recycling system works. At work there seems a focus on recycling paper only [Resp_327]
Spend more time	I work from home [Resp_242] I work part time [Resp_267] I work at home 3 days out of 4 - I'm only in the office ¼ [Resp_317] More time to do so and ease of access to recycling facilities [Resp_319]
Source: Author	

In support of the qualitative and the quantitative findings of this research, the "free text box" comments (Tables 43 and 44) suggest that recycling at home is perceived by the respondents to be different from recycling at work. Although there are similarities in recycling behaviour across the two contexts, especially when facilities are perceived to be adequate in both contexts, there are disparities between recycling at home and recycling at work regarding the motivation/barriers to people's recycling behaviour. Based on the respondents' comments, factors such as job function/role and context where people spend more time have a significant influence on their recycling behaviour while the effect of material

consumption (and/or buying behaviour) is more likely to be responsible for the volume and range of materials being produced.

Table 44: Why People Recycle more/less at **Work**		
Themes		Respondents Comments
Company's policy		We have recycling bins for everything at work whereas at home, my council doesn't recycle everything [Resp_034] The only bins available are recycling bins [Resp_038] Bins provided for recycling all round the office (and no bins at desks any more) [Resp_043] As I work for [**company's name**] offshore it is compulsory [Resp_266]
Facilities	Availability	Easily available recycling bins [Resp_023] Availability of separate bins [Resp_031] There are the facilities to recycle in work [Resp_052] My flat does not have good recycling facilities [Resp_121] There is more availability to do so and it is easier to do so [Resp_150] Robust systems are in place at work which drive recycling [Resp_270] I do not have the facility at home to recycle food waste or gardening waste and things like batteries I would have to take myself to the recycling centre [Resp_305]
	Location (Ease/ Convenience/ Proximity)	Convenience [Resp_011] At home I am only provided with a cardboard/paper recycling bin. The council recycling centre is 6 miles away and always full, similar story at supermarket recycling bins. I've gotten fed up of driving around for an hour to try and find a plastic bin that is not spewing plastic out already. Work has better facilities, but could be improved by providing some recycling bins near kitchenettes, rather than half a building away [Resp_079] It is also easier to recycle at work: there is more space for recycling and separate bins for each material [Resp_086] More convenient. Separate bins provided in all locations [Resp_213] It's easier as the necessary bins are there and dealing with simple products to recycle [Resp_298]
	Accessibility/ bins Identification	. . . we do not have the option to recycle plastic (although i do try where possible to keep this and recycle due to space and the ability to store this is not always possible. I am also not in a position to recycle food waste due to space, although i do try to limit my food waste. . . [Resp_044] There is a good recycling set up in work whereas at home there is limited space [Resp_217] Bins in handy location [Resp_305]

		There is allocated recycling bins in the break out areas at work [Resp_346] More separate recycling units [Resp_364]
Habit		Habit - make my desk as clutter free as possible [Resp_094]
Job function		Work in a Zero Waste to Landfill site [Resp_005] Corporate responsible trader [Resp_049] Nature of the job involves lots of paper [Resp_057] My role involves this [Resp_321]
Materials	Type (waste/ recyclables)	Far greater proportion of office consumables are recyclable at work & facilities are provided on site [Resp_028] Use more recyclable materials at work [Resp_031] Because at home I can't recycle all plastic for example or food, but at work you put all food in the red bins, all useable stationary in a yellow bin and everything else in the green bin which goes for recycling. This means that everything I throw away gets recycled, it is easy to do [Resp_042] I consume more non-recyclable things at home (especially food packaging like film). While at work most of the material I throw away can be recycled (e.g. paper) [Resp_086] A lot of paper and marketing materials are recycled at work [Resp_225]
	Volume	I generate more here, and there are more facilities- my home doesn't have option for tins/glass [Resp_054] More items that can be recycled [Resp_152]
More time at work		I spend more time at work usually, and therefore use more materials there [Resp_227] Spend more time at work [Resp_233] I spend more time at work than at home [Resp_324]
Scheme knowledge		Because our waste carrier gives us more options than the local council does [Resp_056] I was not aware that I had recycling facilities at me home for a while (moved in 4-5 months ago, started recycling recently). We also do not have food waste facility at my home, but I use it at work [Resp_135] Separated bins and collection is easier [Resp_318]
Social Influence		Easier to take time to deal with it at home. Get frustrated with people putting wrong items in recycling bins at work leaving no space for items which can be recycled [Resp_131] I live at home by myself, and at work there are over 20 people in the office [Resp_163] Someone else does the heavy lifting [Resp_221]
Source: Author		

Nevertheless, both waste and recyclables are used interchangeably by the research respondents to describe the materials that are being produced in both contexts. It is understood from the comments that the way people perceive the materials (such as waste or recyclables) is likely to have a significant implication for how those materials are handled at home and at work. This is more likely to be associated to the people's consumption (and/or buying) behaviour at home leading to the production of more waste at home and the available facilities at work suggesting that people may generate less waste but recycle more materials/recyclables compared to when at home. For instance, people are more likely to produce more volume and a wider range of materials at home compared to their workplace where material production may be limited mainly to key recyclables, such as paper and plastics, in compliance with the current legal requirements for businesses. In the section that follows, the observed disparities and similarities between recycling at home and recycling behaviour at work are further discussed.

10.5.1 Perception of Waste Volume

As already reported (see section 9.3.1), recycling at home is similar to recycling at work in that people recycle materials in both contexts although recycling is observed to be different in terms of volume of materials in both contexts. From the respondents' comments, various factors (see Tables 43 and 44) are observed to be responsible for the recycling pattern in each context. It is observed from the respondents' comments that when more materials are consumed at home compared to a work setting, this contributes to the volume of waste being prepared for recycling in that context. For instance,

Just because I am buying more stuff for home rather than work [Resp_004]

"I generate more waste at home by cooking, post mail received and everyday life, therefore there is more material to recycle" [Resp_89]

"I have significantly fewer items at work to recycle" [Resp_98]

I generate more waste at home than at work [Resp_207].

This is contrary to the initial assumption that where people spend more time will have significant influence on their consumption behaviour (and/or decision). Considering that many respondents are full-time employees (see section 9.1.4), it is expected that more waste will be generated at work compared to home settings. However, this is observed not to be the case as many respondents reported a higher volume of materials at home compared to what they produce at work. While consumption/buying behaviour influences the rate of waste generation and hence the volume of materials being recycled, there are many reasons, such as family composition, why people consume more materials at home. When asked why people produce more waste at home, family composition is identified as one of the reasons. For example,

"I'm responsible for more people {at home} *and together we generate more material that needs to be recycled"* [Resp_162]

"Household of 4 produces more recyclable material than single worker" [Resp_217]

"There are 4 of us so more waste generated" [Resp_296].

This is a very important observation considering that the number of staff in most organisations is more than four people, however, these comments indicate that people are only paying attention to their personal waste at work unlike when they are at home where waste is construed as a household issue. The fact that these behavioural contexts are compartmentalised regarding waste is likely to affect people's perception of responsibility and personal commitment to recycling at work. This corroborates the qualitative findings (see section 5.8) of this research where people's subjective account of recycling was observed to change from "We" at home to "I" at work. As a consequence, the lack of responsibility and personal commitment may reduce the propensity of engaging in recycling at work.

In addition, job function and/or where people work is another reason that reduces waste generation at work and consequently increases the volume of materials people are preparing for recycling at home compared to work. The following comments, for example, demonstrate why less waste is produced at work;

"Work in a Zero Waste to Landfill site" [Resp_005]

"Corporate responsible trader" [Resp_049]

"I have a job that requires me to do my entire work on the computer. Further, I do not print anything unless absolutely necessary, for e.g. to submit a report required in print. I keep my desk as paperless as possible. I don't use any stationary from day to day. Hence, my 'material' requirements at work are negligible" [Resp_183].

Although family composition and job function can be attributed to waste generation potential, recycling facilities are reported as the most significant reason why people recycle more volume of materials at home compared to work. As noted from the "free text box" for example,

"Easier access to recycling facility (i.e. council run)" [Resp_66]

"Recycling bins are at my back door and all easily recognisable and colour coded" [Resp_068]

The recycling bins are harder to find at work, especially for food waste, and it's more convenient to use disposable items" [Resp_134]

"Good local kerbside and community collection systems and availability of recycling centres for home recycling" [Res_169]

"There are less opportunities to recycle at work than at home" [Resp_252]

Based on the respondents' comments, the lack of adequate recycling facilities in some organisations suggest that people are utilising another means other than their workplace. As demonstrated in section 9.2.3, many people are using other facilities such as their homes and recycling centres (bring sites) to recycle materials being produced at work due to the lack of adequate facilities in their workplaces and/or organisational commitment (especially, company strategy). For instance,

". . . I take glass home from work to recycle {at home} *as I can't recycle glass at work"* [Resp_145]

"Few facilities at work for recycling so tend to take waste home" [Resp_166].

By using other available recycling points, such as supermarkets or taking recyclables home, to recycle waste being generated at work, people tend to report more volume of waste at home in comparison to what they recycle at work. This may likely contribute to the observed disparity between recycling at home and recycling at work regarding the volume of materials being recycled in both contexts.

However, the influence of organisational commitment (including strategy) indicates the probability that people engage in recycling, regarding the volume of waste, more at home than at work. Therefore, it could be that organisations only provide facilities for materials that are prominent in that workplace and/or for materials with high economic benefits to their waste contractor(s). While people may be limited in what they can recycle at work based on the available facilities, it should be noted that the limitation is a dual function of what people consume at work and the commitment of organisations. From the "free text box" comments, it is evident that people not only consume more, leading to more waste at home, but also recycle more at home compared to work settings. Although people who recycle more at home cite the amount of waste generated and the facilities as the reasons for increased recycling at home, people who reported more recycling at work attribute their recycling more to the influence of facilities. On the one hand, the "free text box" comments suggest that people tend to perceive that they recycle most in the setting where they produce most materials. On the other hand, people are more likely to label materials being generated at home as waste, however, recyclables are most used for materials being produced at work. For instance,

"I consume more non-recyclable things at home (especially food packaging like film). While at work most of the material I throw away can be recycled (e.g. paper). It is also easier to recycle at work: there is more space for recycling and separate bins for each material" [Resp_86]

"*More items that can be recycled*" [Resp_152].

10.5.2 Effects of Facilities on Range of Materials

As demonstrated in the previous section (section 10.5.1), the amount of materials being generated by people and available recycling facilities are the two dominant factors observed to be influencing recycling behaviour at home and at work. On the one hand, the fact that people consume a higher volume of materials at home indicates a tendency for people to produce a wider range of materials at home than they do at work. This is reflected in the respondents' comments, for example;

"I use a limited amount of things at work, it is essentially paper and food and food packaging whereas at home I have everything" [Resp_042]

"I use a wider range of items like food, groceries, toiletries, clothes, etc, hence I recycle more {at home}*"* [Resp_183]

"Mostly because I use more materials that can be recycled at home, e.g. glass, metal, plastic, cardboard" [Resp_191].

On the other hand, it is observed that people are constrained by what they are allowed to produce at work considering that some organisations are restricting what can be collected for recycling at work as shown in 10.5.1. As a result, it is observed from the respondents' comments that many organisations have no provision for some items such as food waste and glass which may influence material consumption as well as recycling behaviour in such workplaces. For instance;

My work is limited in terms of what can be recycled [Resp_008]

My office only has recycling for paper and card [Resp_040]

"I . . . cannot recycle glass and food waste at work (not allowed by policy)" [Resp_230].

This has a serious implication for waste generation as well as recycling behaviour in that people may only consume items/materials that can be recycled at work, hence preparing items that can be collected for recycling in their workplaces. This is evident in people's subjective descriptions of their recycling behaviour where the term 'recyclables' is used for materials at work and whilst the term 'waste' is used for materials at home. Nonetheless, the

"free text box" comments support the initial findings (see Chapter 9) and show that people generate a wider range of materials at home compare to work. This is so, given that recycling at work is mostly limited, particularly by the current legislation, to key recyclables such as glass, paper, and plastics including food items which consequently affect what can be consumed at work.

Although more people repeated that they consume more materials at home and are sometimes restricted on what (range of materials) can be recycled at work, these should not necessarily determine the extent (that is, the frequency of recycling) to which people recycle at work and may not offer a holistic explanation of why people recycle more frequently at home. For instance, job function/requirements are observed to be limiting which (materials) and how people recycle at work. This is not the case at home where there are more opportunities regarding what and how people recycle. Based on the comments from the "free text box", recycling at work is more likely to be influenced by the extent to which organisations are committed to recycling. When asked to compare their recycling behaviour at home and at work for instance, a few comments suggest the availability of adequate facilities in some workplaces with a positive influence on people's recycling behaviour. For instance,

> *"We have recycling bins for everything at work whereas at home, my council doesn't recycle everything"* [Resp_034]
>
> *Work has better facilities but could be improved by providing some recycling bins near kitchenettes, rather than half a building away"* [Resp_079]
>
> *"There is a good recycling set up in work whereas at home there is limited space"* [Resp_216].

Similar to recycling at home, the extent to which people recycle more frequently at work is mostly influenced by the presence of recycling facilities at work. To engage in recycling irrespective of the behavioural contexts, there is a need for adequate facilities to be available, accessible, and convenient for people to use. It can be argued from the respondents'

comments that facilities contribute to recycling at home in the same manner they influence recycling behaviour at work. However, a higher proportion of respondents perceived facilities at work as a barrier to their recycling behaviour at work which may likely reduce the frequency of their participation in recycling when at work. For instance,

"When you have to separate items, easier to know where to put items at home" [Resp_069]

"Office doesn't offer same facilities to segregate that I have at home" [Resp_211]

"No facilities to recycle at work" [Resp_306]

Because there is a greater opportunity to do so (at home)- *work only recycle a very small number of items* [Resp_329].

Although the influence of facilities in terms of accessibility and convenience can be subjective, the effects of facilities regarding their accessibility and convenient are not likely to be uniform within a context (such as household or workplace) and across contexts (for example, household and workplace). Nevertheless, the available facilities should be easily recognisable and should make recycling at home and at work easy to perform.

10.5.3 Perceptions of Control

The knowledge from the previous sections, sub-sections 10.5.1 and 10.5.2 suggest that people may likely recycle more frequently at home than they do at work due to the rate of material consumption and the adequacy of recycling facilities. Based on the respondents' comments, the extent to which facilities interact with people's recycling behaviour contributes to recycling either at home or at work and observed to result in the perception of personal control over recycling. It is obvious from the comments that people are most likely to feel more responsible for waste they produce at home with a strong perception of control over how the recycling facilities at home are arranged. As a result, facilities at home are mainly set-up to people's personal needs/requirements unlike their workplaces where recycling facilities are generally considered not to be within their control. For instance,

"It's easier to control your own environment than it is to control another" [Resp_32]

"I am in control of what gets recycled and know how to find out what is available" [Resp_90]

"I am in control, there is convenient provision for it" [Resp_188]

"At home I feel like I have more facilities in place and am more in control of what is recycled. I did set up food waste recycling in the office, however it's difficult to encourage staff to do this" [Resp_214]

"I'm more in control of my recycling means and my environment at home" [Resp_235]

"Because I mainly have control at home, so I can determine what needs to be done" [Resp_277].

The significant contribution of perceived control to recycling at work is not only reflected in the respondents' comments regarding their recycling at home and at work but also emerged strongly as one of the determinants of recycling at work as demonstrated in section 10.3.1. From these findings, there is strong evidence from this research that people are most likely to engage in recycling at work when they perceive that they are in control of their recycling behaviour. The perception of control is likely to extend beyond facilities to the extent to which the facilities are perceived to be convenient including what can be prepared for recycling.

10.5.4 Perceptions of Responsibility

From section 10.5.3 above, this research argues that people are more likely to feel responsible for their waste when they perceive that recycling is under their control which is likely to influence their recycling behaviour. As previously argued (see section 6.2.3), a sense of responsibility is associated to people's personal (moral) norms according to Schwartz's Norm-Activation-Model. From the initial findings, people at work are most likely to engage in recycling when they ascribe responsibility of recycling to self rather than their organisations. When asked about recycling at home and at work, some responses suggest that responsibility for recycling at work is ascribed to others. For example;

"At work I am not responsible for the disposal routes for example for redundant electrical equipment, but I assume this is recycled as required" [Resp_106]

"Because at home I am responsible for the functioning of the entire home, whereas in the office other people (e.g. facilities management) look after certain functions" [Resp_314].

The comments from the "free text box" extend and support the findings by showing that there is a tendency for people to ascribe recycling responsibility to self when they perceive they are in control of their behaviour.

Based on the respondents' comments, there is enough evidence to suggest that a sense of personal responsibility for waste being generated with the consequently influence on how (perception of control) the recycling facilities are set-up contribute significantly to recycling behaviour at home. For instance;

"Responsibility and accountability at home is mine" [Resp_164]

"It feels my personal obligation at home" [Resp_235]

"More convenient, system set up to personal requirements" [Resp_355].

The effects of recycling facilities do not complete the story of why people engage in recycling more frequently at home and at work although facilities with regards to the availability and convenience may facilitate and/or hinder recycling behaviour. To complete the recycling jigsaw puzzle at home and at work, there is a need for people to have some level of ownership (commitment) and responsibility for waste/materials they produce with a certain degree of personal control over their recycling. According to the qualitative and quantitative findings of this research, there is strong evidence that people engage in recycling, especially at work when there they have control over recycling while ascribing recycling responsibility to self rather than to their organisations.

Taken together, the respondents' comments in the "free text box" provide a new insight into the narrative of recycling at work including why people recycle differently at home and at work. In support of the earlier argument and contrary to many studies on OCBE

(see section 3.4), the findings of this phase demonstrate that recycling behaviour at work is not discretional and is mostly driven by organisational support/commitment, especially through the presence of recycling facilities which may inform a degree of personal commitment/responsibility and control. On the one hand, recycling behaviour either at home or at work is a function of materials being produced by individuals. On the other hand, there is enough evidence to suggest that recycling at work is mainly driven by organisational commitment (such as recycling policy and schemes) and facilities (including availability, ease/convenience, and accessibility).

10.6 Chapter Summary

This chapter is exclusively focused on the approach taken in answering the research questions as well as meeting its underpinning objectives. In order to achieve this goal by testing the research hypotheses, different procedures were used in analysing the quantitative data collected for this research. Also, the respondents' comments as provided in the "free text box" were analysed and presented in this chapter. The intention is to make a reasonable and complete conclusion regarding people's recycling behaviour at home and at work by extending the narrative of recycling to the respondents' views and perspectives.

In the first instance, different analyses were performed to establish a causal relationship between recycling at home and at work. These analyses were carried out based on the hypotheses underpinning this research as depicted in the hypothesised (structural) model(s). The main rationale was to confirm whether the models were consistent with the sample data of this research using the recommendations for the model fit indices.

As a result, statistical data analysis software packages such as AMOS, PROCESS macro, and SPSS were used in facilitating the data analysis process regarding the hypothesised direct and indirect (mediation/moderation) effects. To allow rigour in the explanation of the obtained effects and to identify conditions under which these factors can predict recycling at work, the PROCESS macro using bootstrap confidence intervals was used. The estimates

generated the conditional indirect and direct effects of recycling at home on recycling at work at different values of moderators (context-based factors).

From the findings, both psychological factors and situational factors were observed to be predicting recycling at work. However, scheme knowledge and office layout regarding the convenience of workplaces in facilitating recycling at work were observed not to be statistically significant. For example,

- Perceived organisational commitment has a significant causal relationship on recycling at work. However, the regression estimates suggest that the current commitment as perceived by people at work is less likely to enhance their recycling behaviour. This is evident in the respondents' comments which indicated that the level of support in many organisations, especially with regards to recycling facilities is inadequate. However, the effect of office layout suggests that the current office layout in UK workplaces were perceived to be inconvenient corroborating that the support or commitment from organisations were perceived to be inadequate in facilitating recycling;
- Also, the findings corroborate the Schwartz's norm-activation-model and suggest that awareness of consequences effect ascription of responsibility which is more likely to result in the formation of personal norms. This suggests that awareness of consequences and ascription of responsibility to self are requirements for the formation of personal norms towards recycling at work;
- In addition, the findings show that past behaviour (recycling at home) can lead to the formation of personal norms towards recycling at work, given that a significant positive causal relationship between recycling at home and personal norms was obtained. As a result, people who have recycled in the past (or are currently recycling) at home are most likely to form a sense of moral obligation towards recycling in another context, such as the work setting as investigated in this research;

- While there is a positive causal relationship between recycling at home and at work, the interaction effects of the context-based factors (office layout, scheme knowledge, and perceived organisational commitment) are not statistically significant. This suggests that these factors are not likely to moderate the positive effect of recycling at home on recycling at work;
- On the contrary, norm-based factors based on the Schwartz's norm-activation-model only showed a partial mediation effects between recycling at home and work;
- In addition, the mediated-moderation analysis using the PROCESS macro provided the conditional (direct and indirect) effects of recycling at home on recycling at work at different values of context-based factors. From the findings, it is evident that the direct and indirect effects of recycling at home on recycling at work are not moderated by any of the context-based factors in the model (Model D) involving subjective norms as a mediator.

Although there is a tendency for behavioural spillover from home to work, the situational factors are more likely to be moderators and norm-based (psychological) factors are most likely to mediate the causal relationship between recycling at home and at work. Also, using the PROCESS macro allowed the estimates of various points at which the moderation factors can influence the direct and indirect (the mediation effects of norm-based factors) based on different values of moderators (context-based factors)

In the next chapter, these findings are further discussed in relation to the review of literature in Chapter 3 and the findings of the qualitative phase of this research. The intention is to integrate both the qualitative (Chapter 5) and quantitative findings (Chapters 9 and 10) together while using the existing literature to support the discussion.

Chapter 11 Discussion and Conclusions

11.0 Introduction

The present research empirically investigates the relationship between recycling behaviour at home and at work including how recycling behaviour at home can spillover to the workplace setting. As a result, it identifies different factors that can independently determine recycling at work as well as influencing the causal relationship between recycling at home and at work. Although different factors can influence recycling at work including the spillover of recycling from home to work, the findings of this research show that contextual factors, particularly organisational support, rather than personal/psychological factors are the dominant drivers of recycling behaviour at work. Nonetheless, a sequential mixed methods approach, with a qualitative phase preceding the quantitative phase, was used to achieve the main goal of this research.

Using a mixed methods approach, the following research questions are addressed in the research:

1. What factors are underpinning recycling behaviour at home and at work including their differences/similarities?
2. Is there any relationship between waste recycling behaviour at home and recycling behaviour at work?
3. To what extent can recycling experience at home predict or explain recycling behaviour at work for the same individual?
4. How can we understand and explain with some degree of certainty why people recycle or do not recycle their waste when at work?

The intention of research question 1 is to identify different factors that are likely to influence recycling behaviour at home and at work leading to the design of the conceptual model with the development of its corresponding hypothesised model. This was achieved by reviewing policy documents (Chapter 2) and academic literature (Chapter 3) including the

findings of the qualitative phase of this research (Chapter 5). However, research question 2 is focusing on the direct relationship between recycling at home and recycling at work. This research question (2) was addressed and answered through the qualitative and bivariate analyses of this research. Similarly, research question 3 is concerned with the spillover of recycling behaviour from home to work by the same individual using the qualitative semi-structured interviews and quantitative survey. Research question 3 was addressed through SEM analysis and conditional in/direct effects using Hayes' (2013) PROCESS macro, having established in the qualitative phase that similar wastes from both contexts should be assessed. Also, research question 4 focuses on the integration and combination of all the findings of questions 1, 2, and 3 by using the overarching research aim as a basis. Answers to these research questions provide a robust explanation of recycling at work with regards to recycling behaviour at home including how recycling behaviour at work can be enhanced.

As presented in Chapter 10, not all the proposed relationships in the hypothesised model were finally examined in the analysis. From the initial hypothesised model, incentives and perceived control were dropped due to their low Cronbach's Alpha coefficients to avoid erroneous conclusions about people's recycling behaviour at work. However, many studies (such as Lee et al., 1995; Sidique et al., 2010; Wan et al., 2012) have used an Alpha coefficient that is less than recommended 0.7 value in their studies and it was completely overlooked in other studies (such as McCarty & Shrum, 1993; Pitt & Price, 2012; Tudor et al., 2007a). However, it is empirically and theoretically safe to use Cronbach's Alpha ≥ 0.7 (Field, 2009; Pallant, 2016; Tabachnick & Fidell, 2014).

In addition, attitudes and feedback were removed due to their low factor loadings and indicators measuring these constructs were dropped to achieve an acceptable model fit. As a result, AMOS failed to provide a unique solution for constructs with a single indicator due to the identification issues. As a result, it was considered necessary to remove the unidentified constructs, such as feedback from the model. Consequently, the hypotheses for attitudes, incentives, feedback, and perceived control were not considered for further analysis. In the

next section, the discussion on the key findings of this research is presented starting with the summary.

11.1 Summary of the Key Findings

This section provides the summary of the key findings from the qualitative (Chapter 5) and quantitative (Chapter 8) analyses of this research. To align the presentation of the findings to the tenets of a mixed methods research, the discussion of the findings allows for the integration of the findings from both phases. Following this overview, each of the key findings is discussed in relation to the extant literature in the sections that follow.

One of the key findings in this research is **the difference in recycling between the private and the public sectors** with people in the public sector showing a greater tendency to recycle than their counterparts in the private sector. It could be that people in the public sector are more willing to engage in voluntary activities outside their normal job roles than their counterparts in the private sector. In addition, people in the public sector may likely perceive themselves as part of the establishment, given that the governance of recycling in the UK is controlled by the government agencies (see Section 2.3).

From the bivariate analyses (see Section 9.3), the findings show that recycling at work cannot be explained in terms of **socio-demographics** such as age, employment status, gender, and qualification level. This is consistent with Diamantopoulos et al. (2003) who reported that socio-demographics are insufficient in explaining pro-environmental behaviours. Although they argued about the importance of socio-demographics in profiling UK consumers regarding their environmental knowledge and attitudes, the relationship between pro-environmental behaviours, such as recycling, and socio-demographics is more complex than often reported in the literature. As a result, there is strong evidence from this research that the contribution of socio-demographics in explaining people's engagement in pro-environmental behaviours, particularly recycling, is a function of situational/contextual factors. However, there is no evidence to suggest that socio-demographics will confound the

relationship between recycling at home and recycling at work. It is empirically right to conclude that any observed relationship between recycling at home and recycling at work is not contingent on people's socio-demographic characteristics. On this basis, this research debunks the notion of a general stereotype for recycling behaviour (see Section 3.2.1) and posits that people cannot be profiled regarding their recycling behaviour using the socio-demographic factors.

In the qualitative phase (see Chapter 5), the reported findings emphasised **situational factors** that can affect recycling behaviour at home and at work rather than the personal and psychological factors that have been the focus of much of the existing research. As a result, situational factors such as organisational commitment with regards to the recycling scheme and recycling facilities are not only affecting how people recycle at work but also play an important role in the spillover of recycling from home to the work settings.

It is understood from the qualitative findings of this research that recycling at work is perceived to be the **responsibility of organisations** rather than an individual's responsibility. This reduces the possibility of employees engaging in recycling at work. One possible explanation is the fact that people receive no tangible benefits or have no financial interest for participating in recycling, especially at work. On the contrary, this may be the effects of job functions which prioritise work demand over recycling at work (see Chapter 5) especially when there is little or no support from organisations (Paillé et al., 2014; Paillé et al., 2013). Although recycling at work can be seen as the responsibility of organisations, it is perceived as an individual's behaviour rather than a joint (or collective) behaviour as it is construed for recycling at home (see Section 5.9).

Taken together, this is better explained by the effects of perceived responsibility and situational factors (such as organisational support) given that the way people perceive the support of their organisations has an important contribution to their recycling at work. It may also reflect the extent to which people at work are satisfied with their job or their organisation

such that they feel a sense of moral obligation to engage in voluntary activities such as recycling at work. This is consistent with the literature (such as Paillé & Boiral, 2013; Paillé et al., 2014) on organisational citizenship behaviour for the environment. From the quantitative findings of this research, organisational support is found to be an important contextual factor that can facilitate/inhibit recycling behaviour at work.

However, office layout and scheme knowledge are found not to be significant determinants of recycling at work. One possible explanation is the crowding-out effect of organisational commitment/support on the predictive capability of office layout and scheme knowledge. This is evident in the PROCESS analyses (see Section 10.4) which suggest that the in/direct effects of recycling at home on recycling at work is contingent on the situational (office layout, scheme knowledge, and organisational support) factors. Nonetheless, it is evident (see Section 10.3) that the current office layout as a measure of perceived convenience is a barrier to recycling at work.

Another important finding from the quantitative analyses of this research is the contributions of **personal norms and subjective norms** to recycling behaviour at work. Although personal norms may enhance recycling at work, there is strong evidence that the perception of recycling activities of colleagues is a barrier to recycling at work based on the sample data of this research. The contribution of perceived subjective norms to recycling behaviour at work is contingent on how people perceive the support of their organisations while ascribing the responsibility of recycling at work to their organisations rather than to themselves. These findings offer support to Lee et al. (1995) and contribute to the explanation of the Schwartz's (1977) NAM (see Chapters 3 and 6).

In this research, a comparison of recycling behaviours at home and work reveals a level of consistency at an aggregate level although recycling at home is different from recycling at work with regards to the range of materials and the volume of materials that can be recycled in both contexts including the frequency of recycling. In other words, if the unit

of analysis had been the individual, then the conclusion of this research would have been that people are likely to recycle in both contexts. However, questions about the differences between recycling in both contexts have revealed important differences. Further, a material by material analysis reveals that behaviours vary between materials across contexts. These findings complexify our understanding of recycling behaviour and contribute to the current debates on spillover (Austin et al., 2011; Thøgersen & Ölander, 2003). There is an increasing indication from the findings of this research that personal norms and perceived organisational support are the dominant facilitators of the spillover effects. However, further study is required to qualitatively explore why people recycle a wider range of materials at home, more volume of materials at home, and recycle more frequently at home even though respondents are mostly full-time workers. In the meantime, these results challenge the basic notion entrenched in the current literature that someone is either a "recycler" or a "non-recycler". In reality whether or not an individual recycles vary across contexts and between materials.

The findings of this research regarding the **spillover** effects should be interpreted cautiously, given that the possibility of behavioural spillover is obvious when recycling behaviour is measured at the same level of specificity with regards to the materials that can be found in both contexts. However, individual-personal factors (such as work demand and perceived lack of responsibility) and organisational-based factors (such as organisational commitment) are the two broad determinants of recycling behaviour at work. These factors are not only explaining recycling at work, they also offer an explanation for the spillover of recycling behaviour from home to work settings.

Having presented the synopsis of the key findings in this section, these findings are further discussed in the next section with regards to the existing knowledge in the literature, especially the recycling literature. In addition to the research findings, this chapter outlines the research contributions, limitations of the research, and recommendations for further research.

11.2 Determinants of Recycling at Work

Different factors have been reported in the literature (see Chapter 4) when explaining recycling at work. On the one hand, behavioural intentions rather than actual behaviour have been investigated by many studies (such as Cheung et al., 1999; Park et al., 1998; Wan et al., 2012) on recycling at work. Also, other studies (such as Andrews et al., 2013; Catlin & Wang, 2012; Largo-Wight et al., 2013; O'Connor et al., 2010) have adopted objective measures to investigate recycling behaviour. In this research, a third strategy was adopted which sits between these two extremes: the findings presented here rely on self-reports of actual behaviour.

In the qualitative phase of this research, different factors, such as type of materials, lack of responsibility/commitment and ownership, and lack of continuity in recycling including lack of similarities between the schemes at home and at work were identified as major barriers to recycling at work. Although it is empirically challenging to draw a comparison between the findings of this research and the findings of other studies that have relied on either recycling intentions as a proxy for behaviour, or direct observation of behaviour, every attempt is made to present the discussion of this research in relation to previous studies and the findings of the qualitative phase of this research.

11.2.1 The importance of Socio-demographics

The bivariate association between recycling behaviour and socio-demographics presents a completely different picture on the possible roles of socio-demographics in recycling to that which has been suggested by previous studies.

Recycling Behaviour and Age

The findings on the association between recycling at work and respondents' age are not convincing and suggest that age is likely to have a moderate effect on recycling at work. These findings are contrary to previous studies (such as Davis et al., 2009; Kelly et al., 2006; Tudor et al., 2007a) that reported a significant association between age and recycling at work.

Contrary to the findings on the association between age and recycling at work, there is a possibility to explain recycling at home in terms of age. A sense of personal responsibility and the way many households are structured with regards to the division of labour at home (Oates & McDonald, 2006) may contribute to the strong effects of age on recycling at home. This is consistent with previous studies (such as Arbués & Villanúa, 2016; Hage et al., 2009; Knussen & Yule, 2008) that have shown that age has an effect on recycling at home. However, the findings contradict studies (such as Berglund, 2006; Hage & Söderholm, 2008) that have reported no influence.

From these analyses, it is reasonable to conclude that the contribution of age in the explanation of recycling behaviour at home and at work is inconsistent. Nonetheless, age offers a meaningful explanation for recycling at home rather than recycling at work although the extent to which recycling becomes normative at work may further diminish the effects of age on recycling at work.

Recycling Behaviour and Gender

The findings of this research on the contribution of gender show that men and women are similar in their recycling behaviour, thus challenging the established wisdom in the literature on recycling at work (such as Davis et al., 2009; Chung & Poon, 1994; Witmer & Geller, 1976) and at home (Babaei et al., 2015; Iyer & Kashyap, 2007; Nixon & Saphores, 2009) that women are more likely to recycle than their male counterparts. Based on the findings of this research (see Section 9.3.3), there is no clear difference between men and women in the way they recycle at work and at home suggesting a possible joint initiator, especially at home (Oates & McDonald, 2006).

Recycling Behaviour and Educational Qualification

The data from this research suggest that the level of education plays no important roles in recycling behaviour contrary to the initial anticipation that a higher level of education would enhance recycling at home and at work. This is surprising considering that the level of

education has been associated with recycling at home by many studies (such as Berglund, 2006; Ewing, 2001; Nixon & Saphores, 2009). Although recycling at work is less attributable to the level of education in empirical studies, it can be suggested from the findings of this research that the higher the level of education the lower the likelihood of engaging in recycling behaviour at home and at work.

On the one hand, the university context at which many studies on recycling at work were conducted (such as Austin et al., 1993; Catlin & Wang, 2012; Kaplowitz et al., 2009) might explain why qualifications were not taken into consideration during the analysis in previous studies. On the other hand, many of those studies were conducted with the aim of increasing the collection of recyclables rather than identifying factors that could explain/influence recycling behaviour (see Oke, 2015). Considering the level of awareness and information on recycling, especially in the UK, higher levels of education may no longer contribute to the explanation of recycling behaviour at home and at work.

However, it is impossible to establish the extent to which the level of education enhances recycling knowledge as well as recycling behaviour considering that no question to investigate the effect was included in the survey instrument. One can only infer from respondents' responses how recycling behaviour is likely to be affected by the level of education. Although qualifications may enhance knowledge about environmental issues, the effect may not necessarily translate to behaviour (Kollmuss & Agyeman, 2002). Nonetheless, organisations should provide adequate information that can increase the level of awareness and knowledge which may contribute to recycling at work.

Recycling Behaviour and Employment Status

The findings on the influence of employment status on recycling behaviour present a new question on why people recycle more at home with regards to the volume and the range of materials including the frequency of recycling despite being full-time workers. Although recycling behaviour has not been explained in the literature with regards to employment

status, the finding contradicts the assumption that people in full-time employment spend more time at work which is likely to increase their waste generation and hence recycling behaviour.

However, recycling facilities may be less adequate than earlier thought which suggests that respondents are utilising another means for waste recycling such as bring sites and household waste recycling centres. Also, it could mean that people are taking waste back to their respective homes due to the lack of adequate facilities at work as uncovered in the qualitative findings of this research. Given that the quantitative findings (Chapter 9) show that respondents are recycling a higher volume of waste at home, a wider range of waste at home, and recycle more frequently at home, despite working full-time, this supports the proposition that the waste being generated at work is being recycled at home or by other means.

On the other hand, respondents may be generating less waste at work, or perceive that they generate less waste, or are even less likely to perceive waste generated at work as 'theirs', compared with a home setting which could explain the obtained findings although this was not examined in this research. Also, respondents may be reporting their *household* waste behaviour for recycling at home rather than their *individual* recycling behaviour compared to the workplace setting where they can only report their own behaviour. This is supported by the qualitative findings of this research where it was observed that participants generally used collective words (such as "we") when referring to recycling at home rather than individualised words (such as "I") when explaining recycling at work (see Chapter 5).

Recycling Behaviour and Personal Annual Income

As explained in Chapter 3, it is uncommon to associate recycling at work with personal annual income unlike recycling at home although household income rather the personal income is often reported when explaining recycling at home. Nonetheless, the findings of this research on the contribution of personal annual income to recycling at home are consistent

with the previous studies (such as Garcés et al., 2002; Hage et al., 2009; Nixon & Saphores, 2009) that have attempted to explain recycling at home in terms of household income.

Although income may influence behaviour such as waste generation, especially at home, there is no evidence that personal annual income would have a similar effect at work. Personal annual income may indicate the socio-economic status of people at work and is more likely to explain other pro-environmental behaviours, such as travelling to work behaviour, it is unlikely to affect how people recycle at work. Nevertheless, the obtained findings on the relationship between recycling at work and personal annual income corroborate Kelly et al. (2006) on the relationship between annual income and the university community (see Chapter 3).

11.2.2 Recycling Behaviour and Organisational Sector

The contribution of organisational sector to recycling behaviour is an important finding in this research and has been surfaced by the multi-organisational nature of this study. From the findings (Chapter 9), organisational sector with regards to the private and the public sectors play important roles in the way people recycle at work. This is not only a new finding for workplace recycling but also extends the waste management literature regarding the influence of situational attributes.

This is consistent with Manika et al. (2015) who observed significant differences in pro-environmental attitudes and energy saving behaviour between the public sector and the private sector with people in the public sector more likely to conserve energy. On the contrary, both the public and private sectors are similar in their printing reduction behaviour (see Manika et al., 2015). Although the private sector is more likely to emphasise their employees' pro-environmental behaviours and most likely to provide incentives to influence their participation (Lee et al., 1995; Manika et al., 2015), it seems that the focus is on behaviours, such as energy use and paper use reduction, that may significantly affect their

bottom line. Nonetheless, recycling behaviour at work is likely to be a function of the type of organisations and the support they provide to facilitate recycling.

This is consistent with the qualitative findings of this research as presented in Chapter 9 where people in the public sector reported to be the initiator of recycling at work. On the one hand, public organisations may be more committed to the idea of recycling and provide necessary support/motivation with regards to recycling facilities other than monetary incentives to their employees. As a result, people in public organisations may be reciprocating the support based on the social exchange theory (Paillé et al., 2013) by contributing to the corporate greening (Boiral, 2009) through recycling at work. Therefore, people in the public sector might be more motivated or interested in recycling such that the recycling scheme is being set-up and monitored by employees.

In addition, people in the public sector could be more satisfied with their jobs and engage in organisational citizenship behaviour for the environment (Boiral & Paillé, 2012; Paillé & Raineri, 2015) where employees are voluntarily participating in recycling at work. On the contrary, there may be little concern for recycling in the private sector based on the perception that engaging in extra-role behaviours such as recycling may undermine their formal job-based roles' performances.

If there are differences in recycling behaviour between the private and public sectors, creating different scheme promotion designs and/or interventions for both sectors may be necessary (see Barr et al., 2011; Manika et al., 2015) to enhance recycling at work. However, there is a need to harmonise the current schemes in UK workplaces to reduce the cost and effort attributable to recycling.

While the findings on the association between recycling behaviour and socio-demographics are mixed, the discrepancies illustrate the complexity of human behaviour and the difficulty in designing interventions that could address behavioural change based on people's socio-demographics. However, the influence of socio-demographics, especially age,

gender, and income, on recycling at work is less obvious. This could be due to conducting the study in the UK where recycling is becoming normative (Thomas & Sharp, 2013) which may be leading to less pronounced differences between groups as recycling becomes a social norm performed across society. The results of this study suggest that, using socio-demographics in profiling people based on their participation in recycling and/or to explain the propensity of engaging in recycling at work will not provide strong explanations of recycling behaviour at work.

11.2.3 The importance of Situational Factors

As presented in Chapter 9, the influence of situational factors such as organisational commitment and office layout (convenience) on recycling at work as obtained in this research was reported. With regards to situational factors, organisational commitment which suggests convenient access to a recycling scheme and its underpinning facilities has the most important effects on recycling at work. The importance of situational factors was originally highlighted in the qualitative findings (see Chapter 5) of this research contrasting the emphasis placed on personal and psychological factors (see Ekström, 2014; Ones & Dilchert, 2012b; Thomas & Sharp, 2013) in the wider literature of recycling behaviour. This led to situational factors, such as organisational commitment, being raised in the questionnaire and these have come out strongly (see Section 10.4 for example), partly facilitated by using multiple organisations in the research design.

However, situational factors have not been critically examined within the wider context of organisational commitment/support although situational factors such as bin proximity has been investigated in isolation (such as Andrews et al., 2013; Brothers et al., 1994; Elfithri et al., 2012). There is strong evidence from this research that organisations may install facilities such as bins without providing support or being committed to recycling. For example, organisations may provide recycling bins based on the current legislative requirements (see Chapter 2) in the UK without fully being committed to the idea of recycling

leading to the employee perception that the support of their organisations is insufficient for facilitating recycling at work.

Therefore, the findings of this research suggest that asking questions on the level of organisational support may crowd-out the responses on the availability of recycling bins or physical facilitations. As a result, focusing on facilities or physical layout alone would not complete the recycling narratives with regards to the contribution of situational factors to recycling at work, particularly in the UK, where recycling is becoming normative (see Thomas & Sharp, 2013). Although previous studies (such as Brothers et al., 1994; Catlin & Wang, 2012; Ludwig et al., 1998) on recycling at work have used experimental methods to some extent, it is empirically misleading to disconnect the effects of situational factors from the support/commitment of organisations especially when using a self-reported approach.

Although scheme knowledge could be classified as personal, the provision of adequate information about the on-going scheme could be regarded as the responsibility of organisations and indicating some level of organisational support. Without the provision of sufficient recycling information, people may not go out of their way to seek information in order to understand what, where, and how to recycle at work to understand the schemes being implemented in that workplace.

However, the quantitative findings (Chapter 10) suggest a tendency for organisational commitment/support to encompass all other situational factors such as scheme design, physical layout, and bin arrangement. For instance, the introduction of a recycling scheme as well as the provision of recycling bins may be perceived by employees as organisational support that could facilitate the ease of recycling at work. Therefore, the lack of objective measures of situational factors (Lee et al., 1995) in this research may suggest that physical layout and scheme knowledge are generally construed within the wider context of organisational support/commitment by respondents. This offers support to Gerbing and

Anderson's (1988) remarks that respondents may interpret a measure and arrive at a meaning that is different from the researcher's original intention.

This may likely reduce the explanatory/predictive capability of other situational attributes, such as physical layout and scheme knowledge, as obtained in this research, when examined in conjunction with organisational support. This is consistent with Lee et al.'s (1995) conclusion on the influence of convenience of recycling at work and supported by other studies (such as Goldenhar & Connell, 1991; Largo-Wight et al., 2013; Ludwig et al., 1998; O'Connor et al., 2010) that utilised objective measures of physical facilitations (see Chapter 3). For example, the presence of desktop bins and access to recycling facilities in many UK organisations suggest that respondents may perceive their recycling to be relatively convenient/easy and requiring little effort to undertake. This is consistent with conditional direct effect of recycling at home on recycling at work using office layout as a moderator (see Chapter 10) and corroborated by Tonglet et al. (2004).

According to the mediated-moderation analysis in this research, people would engage in recycling especially at work when the perception of organisational commitment is strong based on the social exchange theory (see Boiral & Paillé, 2012; Paillé et al., 2013; Paillé & Raineri, 2015). Furthermore, this research demonstrates that the level of organisational support is not only affecting how an individual recycles at work but also determines the extent to which recycling becomes normative at work. As a result, organisational commitment exerts strong catalytic affects not only on an individual's recycling behaviour but also on the general recycling behaviour at work. Taken together, it is evident from this research that organisational support can be a barrier as well as a motivator to people's recycling behaviour at work. Therefore, recycling is not only a function of people's psychological/personality state but also influenced by the context of waste generation, based on the findings of this research.

While there is a need to change the existing behaviour (see Dietz et al., 2009), the findings of this research show that efforts should address organisational level factors

including the culture rather than that of people within the organisational set-up. For recycling to be normative at work, organisations are expected to facilitate the ease of recycling and be fully committed to the idea of recycling. Nonetheless, the quantitative findings of this research suggest that the activation of personal values/norms (or moral obligations) is required for people to engage in recycling at work, particularly when there is a limited opportunity to recycle at work.

11.2.4 Recycling as a Normative Behaviour: Personal and social norms

From the findings (Chapter 10), the contribution of norm-based attributes in explaining recycling at work cannot be underestimated especially when people feel a sense of moral obligation to recycle at work. From the findings, ability to maintain in/consistency across contexts is not only a function of moral obligation but is also dependent on the perception of colleagues' behaviour. This is consistent with Largo-Wight et al. (2012) who observed that moral norms are the most significant factor influencing recycling at work.

According to Thøgersen (2004), people tend to main consistency in their pro-environmental behaviour when they perceive that the behaviour is morally important. While personal norms are observed to be contributing positively to recycling at work, subjective norms are found to be a barrier to recycling at work based on the sample data of this research. The effects of subjective norms as obtained in this research may probably be influenced by the perception of organisational support/commitment as discussed in section 11.2.2 above. However, the conditional indirect (mediated-moderation) analysis demonstrated that personal norms have an important role to play in translating behaviours between contexts.

Also, the effects of social norms on recycling behaviour is a function of how collective or close the community (organisation) in question is perceived to be by social actors. Nonetheless, the influence of family members rather than that of friends/neighbours may be salient at home while the influence of colleagues is likely to be more obvious at work. Therefore, the influence of social (subjective) norms on recycling behaviour is context-

specific and this effect is discussed based on the mediated-moderation analyses to uncover the evidence of spillover as presented below.

11.3 The Spillover Effects

Contrary to previous studies (such as Barr et al., 2010; Biswas et al., 2000; McDonald, 2011), there is strong evidence from this research that people who recycle at home are more likely to recycle the same way when at work. Consistent with previous studies (such as Anderson et al., 2012; Barr et al, 2007a; Lee et al., 1995) it is now possible to link recycling at home to recycling at work with regards to how recycling is being performed. Contrary to this, there is a tendency for recycling at home not to translate to recycling at work when the schemes and materials in both contexts are different coupled with a lack of organisational support/commitment.

According to studies (such as Berger, 1997; Thøgersen, 1999; Thøgersen & Ölander, 2003) on spillover effects, the spillover of pro-environmental behaviours is a function of how the behaviours are closely related as perceived by social actors suggesting that people compartmentalise pro-environmental behaviours (see Barr et al., 2010; Berger, 1997) in terms of dis/similarity. This supports the positive spillover effects from one material to another regarding the findings of material-to-material analysis as presented in sub-section 9.3.1 of this research.

However, our present knowledge about why people recycle a wider range of materials, recycle more volume of materials, and recycle more frequently at home than work is still limited, and perhaps surprising given that people spend most of their active time at work rather than at home. Therefore, the findings of this research are consistent with previous studies (such as Barr et al., 2010; Lo et al., 2012; McDonald, 2011) that argued against the automaticity of the spillover effects across contexts suggesting that certain conditions are to be in place to facilitate the effects.

While there is a strong possibility of spillover effects between contexts based on the findings of this research, recycling across contexts is different with regards to the range of materials, volume of materials, and the frequency of recycling. Also, situational factors such as institutional commitment are prominent factors in differentiating recycling across contexts and this research shows that the level of institutional support/commitment as perceived by people has an important contribution to their recycling behaviour. While people may have strong psychological attributes (such as personal values/norms), their influence on behaviour may be attenuated by the strong effects of situational factors. This is consistent with McCarthy and Shrum's (1993) study about the effects of beliefs on recycling behaviour. From the findings of this research (see Chapter 9) and supported by Hansen et al. (2008), recycling is the lowest activity on people's priority list when at work, however, the provision of necessary support by their organisations could enhance their control over recycling (Largo-Wight et al., 2013) or self-efficacy (Bandura, 1984; Thøgersen, 2003) and nudge their behaviour towards recycling at work.

It is evident from these findings that people who regularly recycle at home due to their strong personal norms may not necessarily translate their recycling behaviour at home to recycling at work. This could be the case when new personal norms are acquired as a result of dominant social norms at work that are influenced by situational cues such as the existing organisational support. Therefore, the newly acquired norms may either replace or co-exist with the old norms such that the activation of norms depends on the situational cues and/or on the norms that are salient. This is consistent with the Guagnano et al.'s (1995) A-B-C theory and supported by Petty et al. (2006) and Wilson et al. (2000) on the dual effects of behavioural attitudes as explained in Chapter 3.

Nonetheless, people would rely on their personal values/norms or sense of moral obligation to maintain consistency in their behaviour when the effects of situational factors are perceived to be strong. This suggests that only people with strong personal norms may probably maintain consistency (Berger & Kanetkar, 1995) in their behaviour based on the

findings from the mediated-moderation analysis (Chapter 10). As a result, people may activate their personal norms to maintain consistency even when organisational support is lacking, and/or the behavioural situation is not facilitating recycling. While this is a plausible explanation, it is methodologically challenging to establish the meaning of recycling as perceived by respondents given that many organisations are still using desktop bins. Using desktop bins may reduce the personal cost (effort and time) of recycling although this is not necessarily giving a full picture of recycling given that recycling involves more than throwing materials into a bin (see Oke & Kruijsen, 2016).

In answering the question of whether recycling behaviour is context-specific, this research re-affirms the concerns (such as Barr et al., 2010; Frey, 1993) that recycling is context-restricted with regards to the opportunity available to support recycling across contexts. For instance, the similarity between the materials at home and at work may possibly bias the effects of spillover as obtained in this research. This is not like to be experienced in another jurisdiction where materials that can be recycled in both contexts are taxonomically different (see Littleford et al., 2014; Poortinga et al., 2013; Thøgersen, 2004; Whitmarsh & O'Neill, 2010). Therefore, the concept of spillover may be restricted to a location/context where the norms are relatively uniform (personal and/or social) with similar situational factors as informed by the mediated-moderation findings of this research. Based on the mediated-moderation findings, there is a clear difference between the types of people that are most likely to translate their recycling at home to recycling behaviour at work.

Therefore, this research has extended the spillover literature by examining whether there was spillover between contexts (rather within domains or across domains as has been traditionally researched). This was enabled by a two-context research design whilst the multiple material analysis has shown the evidence of spillover across contexts within materials. So, whilst this study broadly concludes that people recycle similar materials in different contexts, supporting a spillover explanation, it also shows differences in the range, volume and frequency of recycling in the two contexts, showing that translation between

contexts is not straightforward or perfect. The qualitative data analysis suggests that either arisings (or perceived arisings) and/or situational factors may play a part in this lack of complete spillover and the effect of the latter was confirmed through mediated-moderation analysis. Nevertheless, this research suggests that further qualitative work will be important to explore this relationship further, given that the concept of spillover is overly complex and generally challenging to establish (Barr et al., 2010).

11.4 Recycling in the context of OCBE

Organisational support is a significant determinant of pro-environmental behaviour at work in the OCBE literature. Organisational support may contribute significantly to employees' self-efficacy (Ramus & Steger, 2000), self-predisposition (Ramus & Killmer, 2007), and perceived behavioural control (Boiral et al., 2015) in engaging recycling at work.

In addition, the commitment/support of organisations is indicative that the recycling efforts of people at work are valued/approved by their organisations (Lamm et al., 2013). Therefore, the extent to which employees engage in recycling at work which is a form of OCBE is a function of the level of support/commitment from their organisations (Paillé & Boiral, 2013).

11.5 Contribution of Scheme Design on Recycling

11.5.1 Scheme Feedback

In addition to office layout, performance feedback is another construct operationalised in this research as a measure of the effects of situational factors on recycling at work. The inclusion of this construct in the model was informed by the qualitative findings of this research although previous studies (such as Goldenhar & Connell, 1991; Katzev & Mishima, 1992; Kim et al., 2005; McCaul & Kopp, 1982) that investigated the effects of performance feedback on recycling at work adopted different experimental set-ups to directly observe employee recycling. Contrary to this research, previous studies of the effects

of feedback have mainly investigated the recycling performance of individuals rather than that of organisations.

As a result, it is very difficult to establish a direct comparison with other studies on the influence of performance feedback on recycling behaviour at work although the qualitative findings suggest that it could motivate organisations to do more. In addition, the qualitative findings of this research suggest that people are less concerned about recycling performance at the individual level when at work. This is contrary to Ones and Dilchert (2012b) who argued that the performances of each employee in contributing to the organisation's environmental goals should be evaluated. Based on this knowledge, the effects of performance feedback should be assessed with regards to organisational environmental goals using objective measures, with the organisation as a unit of analysis rather than individuals at work.

Nevertheless, the findings of this research suggest that performance feedback of recycling activities at an organisational level is not sufficient in its own right to enhance people's recycling behaviour. The lack of objective measures of performance feedback in this research such as using charts depicting volume of waste generation against the volume waste recycled and landfilled may be responsible for the obtained results.

11.5.2 Scheme Knowledge

Based on the qualitative findings of this research (see Chapter 5) and as illustrated in Oke and Kruijsen (2016), the inclusion of scheme knowledge in this research forms an empirical bridge between personal and contextual factors. Although knowledge is personal, organisations are expected to provide adequate information about their recycling schemes. For instance, scheme knowledge cannot be enhanced without organisations providing sufficient information/awareness about the recycling scheme or without organisations being committed to the idea of recycling. As a result, recycling information/awareness that could enhance scheme knowledge is not likely to be updated/revised when organisational

commitment is lacking. The provision of recycling information can have ripple effects on other factors such as perceived control with regards to people's self-efficacy (Bandura, 1984) and could be perceived by people at work that their organisations are committed to recycling.

Therefore, scheme (specific) knowledge rather than general (environmental knowledge) was operationalised in this research. Unlike many studies (Goldenhar & Connell, 1991; Kaplowitz et al., 2009) that have shown a positive association between knowledge and recycling behaviour, this present research suggests that scheme knowledge is not an important criterion for recycling at work. The findings are consistent with Tonglet et al. (2004) and suggest that scheme knowledge will possibly explain the behaviour of people that are not exposed to recycling and/or with no access to recycling. This assumption is corroborated by conditional direct effect (Hayes, 2013) of recycling at home on recycling at work which is contingent on scheme knowledge using the bootstrapping approach (Chapter 10).

Another possible explanation could be associated with the influence of organisational commitment as explained above suggesting that scheme knowledge should be operationalised as a second-order factor. The most important reason could be the similarity between the materials that can be recycled at home and at work as investigated in this research. This indicates that respondents have sufficient knowledge about recycling, given that recycling of the materials examined is common at home. Based on these findings, recyclers and/or people that are regularly recycle at home are not likely to seek further information/knowledge about recycling at work when they are already aware of what/how to recycle. This assertion is consistent with the qualitative findings of this research and corroborates Hansen et al. (2008). Also, Price and Pitt (2012) contested that frequent recyclers require no further information on what, where, and how to recycle while Ajzen et al. (2011) believed that the provision of information about a reality may not likely influence behaviour.

11.5.3 Incentives

Financial incentives are another construct that were not included in the final analysis due to the low Cronbach's Alpha value as presented in Chapter 8. From the findings of this research with regards to respondents' high level of personal norms, it is unlikely that financial incentives have the capability to nudge behaviour towards recycling at work. Although financial rewards have been found to increase recycling, it seems the effects of financial incentives on recycling at work is a function of people's social status including their personal values/norms. For instance, many studies (such as Luyben & Cummings, 1981; Prestin & Pearce, 2010) that have found a positive association between recycling and financial rewards used student participants compared to studies (such as Lee et al., 1995) that respondents are mainly working class.

While the way a scheme is designed could enhance recycling, the provision of financial incentives (or rewards) at an organisational level rather than at the individual level may enhance recycling behaviour at work, given the effects of community-based incentives on recycling at home (see Thøgersen, 1994; Shaw & Maynard, 2008). Nonetheless, incentives are likely to provide a marginal increase in recycling before recycling returns to the baseline (Timlett & Williams, 2008).

There is an increasing evidence that financial incentives will be counter-productive while reducing the propensity to engage in recycling at work especially when people have strong personal (moral) norms. Therefore, economic incentives could act against intrinsic satisfaction being derived from recycling and may consequently have a negative influence on recycling at work.

11.6 Attitudes

Attitudes are conceptualised and operationalised in this research based on the initial assumption from the literature review that pro-environmental behaviour, particularly recycling behaviour is a function of behavioural attitudes. Based on the theory of planned

behaviour (Ajzen, 1991; Ajzen & Fishbein, 2000), attitudes are the most investigated construct in social-psychological research as discussed in Chapter 3. However, the construct suffers from internal reliability issues as its Cronbach's Alpha was less than 0.7 benchmark although the construct was later considered for further analysis upon the removal of two indicators to achieve 0.7 Alpha level (see Chapter 8).

Despite the effort to include behavioural attitudes in the final analysis, the construct has a multicollinearity issue with other constructs in the hypothesised model (see Chapter 8) and was subsequently dropped from the model. It supports Chan and Bishop's (2013) suggestion that attitudes should be replaced by personal norms based on their observation that attitudes and personal norms are conceptually related. This is extremely interesting considering the large amount of research dedicated to assessing attitudes to a wide range of pro environmental behaviours, and the mass of work undertaken to examine the attitude behaviour gap (see Ajzen, 1991; Bamberg & Möser, 2007; Miafodzyeva & Brandt, 2013; Osbaldiston & Schott, 2012).

One possible reason could be the way attitudes were originally conceptualised within TPB as antecedent of intention rather than behaviour itself although findings are inconsistent in the utilities of attitudes (see Chapter 3). On the other hand, the way attitudes have been measured in studies (see Ajzen, 1991; Tonglet et al., 2004) may suggest that attitudes are no more relevant to the field of recycling. Considering that attitudes are nowhere to be seen and did not even make the first cut of the model, this research argues that attitudes are much less relevant than has been previously assumed and should be dropped from any future research involving recycling.

11.7 Practice and Policy Implications

In the previous sections, key findings of this research with regards to recycling at home and recycling at work including their relationships have been discussed and presented. This section will highlight the implications and recommendations of this research for policy

makers, businesses, and other key stakeholders involved in the management of waste in the UK.

In this research, it has been demonstrated that recycling at home is a predictor of recycling at work. However, these findings revealed that there are many things policy makers and organisations can introduce to facilitate recycling at work rather than simply assuming that people would recycle once facilities are provided. Although facilities could enhance recycling at work, the quantitative phase including the comments from the "free text box" of this research has shown that facilities should be adequate and convenient to use. As a result, views and opinions of people at work should be taken into consideration when designing a recycling scheme at work, given that they are the users of that scheme.

However, the categorisation of people into different clusters based on their information needs as achieved using the PROCESS macro suggests that people who scored low on the percentiles of the distribution have insufficient scheme knowledge. This revelation is supported by the "free text box" comments and suggest that many people/employees lack a basic understanding of where, what, and how to recycle in their workplaces. Therefore, efforts in increasing/enhancing recycling at work should not only address the issue of scheme knowledge but should also make recycling less difficult/inconvenient to perform.

Furthermore, this research revealed that organisations should demonstrate the necessary leadership by showing adequate commitment to and concerns about waste management not only by introducing recycling schemes but also by encouraging their employees to engage in recycling. For example, the organisation's waste management strategy should be incorporated into the induction process for new recruits so that they are aware of organisations' intention regarding recycling and other pro-environmental activities from their first day. On the one hand, employees can be encouraged by their employers (organisations) supporting their initiatives (eco-initiates) and by providing a platform to share their experience that may assist (eco-helping) their colleagues in undertaking recycling

at work. On the other hand, efforts to enhance recycling at work should aim to make recycling a normative behaviour at work, especially through social cohesion (eco-helping) and organisational support (eco-civic engagement). This would shift the recycling responsibility from organisations to their employees and allow people at work to perceive recycling as part of their normal life at work rather than the responsibility of their organisations.

For policy makers and waste planners, this research showed that there should ideally be 1:1 correspondence between the scheme at home and other contexts to allow people in maintaining consistency in their recycling. To maintain consistency across organisations in the UK, waste planners (and policy makers) should ensure that recycling schemes are uniform/similar for all organisations in the UK. This similarity includes the type of collection bins being provided for each waste stream regarding their design and colour coding. This would not only reduce or eliminate confusion when people are visiting other organisations but would also reduce the overhead and operational costs of waste collection while reducing the environmental pollution associated with waste collection. For instance, the tendency of cross contamination is likely to be reduced which may reduce the need for pre-processing of materials before undergoing recycling. This is necessary given that the way the key recyclables, especially paper and plastics, are currently being recycled in the UK would be significantly affected as a result of changes in China's rule regarding recycling. According to the new rule that is effective from 1 March 2018, there is a complete ban on the importation of mixed paper while the contamination of paper including cardboard exported to China must be less than 0.5% rather than the current 1.5%. Also, the similarity in recycling schemes and facilities would consequently reduce the volume of materials being disposed of in landfills which could in turn reduce the cost associated with landfill tax. Although these benefits are not insignificant the practicalities of enforcing such a uniformity of facilities would be very hard to realise in practice and has so far eluded the more established domestic waste collection schemes in the UK.

Also, the findings of this research could inform decisions on waste management regarding the harmonisation of schemes across the UK including the need for more investment in waste infrastructure when the UK finally leaves the EU rather than using financial incentives to stimulate behaviour. Although the implications of the new rule regarding the exportation of recyclables to China are currently unknown, the UK waste sector is facing an uphill task if right investment is not made to improve the current waste management, particularly recycling, facilities in the UK. Also, there is a need for a proper monitoring and enforcement of the existing policy instruments, especially the instrument that introduced the source segregation of recyclables in UK workplaces.

11.8 Research Contributions

This research has made significant contributions to the existing body of knowledge (research and practice) on pro-environmental behaviours, particularly recycling behaviour at home and at work as well as enhancing the existing knowledge of spillover regarding recycling behaviour from one context to another. For clarity, the key contributions of this research are identified and sub-classified into theoretical, empirical, and methodological as discussed below.

11.8.1 Theoretical Contribution

This research contributes to the existing knowledge on recycling behaviour by extending the narratives beyond the effects of personal-psychological factors that have dominated pro-environmental research for many decades. Contrary to the extant literature, the effects of contextual factors on recycling behaviour emerged strongly from this research and are the significant contribution of this research. In addition, the findings differentiate this research from other studies on pro-environmental behaviours and complete the missing blocks in the recycling jigsaw puzzle. Based on the researchers' and policy makers' worldviews, previous studies have assumed that people's participation in pro-environmental initiatives including recycling is contingent on personal/psychological factors. However, this

research demonstrates that critical components of the recycling jigsaw puzzle, such as facilities, are to be perceived as facilitators and not barriers for recycling schemes to be attractive for participation. The jigsaw, based on the qualitative and quantitative findings of this research suggests that contextual factors are important factors in instigating and influencing recycling at work including its relationship to recycling at home irrespective of people's psychological traits. While previous studies have emphasised the importance of personal/psychological factors in explaining people's participation in recycling through social psychology theories, this research shows that people's behaviour, especially recycling at work, cannot be analysed in isolation without understanding the behavioural context including its attributes.

Although previous studies have persistently attributed pro-environmental behaviours, such as recycling, to the effects of personal-psychological factors, the influence maybe short-lived by the interacting effects of contextual/situational factors irrespective of a workplace. According to this research, contextual attributes not only independently affect recycling behaviour but also interact with other factors (either personal or psychological) in determining whether people (not) engage in recycling at work.

Nonetheless, factors influencing recycling behaviour, particularly recycling at work, are classified into personal/psychological traits and situational-organisational factors in this present research. While the factors are classified into two broad categories (see Figure 38 below), contextual factors, particularly organisational commitment/support, is situated at the heart of people's decision-making process with regards to recycling at work.

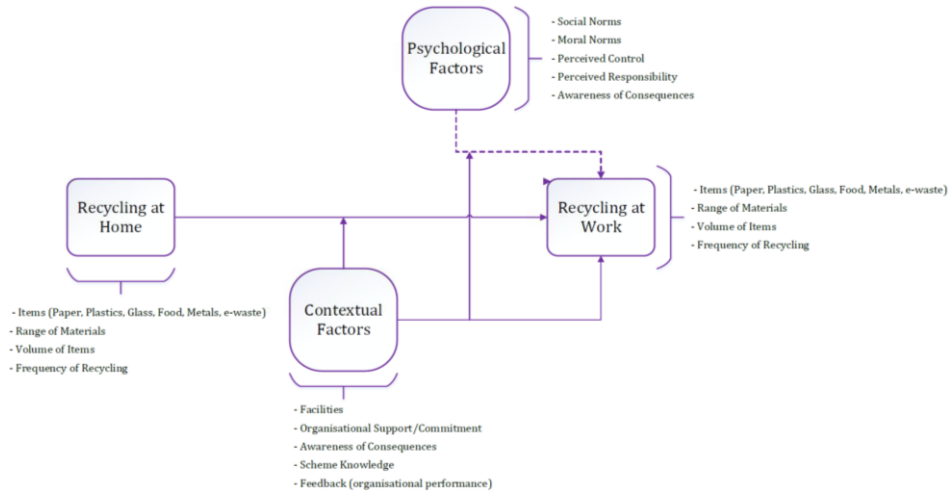


Fig. 38: Conceptual Framework for Recycling Behaviour at Work

As a result, this research argues that the ongoing debates on the possible spillover of recycling behaviour, especially from home to work, should focus more on organisational (contextual) attributes rather than individuals' personal/psychological traits. This may require an in-depth qualitative exploration including site observations across multiple organisational sectors, given that recycling is not similar from one sector to another as established in this research (see sub-section 9.3.2).

In addition, this research contributes to existing knowledge by challenging the roles of psychologists and the efficacy of theories such as the theory of planned behaviour (TPB) in explaining recycling behaviour, especially across multiple contexts. On the one hand, the strong influence of contextual factors suggests that psychological factors that are building blocks of many theories are less important when understanding and explaining why people engage in recycling at work. For instance, using similar materials in both contexts to examine recycling behaviour was influenced by the findings of the exploratory qualitative phase of this research and suggests that people are more likely to maintain consistency in their recycling behaviour when measured at the same level of specificity. The influence of similar materials in both contexts may likely reinforce people's awareness of waste (recycling) including its consequences, especially at work, having engaged in similar behaviour at home. On the other hand, this research makes a significant contribution to theories by developing a

comprehensive conceptual model that incorporates findings of the qualitative phase of this research with relevant constructs in the existing and/or dominant theories in social and behavioural research. For example, rather than using behavioural intention, which is unstable, as a proxy for recycling behaviour (Ajzen, 1991; Conner & Armitage, 1998), this research used a self-reported recycling behaviour with regards to the materials that can be found at home and at work.

Based on the findings of this research, it is argued that psychological factors, particularly attitudes, are not sufficient in explaining people's recycling behaviour. Therefore, this research emphasises that attitudes which underpin most of the existing social psychology theories, such as TPB, should be completely dropped. On the one hand, studies investigating pro-environmental behaviours should focus more on personal norms rather than behavioural attitudes. While engaging in recycling behaviour is most likely to be driven by people's moral compass, the effect is contingent on the extent to which the situation/context facilitates such behaviour. It is emphasised that the findings of this research suggest that the attitudes-behaviour link is a constant reminder that there is no absolute or general theory of attitudes and also that there is no universal way of constructing attitudinal questions.

Nevertheless, the influence of attitudes on pro-environmental behaviours has been argued (Barr, 2007; Bratt et al., 2015) to be a function of behaviour under investigation including its context (Fishbein & Ajzen, 2011). Besides, the thesis that posits that attitudes once formed may lead to behaviour is conceptually misleading, given that the components of attitudes formation involve conative aspects. Also, theorists and social-investigators should emphasise contextual factors more when investigating pro-environmental behaviours, especially recycling, at work. Nevertheless, this research offers a better and alternative explanation to people's recycling behaviour, particularly recycling at work and demonstrates that no theory has a sole utility in explaining why people do not engage in recycling either at home or at work.

Also, this research enhances the current knowledge on the consistency of recycling behaviour by establishing a possible spillover effect as well as identifying the conditions to which spillover of recycling from home to work could be facilitated. On the one hand, this research shows that the concept of spillover, particularly the spillover of recycling from home to work, is more complex than previously conceived in empirical studies. On the other hand, this research contributes to the on-going debates on the possibility of spillover effect (see section 3.4) and offers a support for the spillover of behaviour from one context to another, particularly when contextual attributes facilitate recycling. Previous work on spillover has been confined to whether one pro-environmental behaviour (such as paper recycling) can predict another in the same domain (such as plastic recycling), or in a different domain within the same context (such as buying organic vegetables at home). This research therefore extends the current debate beyond a simple correspondence between contexts using the functionalities of PROCESS macros, it identifies conditions/circumstances that can result in spillover from recycling at home to recycling at work.

Furthermore, this research makes a significant contribution to the OCBE literature by identifying organisational commitment as a prominent factor in determining the extent to which recycling becomes normative at work which could result in the formation and activation of psychological/personality traits towards recycling when at work (see Figure 38). Based on the findings of this research, organisational support/commitment is not only central to participation in recycling at work but is also at the heart of all contextual factors at work. Although previous studies on OCBE have focused on the contribution of employees to pro-environmental initiatives at work, this research argues that there should be more consideration regarding the extent to which employees' pro-environmental behaviours are facilitated by their organisations. Contrary to the existing knowledge in the literature, this research suggests that organisational support/commitment to recycling or a wider environmental agenda as perceived by people at work is a significant determinant of recycling behaviour at work. This is important in explaining recycling at work and enhances the

propensity of spillover of recycling from home to work irrespective of people's personal/psychological traits.

Based on this understanding, this research challenges dominant cognitive social-psychology studies that attribute recycling behaviour to the effects of people's cognition and psychological state without taking the behavioural context into consideration. Therefore, this research advocates for more research on workplace pro-environmental behaviours with a focus on contextual rather than psychological factors**.**

11.8.2 Empirical Contribution

In addition to the theoretical contributions (see sub-section 11.8.1), this research makes empirical contributions that enhance how pro-environmental behaviours, particularly recycling, could be viewed. The complexity of human pro-environmental, especially recycling behaviour is inconceivable, however, the findings of this research offer a new insight into the narratives of recycling and other pro-environmental behaviours at work. As previously identified (see Chapters 1 and 2), studies in this realm have been confined to home contexts, this research is one of the few studies that investigated recycling behaviour at work. It is acknowledged that recycling behaviour has been studied by different researchers across many disciplines, but only a few studies have drawn a parallel between recycling at home and at work. However, no research has been specifically designed to investigate the relationship between recycling at home and recycling at work using multiple waste streams across many organisations. The nearest comparator in terms of the ambition of its research design is a study conducted more than two decades ago, in Taiwan, that utilised multiple (32) organisations but focused on a single waste stream (waste paper). Therefore, this research is the first known study that explain recycling at work including its relationship to how people recycle at home with the use of multiple waste streams and across different organisations.

Also, this research has empirically demonstrated the relationship between recycling at home and at work, an area with little or no research interest for many years. Contrary to

previous studies that have attempted to explain recycling behaviour by combining "apples and oranges" in their approach, this research is the first study specifically designed to investigate individual's recycling behaviour at work including its spillover from home to work. Whilst Ones and Dilchert (2012b) suggested that studies on a single pro-environmental behaviour, such as recycling, may be too narrow for scientific understanding, this research argues that the claim is unsubstantiated, and amounts to "empirical fallacy" considering the disparities in the motivations for engaging in pro-environmental behaviours. For instance, this research argues that recycling at work is the only pro-environmental behaviour being regulated/guided through a legal framework. Also, the qualitative findings and the comments from the "free text box" of the questionnaire survey indicate that many people are still confused about recycling at work, regarding where/what/how to recycle due to the lack of clear guidance in many organisations.

Although organisations in the UK are guided by the same legislative obligations regarding recycling of waste, this research shows that recycling as being currently practised is different from one sector (and organisation) to another sector (and organisation). Also, the lack of similarities between the private and public sectors regarding recycling behaviour at work is another important contribution of this research and suggests a need for different strategies/schemes across sectors. This is likely to be problematic for policy makers and planners when making decisions on cost-effective and attractive waste schemes at work, given that similar schemes across sectors and between home and work may enhance recycling behaviour including its spillover effects. Based on the findings of this research, it is obvious that many organisations are not fully complying with the regulation and the lack of monitoring or enforcement suggests that organisations are reluctant to support (commit) recycling initiative at work. Rather than focusing on personality/psychological traits, this research makes significant contributions by showing that contextual factors such as organisational commitment are prerequisites in enhancing recycling at work. This is a paradigm shift not only for the advancement of theories in explaining recycling behaviour at

work but also for planners in designing the way recycling could be effectively practised at work. Therefore, the findings of this research indicate that the understanding of behavioural patterns, particularly pro-environmental behaviours at work, would assist waste planners in designing a holistic strategy that may facilitate ease of recycling across multiple contexts.

11.8.3 Methodological Contribution

To uncover the antecedents of recycling at work, this research adopted a thorough process to attain a plausible conclusion about the research findings. For instance, the findings of the mediated-moderation analysis were further probed to identify when and how recycling at home could transmit its effects to recycling at work. The intention is to ensure that the findings are not due to chance. Therefore, this research has identified different factors that could influence recycling at work including the circumstances/conditions under which these factors could contribute to the prediction of recycling at work using an innovative statistical analysis, the PROCESS macro (Hayes, 2013). To achieve this, a comprehensive model based on the findings of the qualitative phase of this research including the knowledge from previous studies was developed and confirmed using different analytical procedures. Based on the methodological approach adopted, this research argues that it is empirically misleading to disconnect the effects of contexts (see Figure 38) when explaining recycling at work including the spillover of recycling behaviour from home to work based on the findings of this research.

Rather than aggregating people into a single unit of analysis irrespective of their scores on the constructs of interest in the survey instrument, this research makes an important contribution by reassigning people into different clusters based on their percentile of the distribution (see Chapter 10). Using this approach, it is now easier to explain and understand the complexity of the spillover of recycling from one context (home) to another (work) including its mechanisms. Therefore, it is possible to understand the clusters of people

(low vs. high) on the continuum that may likely be affected by situational factors irrespective of their personal obligation towards recycling.

In addition, this research is the first known study that adopted this approach (PROCESS macro) in determining the spillover of behaviour including its mechanisms. As at the time of this research, only 23 published articles have used the PROCESS macro and no published study has adopted the PROCESS macro to investigate pro-environmental behaviour according to Google Scholar index. Nevertheless, this approach is not only providing robust estimates, it allows for strong arguments and conclusions to be drawn from the research. With this approach, it is now empirically possible to confidently address the spillover effects of recycling at home on recycling at work by answering whether recycling at home affects recycling at work including how and when the effects are likely to occur.

From the methodological stand-point, it is plausible to conclude that the current measures of recycling behaviour are dated and many theories such as TPB are out of touch with the present environmental issues due to the increasing norms of knowledge, awareness, and acceptance of recycling in contexts such as the UK. Conceptually, the results of this research pose a challenge to the notion that any individual can be conceived of as either a recycler or a non-recycler.

11.9 Limitations of the research

While the research has many positives including its contributions as presented above, it also has some limitations that future studies may address.

The lack of a formal database for employees' contact details in the UK suggests that the sampling process was not strictly formal and not entirely dependent on random sampling (see Section 7.2.3). As a result, both probability sampling and convenience sampling approaches were used which may likely introduce a selection bias and a social desirability bias although these were statistically corrected in this research. Based on this research, convenience sampling using reliable contact(s) from each organisation was found to be more

effective, regarding participation, than the probability sampling involving dissemination of a survey link to randomly selected organisations from the commercial databases. Although the approach as used in this research was challenging and less straight-forward (see section 7.3.3), there was no better approach to data collection available other than the one used in this research as at the time of the data collection process.

In addition, using a web-based platform suggests that the overall response rate could not be determined. It was also more challenging to estimate those who started but failed to complete the questionnaire. Nonetheless, the web-based platform offered a cost-effective way of collecting data and may soon replace the dominant postal survey administration method (see sub-section 7.3.1). While the company size could be estimated by checking the company's website, it was impractical to estimate the actual number of people that received the survey link for their participation in the research. For instance, the survey link was sent by a dedicated contact in one of the participating organisations to the staff members who were likely to be sympathetic to the research. While the size of that organisation could be determined from their website, it was challenging to estimate the actual number of people that received the survey link, making it impossible to calculate the response rate.

Therefore, it is assumed that only respondents with a vested interest in the research completed and returned the questionnaire. Whilst the use of forced response enhances the data quality, it is difficult to establish its effect on the response rate of this research. It can be suggested that many respondents in this research were committed to recycling which may have important effects on their responses although this may require objective measures to establish. This could attract non-normality issues and potential outliers if not addressed statistically as it was done in this research, given that respondents may decide to respond to every question in a consistent pattern without reading the questions.

In addition, the lack of direct observation of situational factors, such as organisational support and office layout, implies that it was difficult to validate the physical set-up against

the responses and how it affects recycling with regards to the quality and quantity of recyclables. Also, it was problematic to establish the level of organisational support that is available in workplaces other than through the subjective perceptions of the employees of their organisation's commitment/support which may vary from person to person. Although the findings of this research suggest that many organisations are not complying with the current legislative requirements regarding the source segregation of materials, it was not possible to confirm this objectively in this research.

The paucity of studies on workplace recycling behaviour (see Chapter 3) indicates that the findings of this research are difficult to compare to other studies on recycling at work. This is so, given that some existing studies, because they were based on a single workplace, were able to use direct observation to ascertain the facilities and policies in place in that single workplace.

Also, the data analysis method used in this research is another limitation although the method provided an opportunity to examine the complex relationships between recycling at home and recycling at work. Although an SEM analysis is more robust than ordinary regression method, the complexity of "model fit" and the lack for utility for single-item constructs suggest that some constructs, such as "Feedback" could not be operationalised in this research using SPSS AMOS. In addition, the inability to operationalise all the hypothesised constructs by dropping some items due to their low Cronbach's Alpha coefficients is perceived as one of the limitations of this research. Although it is considered to empirically safe to use Alpha ≥ 0.7, many authors (see section 11.0) have adopted an Alpha coefficient ≤ 0.7 value in their studies.

However, the lack of resources to conduct test-retest reliability (by administering questionnaire survey to the same respondents on two separate occasions) on some questionnaire items from qualitative findings may likely responsible for the low Cronbach's Alpha and low factor loadings on some constructs such as "Feedback". Therefore, it would be

useful to estimate the stability and reliability of the questionnaire items by performing a test-retest procedure on all novel items (and their scales) in a future study.

Although further analysis was not performed to investigate the conditional direct and indirect effects using other measures (such as volume, range, and frequency of recycling) that can partition respondents into groups, this could be undertaken in the future. For instance, tests of measurement invariance could be used to examine the mediation effects of the volume of materials and range of materials being recycled including the frequency of recycling in the prediction of recycling at work. Although the analysis is not included in this thesis, it is anticipated to be conducted in the future and written up as a journal article.

11.10 Recommendations

The qualitative data including the respondents' comments from the "free text box" suggest that many organisations may not be compliant with the new legislation that introduced waste segregation in UK workplaces. Data from the survey including the "free text box" comments might imply that non-compliance is more prevalent in the private sector given the findings presented in sub-section 9.3.2. This needs further research specifically on compliance to establish beyond doubt the extent to which organisations are utilising the provisions/requirements in the legislation to enhance recycling at work. However, without any penalties or monitoring, it is perhaps not surprising that this is the outcome. This is typical of the UK approach and mirrors the approach taken to the targets set for domestic recycling in the 90s without any infrastructure, resources, monitoring or penalties (Shaw & Maynard, 2008). Although more work will be required at a policy level if these changes in workplace recycling are to become widespread, there is a need for enforcement and monitoring of the new legislation as well as the introduction of incentives (penalties and rewards) by policy makers to enhance compliance.

Also, the lack of objective measures for office layout with regards to bin proximity and bin arrangement may explain the obtained relationship (Lee et al., 1995), however, this

research argues that office layout should be operationalised within the wider context of organisational commitment rather than a separate measure (see Figure 32). On the one hand, office layout could be assessed without the inclusion of perceived organisation commitment in the equation. On the other hand, office layout could be modelled as a second-order factor of perceived organisational commitment. Therefore, future research should be cognizant of this caveat and office layout as a measure of perceived convenience should not be assessed in the same spatial level as organisational commitment.

Further, a programme of organisational education will be required in order to improve the situational factors, especially organisational commitment, that have turned out to be a feature of scheme success. From the "free text box" comments, it becomes obvious that many people lack the basic understanding and awareness of the recycling scheme including where, what, and how to recycle in their workplaces. Rather than the assumption that people would know how to recycle, organisations should communicate recycling information including any changes in the law to their employees to enhance recycling at work. In addition, organisations through their waste planners should make recycling facilities more visible so it is easy for people to distinguish receptacles regarding the materials that can be collected for recycling and those that are destined for landfill sites.

From the "free text box" comments, it becomes obvious that many organisations have introduced a strict strategy regarding what (materials) that can be collected for recycling in such organisations. This has resulted in many people using other means such as home and recycling centres to prepare their materials for recycling although this may attract cross contamination. Considering the new recycling rule regarding the exportation of materials (see section 11.7) organisations should provide recycling facilities, especially for all the key recyclables, to avoid cross contamination while enhancing the quality of materials for recycling. Based on the evidence of this research, the UK government should provide more investment opportunities to boost the development of local material reprocessing (sorting and recycling) facilities rather than shipping valuable resources and jobs abroad. One of the

opportunities is to reinvest landfill tax (see Chapter 2) and provide loan facilities with the aim of increasing recycling capacity while maximising the economic benefits of waste by preventing the possibility of sending valuable resources abroad which may create more jobs locally.

Nonetheless, it is unlikely that organisations would provide recycling opportunities for materials of low economic value or materials of low quantity which may prevent people at work from preparing such materials for recycling. For instance, organisations may introduce a commingled system for collecting dry recyclables together (cans, paper, and glass) rather than providing a separate collection for coffee cups, yogurt pots, and other food packaging materials. This corroborates the findings of Chung and Poon (1994) who observed that the members of staff of the Hong Kong Polytechnic are likely not to engage in recycling when they perceived that the amount of waste they generated will not make recycling worth the effort. Also, Oskamp et al. (1994) reported that financial motives were considered as an important factor for businesses to set-up recycling schemes, particularly paper recycling, meaning that a higher volume of paper may be required to make recycling profitable.

To enhance the consistency of recycling behaviour across contexts, there is a need for the introduction of similar laws guiding recycling irrespective of the waste generation contexts. Also, policy makers should harmonise waste schemes including their underlying facilities across contexts to enhance participation by making recycling easy for people to perform. This would not only reduce the effort (including time and cost) dedicated to waste management, it would also reduce the current confusion about recycling especially when people are moving from one location to another.

11.11 Chapter Summary and Conclusion

This Chapter was designed to put the findings of this research into context in relation to the existing knowledge in the literature. As a result, the important findings from the qualitative and quantitative analyses in Chapters 5 and 8 of this research were discussed

within the contexts of extant debates on recycling, within the waste management literature, spillover within the social psychology literature, and OCBE within the organisational behaviour literature.

While many factors could influence recycling behaviour, this research argues that personal factors, such as socio-demographics, and psychological factors, such as attitudes are not suitable for explain recycling behaviour, especially at work. Therefore, profiling people with regards to their recycling behaviour using their socio-demographics is empirically misleading.

Nonetheless, situational factors, such as organisational commitment were identified as the most important contributor to the explanation of recycling at work. According to the findings of this research, it is plausible to conclude that the understanding of why people engage in pro-environmental behaviour, particularly recycling at work transcends the influence of personal and psychological attributes. This research demonstrates that organisational commitment/support is at the heart of recycling activities, particularly within work settings.

Based on the findings of this research, factors influencing recycling behaviour were classified into two broad categories which include personal/psychological attributes and organisational-based (or contextual) factors. These classifications are not only important to explain recycling at work but could also enhance the extent to which recycling at home could be translated into recycling at work. As a result, this research suggests that waste arising and situational factors should be taking into consideration when explaining the spillover effects of recycling at home on recycling at work. Whilst there is a similarity between recycling at home and at work, recycling is different with regards to the range of materials, volume of materials, and the frequency of recycling at home and at work.

The “free text box” comments provide a new insight into why recycling at home is different from recycling at work and reinforced the findings on the effects of situational

factors on recycling behaviour, particularly at work. Rather than aggregating people into a single unit, the mediated-moderation analyses allowed the re-classification of people into different clusters based on their percentiles of distribution. As a result, it is possible to identify clusters of people that are more likely to translate their recycling at home to recycling at work including the conditions that could inhibit/enhance the spillover of recycling.

Having presented and discussed the key findings, practice and policy implications of this research including its contribution and the limitations of this research were highlighted. Following the identification of the research limitations, many recommendations for future research were presented.

Appendices

Appendix 1: Survey Cover (introductory) Letter

Recent changes in the law mean that all organisations must present their recyclables and food waste for collection separately. Organisations must rely on their employees to use waste recycling facilities in order to be able to meet these new legal requirements. Preliminary work by Aberdeen Business School has uncovered some interesting differences between how people recycle at home and in their workplaces and have launched a major survey to examine exactly how and why these differences exist.

As a result, we would like to invite your organisation to take part in this survey.

We would be grateful if you can participate in our research, participation would mean circulating the below link to an online (anonymous) questionnaire which would take each employee about 10 minutes to complete.

https://docs.google.com/forms/d/e/1FAIpQLScazmRd_wlGFDUoEPER3G9oMRCQidivriBLuIQFmVKGdTUg/viewform

Recycling at Home and Work

docs.google.com

Thank you for participating in this survey, which has been designed to collect data for our research. Our goal is to understand recycling in UK workplaces and whether there are any differences with how people recycle at home. The survey will take about 10-15 minutes to complete. Your participation is very important to us and your time is highly appreciated. All the information collected will be anonymous and there will be no attempt to identify individual responses. If you have any queries about the questionnaire, please contact either Adekunle Oke (a.o.oke@rgu.ac.uk) or Seonaidh McDonald (s.mcdonald@rgu.ac.uk). Thank you very much for your help. Adekunle and Seonaidh.

In return, we can offer your association early access to the research results which will suggest ways to increase workplace recycling, reducing both the cost and the environmental impact of commercial waste disposal within UK organisations.

If sufficient questionnaires are completed by your organisation once the study is complete we can also provide the following:

1. A summary of the responses from your own employees, which shows how and why people in your organisation currently recycle at work.
2. A short commentary that considers how the results from your organisation compares to our overall sample of UK organisations and,
3. Some organisation specific recommendations to increase workplace recycling based on the views of your own employees.

If you would like to discuss this study, please contact us via email at a.o.oke@rgu.ac.uk (Researcher) or s.mcdonald@rgu.ac.uk (Professor) and we will be happy to answer any questions otherwise you can assist our research by distributing the above link to you members of staff in the UK for participation.

We look forward to hearing from you.

Kind regards,

Adekunle and Seonaidh.

Appendix 2: Participant Information Sheet and Consent Form

Participant Information Sheet

Project Title

Understanding Waste Recycling behaviour at Work

Purpose

This research is being conducted as part of the primary research for Doctoral degree in Management.

What is this research project about?

The research is to identify and explore different factors underlying waste recycling at work as well as to identify the mechanism(s) for behavioural spillover from home to work.

What will you have to do and how long will it take?

The researcher will want to interview you. This should take **between 30 and 60 minutes** and will take place at your company (office). The researcher may ask for relevant documents or sources accessible for this research. The interview will be recorded. You will be asked to give consent prior to the interview, and maybe asked to also give consent at a later stage.

What will happen to the information collected?

The information collected will be used by the researcher to write a dissertation for the Doctoral degree. Only the researcher and supervisor will be privy to the notes, documents, recordings and the paper written. Afterwards, notes and documents will be destroyed and recordings erased. The researcher will keep transcriptions of the recordings and a copy of the paper but will treat them with the strictest confidentiality. No participants will be identified in the publications and every effort will be made to protect the participants by disguising their identity.

Declaration to participants

If you take part in the study, you have the right to:

- Refuse to answer any particular question, and to withdraw from the study at any time (including after the interview has been completed).
- Ask any further questions about the study that occurs to you during your participation.
- Be given access to a summary of findings from the study when it is concluded.

Who's responsible?

If you have any questions or concerns about the research, either now or in the future, please feel free to contact either:

Researcher:

Adekunle Oke

Research Room 540

Aberdeen Business School

Robert Gordon University

Garthdee Road, Aberdeen AB10 7QE

E-mail: a.o.oke@rgu.ac.uk

Or

Supervisor:

Seonaidh McDonald

Aberdeen Business School

Robert Gordon University

Garthdee Road, Aberdeen AB10 7QE

E-mail: s.mcdonald@rgu.ac.uk

Consent Form for Participants

Understanding Waste Recycling behaviour at Work

Consent Form for Participants

I have read the **Participant Information Sheet** for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time, or to decline to answer any particular questions in the study. I understand I can withdraw any information I have provided up until the researcher has commenced analysis on my data. I agree to provide information to the researchers under the conditions of confidentiality set out on the **Participant Information Sheet**.

I agree to participate in this study under the conditions set out in the **Participant Information Sheet**.

Signed: _____

Name: _____

Date: _____

Researcher:

Adekunle Oke

Research Room 540
Aberdeen Business School
Robert Gordon University
Garthdee Road, Aberdeen AB10 7QE
E-Mail: a.o.oke@rgu.ac.uk

Supervisor:

Seonaidh McDonald

Aberdeen Business School
Garthdee Road, Aberdeen AB10 7QE
Robert Gordon University
E-mail: s.mcdonald@rgu.ac.uk

Appendix 3: Interview Protocol (Interview Guide)

Interview Protocol

Institution: Robert Gordon University

Interviewee:

Interviewer: Adekunle Oke

Discussion topics: Waste recycling experience (General and Contexts specific), Recycling Motivations, Recycling Barriers and Socio-demographics.

Notes for Interviewer: Preamble and Recruitment

During the interview, we would be careful not mention the project title. However, participants would be asked to help us with a research on waste management (with a special focus on waste recycling) in the UK while Robert Gordon University (Aberdeen) may be mentioned as the research facilitator. We should make it clear that the interview is only for academic research purposes and is not associated with any commercial market research. The tone of the interview should be very informal while interviewer(s) are to wear causal clothes so as to ensure a relaxed and friendly environment.

To set the scene, we may use the current state of resource consumption and waste management in the UK with respect to the EU waste recycling and disposal targets coupled with increasing landfill tax in the UK.

For the recruitment, we may want to use a snowballing technique whereby each interviewee is asked at the end of each interview whether they could recommend someone else to partake in the study.

We may completely avoid academics or people working in educational institutes as our research participants except where we come across part-time students working full-time in other professional sectors.

Sample Size:

The plan is to conduct about 15 different interviews; however, we anticipate a theoretical saturation point before this amount. At that point, the interview process would be truncated.

Sample Population:

Participants must be actively employed (part-time, full-time, contract, or permanent staff) and must be working outside their home. People in employment in both rural and urban (settings) in Scotland would be qualified as the research participants.

Notes for Interviewee:

In order to facilitate the interview process, our discussions would be recorded and we would like you (participants) to sign the consent form. As part of the informed consent, you must be aware that it is our intention to publish results of this study in academic papers. However, any quotations used from the interviews will be anonymised. For the anonymity, you are allowed to adopt a preferred name otherwise interviewer could assign you a pseudo-name based on your gender. The consent form is to demonstrate your willingness to participate in the process and also show your approval of the audio recording. The recordings would only be accessed by researchers on the project and will be destroyed according to the Robert Gordon University data protection act after they are transcribed. Whilst your participation in the interview is voluntary and can be withdrawn at any stage in the process, all information will be confidential and held securely. We really value your time and appreciate your decision to participate in our research.

The interview session has been carefully designed and anticipated to last no longer than one hour. This will be conducted using an iterative approach, consisting of five different stages that will cover several questions. We may decide to interrupt the discussion and move to the next stage if we begin to run short of time, this is to afford us an opportunity to complete all the themes of our research.

Interview:

Stage 1: Waste recycling experience (General and Contexts specific)

We would ask participants about their experience with respect to waste recycling: In order to understand your perception about waste and waste recycling, it would be of help if you can answer the following questions.

Questions:

1. What is your perception of waste management practices in the UK?
2. What is your experience about waste recycling?

   Note: We may reframe the question to relate the respondents' experience to specific contexts of interest (home and work) if no context is mentioned when answering question 2.

3. Considering recycling at home, who is in charge of recycling in your household?

4. What items do you recycle? (Also, this question could be tailored to the contexts of our research)

Note: We may provide some examples of recyclables if the respondents could not identify all recyclables to refresh their memory.

5. How do you recycle these items? (We may make reference to source separation, commingle and recycling facilities)
6. How often do you recycle these items?
7. How would you describe the recycling facilities at work?

Stage 2: Motivation for recycling

Here we would ask respondents about their motivations by making reference to responses from the Stage 1: In order to identify why you're (not) participating in waste recycling, it would be helpful if you could answer the following questions

Questions:

1. How would you describe your recycling at home (and at work)?

   1b. Is it the same thing that keeps you recycling?

   1c. Are they different?

2. What made you start recycling (i.e. at home and at work)?

   2b. Is that the same reason that you recycle now?

3. In reference to questions 2, 3 and 4 above, why do you (not) recycle?
4. How do you think we could increase the rate of waste recycling at work in the UK?
5. Consistent with question 7 in Stage 1, do recycling facilities in your organisation helpful for your recycling behaviour

   5b. In what ways do your organisation supports your recycling?

6. What do you consider as the most influential factors in your recycling behaviour (at home and at work)? (Reference could be made to colleagues, friends and organisation as a whole).

Stage 3: Barriers

Here we would ask respondents about barriers to their waste recycling behaviours in reference to their responses from the Stage 1 above

Question:

1. Are there any things that hinder your recycling or that reduce the amount of waste you recycle at work?
2. Consistent with question 7 in Stage 1, how would you describe the influence of recycling facilities in your organisation on your recycling behaviour?
3. In relation to question 1, how could the effects of these barriers be reduced or eliminated?

Stage 4: Socio-demographics

Here we would collect socio-demographic information such as age, income level (personal, then household), education and Ethnicity (Use labelled categories for these and ask them to point to the one which fits their circumstance).

Stage 5: Snowballing questions

In order to further our data collection process, who else should I speak to or would you recommend other individuals to participate in this study?

Appendix 4: Participants' General Perceptions of Waste and Recycling

Participants	General Perception of Waste & Recycling
001	"Everyone in the UK has to cut down on waste, the government sets guidelines on how much waste should go to landfill . . . so everyone is obviously trying to reach these levels". "In the UK, you'll find that a lot of people still don't recycle . . . although nowadays you've got street bins that household waste to go in, is still to getting people to realise we've got to recycle, that will be hardest".
002	. . . "Is link to a process which everybody knows everything about until it actually starts or when you ask questions". "So, I think is one of those things that everyone has an opinion whether is good or bad thing or what we can do to recycle or what can't recycle or what we should recycle and that doesn't necessarily tie or linking with what we can". "So, you hear a bit more about it Scotland and perhaps South of the border but you've to question how much is happening on the ground and how much we're seeing on the ground". . . . "Overall the UK industry is that we're making good noises, you know there's a lot of bite there but not necessarily too much bite".
003	"From my personal experiences, the infrastructure available to us on all the main stream waste categories without an early point of export is really pretty best to be honest". "So, from the easier type of waste to manage, so I'm including the like of cardboard, the glass, we're in a very good position but we've also got a very good range of options open to us for general recycling as well. So, I think we're pretty fortunate".
004	"I can say where is coming from Europe and things like that, I mean the UK as a whole is not . . . I don't think is necessarily not leading the way, is getting better, definitely more resources are available in coming out and things like that". "And then Scotland is a little bit ahead of England with regs coming in providing the changes and things certainly on commercial point of view is always a year ahead". "I think certain definite improvements are to be made, we are behind some other countries in particular in Europe and things like that as well. I don't think we're bottom of the list but I think yeah technology is gradually improving to be able to make, to make the changes we need to do; so, we are getting there".
005	"In the UK, I guess is been a big push possibly within the last decade I'll say . . . so you're reducing, re-using and then recycling". "I guess is been a big push on there, I call it a push because I guess the Local Government they will give you recycling bins and they will take away some stuffs". "So, I guess it kind of ties with the council given you specific bins to do this and I think you start to think more about it and everywhere you look through the papers, media there's always about do you do your bit for the environment be it recycling". "So, I think, you kind of force into doing something so you know if they check your general waste bin and find recyclable materials; they won't take your bins away". "There's a push to reduce something we talked about electricity, I know it's not recycling, however, is being energy waste and that kind of stuff where we switch the lights off, switch the monitor off, doing the good stuffs while we're at work so you know it's not recycling".

006	"It's not just in the UK, it's a global thing to reduce the overall amount of . . . the amount of waste that could potentially be generated". "Ever since the beginning of time, humans have produced waste and we don't want to over-pollute the planet". "I think the practices have all got very good intentions; I think we are still learning and we learn by experience, certainly is a different world now than it was before".
007	"We know that landfill sites are filling and we must find an alternative to get rid of our waste, now at the present time we separate our paper, cardboard, and glass, and plastic and they are kept in separate containers which are lifted by the council every two weeks". "What you're speaking about (*recycling*) is not at the back of their mind, they must make their profits per week before they (*businesses*) think of anything else".
008	"In the UK, I think it's very much depends on what area you live in whether you recycle or not, whether you're wealthy or you live in a sort of less wealthy area I think". "I've also lived in Oxfordshire and sort of being in London quite often for a year and I've experienced what is like to live there as well. It's not very clean depending on where you go, like I said depending on the social sort of wealth - depending on the wealth area". "I think recycling can be considered as just throwing away your trash, throwing away any trash but because of the background I come from I think that's becoming more widely spread. Recycling is now I think considered as splitting up the type of trash that you've to be sort of more environmentally aware and to save money".
009	"I think the UK has a lot to learn from other European countries for example Germany and some Scandinavian countries are doing a lot of great work . . . however . . . the recycling rate in Scotland has really improved". "It's becoming less acceptable not to recycle, I think that people are aware that we can't continue to put things to landfill that's not sustainable and they want to take action to do something". "So, I think the recycling is becoming more popular we can see from the figures overtime in Aberdeen city that they've increased and waste is a resource as well".
010	"You do tend to find certain people - generally younger people are doing it, older people don't - tend why should I do this and is attitude especially older generation; why should I do this, why should I make them money?". "That's sort of attitude yeah, and I think laziness as well - a lot of people is a bit not get it". "The older generation they don't care, their problem I don't get it you know, why should I bother?"
011	"I see it (*recycling*) as a highly important issue that isn't dealt with as effectively as it should be . . . I feel is very important issue however I don't think that many people are aware of how important it is so is become more individualised rather than a community helping recycle as a whole". "I think is very important to recycle, my views of it in the UK is that its, it doesn't seem to be very important issue perhaps it has become more apparent feasible in the media in recent years. However, I don't think that enough is been done to help manage recycling".

	"Sometimes I struggle if I'm walking down the street I say for example I have a plastic bottle and I want to get rid of it there especially on union street I've never seen any recycling bins so there just a standard general waste bin".
012	"In the UK, well I supposed really that overall strategy is to reduce landfill and to recycle as many products as possible can to reduce landfill; I think that's overall aim of the strategy". "So, I think everything they are after is based on this reduction in landfill".
013	"I think the industry has a whole have seen development over the years, a lot of diversion from where we are today. I think there are economic drivers, regulatory drivers; there are more commitment in terms of awareness by people who want to get more committed in the things like green energy, recycling, things like cubing the environmental effects of waste disposal". "There is a growing emphasis on recycling now and recovery of waste. In the UK, I would say one of the main regulatory drivers was the landfill directive which is European directive. Obviously, it has so many dimensions to it, one of the key achievements is something like reduction in disposal of biodegradable waste by given alternatives to other technologies like composting, AD". "So overall I would say that the impact of regulation and economic drivers through government policies have obviously changed waste management in the UK. Obviously in 1990 the recycling rate waste was about 8-9 and today it is about 45-50 in some councils".
014	"I think the whole waste is not clear . . . I just don't think it's well enough advertised, there's nothing there". "If you've a point, yes you get bins and stuffs, put stuffs you put advertise around them marketing around them so students know this is what goes in there". "I just feel that's not enough for that it's a lot stick on the bins they don't want to look at that, they just go that's fine because every bottle they go okay that's where the bottles is you know make it more visible to the students".
015	"I think in terms of general perception, it comes a long way in the last 10 or 20 years, is become a lot more intelligent industry. So, 20 years ago it was mainly about picking up waste and putting it in landfill, by and large that was what we do. We are now in a position where we are picking waste up taking it for recycling, we look at re-use, there is a lot more different treatment facilities or energy from waste and co-digestion. It has evolved a lot in the last 20 years". "It's just it's looking at waste more as resource now rather than just say you pick it up chuck it on the ground. Yeah, I mean that's industry now we try to move away from calling it waste. Now we see ourselves as resource industry rather than waste industry". In terms of that change from 20 years ago is definitely national policy, so the main piece of legislation is Environmental Protection Act 1990. Ah that put in place something like recycling targets, em local authority recycling plans, it made landfill more regulated and try to bring in landfill tax. That was a big drive in terms of the change in industry. That's the view of the industry in the UK at the moment is actually the policy is quite weak, that's why recycling from household recycling rate is started to slow down and stay the same".
Source: Author	

Recycling at Home and Work

Thank you for participating in this survey, which has been designed to collect data for our research. Our goal is to understand recycling in UK workplaces and whether there are any differences with how people recycle at home.

The survey will take about 10-15 minutes to complete.

Your participation is very important to us and your time is highly appreciated.

All the information collected will be anonymous and there will be no attempt to identify individual responses.

If you have any queries about the questionnaire, please contact either Adekunle Oke (a.o.oke@rgu.ac.uk) or Seonaidh McDonald (s.mcdonald@rgu.ac.uk).

Thank you very much for your help.

Adekunle and Seonaidh.

* Required

1. **Please indicate how often you do each of the following activities at HOME by clicking the appropriate circle.** *

   Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
I save paper by printing on both sides	◯	◯	◯	◯	◯
I buy loose fruit and vegetables	◯	◯	◯	◯	◯
I find ways to avoid creating waste	◯	◯	◯	◯	◯
I leave the tap running while washing dishes	◯	◯	◯	◯	◯
I buy products that can be used again rather than buy disposable ones	◯	◯	◯	◯	◯

2. **Please click the appropriate circle to indicate how often you do each of the following activities at HOME.** *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
I reuse plastic containers (such as margarine tubs)	◯	◯	◯	◯	◯
I try to repair things before buying new ones	◯	◯	◯	◯	◯
I use disposable cups	◯	◯	◯	◯	◯
I reuse glass bottles & jars	◯	◯	◯	◯	◯
I use my own bag when shopping rather than buying a new one in the shop	◯	◯	◯	◯	◯

3. **How often do you recycle the following materials at HOME? Please indicate by selecting the appropriate circle.** *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
Paper (including envelopes, magazines & newspapers)	◯	◯	◯	◯	◯
Plastic (including bottles & food containers)	◯	◯	◯	◯	◯
Glass (including bottles & jars)	◯	◯	◯	◯	◯
Metals (including drinks cans & food tins)	◯	◯	◯	◯	◯
Food waste	◯	◯	◯	◯	◯
Cardboard	◯	◯	◯	◯	◯
Garden waste	◯	◯	◯	◯	◯
Textiles	◯	◯	◯	◯	◯

4. **Are there any other things (for example batteries, ink or toner cartridges) that you recycle at HOME? Please indicate below.** *

_____

_____

_____

_____

_____

Thank you for answering our questions about your recycling at home. The rest of the questions will be about any recycling that you do in your workplace.

5. **Please indicate how often you do each of the following activities at WORK by clicking on the appropriate circle.** *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
I make notes on paper that has already been used	◯	◯	◯	◯	◯
I leave my computer screen on even when I'm away from my desk	◯	◯	◯	◯	◯
I print/make copies on both sides of the paper	◯	◯	◯	◯	◯
I avoid eating packaged food at work	◯	◯	◯	◯	◯
I remember to switch lights off in unused rooms	◯	◯	◯	◯	◯
I switch off office equipment when not in use, especially overnight	◯	◯	◯	◯	◯
I refill water bottles instead of using disposable cups	◯	◯	◯	◯	◯

6. **How often do you recycle the following materials at WORK? Please indicate by clicking the appropriate circle.** *

Mark only one oval per row.

	Never	Rarely	Sometimes	Often	Always
Paper (including envelopes, magazines & newspapers)	◯	◯	◯	◯	◯
Plastic (including bottles & food containers)	◯	◯	◯	◯	◯
Glass (including bottles & jars)	◯	◯	◯	◯	◯
Metals (including drinks cans & food tins)	◯	◯	◯	◯	◯
Food waste	◯	◯	◯	◯	◯
Cardboard	◯	◯	◯	◯	◯
Textiles	◯	◯	◯	◯	◯

7. **Are there any other things (for example batteries, ink or toner cartridges) that you recycle at WORK? Please indicate below.**

_____

_____

_____

_____

_____

8. **How would you compare the volume of materials you recycle at HOME & WORK? Please select one answer.** *

Mark only one oval.

◯ I recycle a larger amount of materials at HOME *Skip to question 9.*

◯ I recycle a larger amount of materials at WORK *Skip to question 10.*

9. **Please tell us why you recycle more material at HOME.** *

Skip to question 11.

10. **Please tell us why you recycle more material at WORK.** *

11. **How would you compare the range of materials you recycle at HOME & WORK? Please select one answer.** *

Mark only one oval.

- ◯ I recycle a wider range of materials at HOME *Skip to question 12.*
- ◯ I recycle a wider range of materials at WORK *Skip to question 13.*

12. **Please tell us why you recycle a wider range of materials at HOME.** *

Skip to question 14.

13. **Please tell us why you recycle a wider range of materials at WORK.** *

14. **How would you compare how often you recycle at HOME & WORK? Please select one answer.** *

Mark only one oval.

- ◯ I recycle more often at HOME *Skip to question 15.*
- ◯ I recycle more often at WORK *Skip to question 16.*

15. **Please tell us why you recycle more often at HOME.** *

_____

_____

_____

_____

_____

Skip to question 17.

16. **Please tell us why you recycle more often at WORK.** *

_____

_____

_____

_____

_____

17. **To what extent do you agree with each of the following statements? Please click on a circle for each statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
It frustrates me that my organisation doesn't do more to encourage recycling	◯	◯	◯	◯	◯
When I recycle at work, I feel good	◯	◯	◯	◯	◯
Recycling should be a normal part of our life at work	◯	◯	◯	◯	◯
I do not have enough items to recycle at work to make recycling worthwhile	◯	◯	◯	◯	◯
To me personally, recycling at work is very important	◯	◯	◯	◯	◯

18. **Please click on a circle for each statement to indicate how much you agree with each of the following statements.There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I believe people at work should make every effort to recycle	◯	◯	◯	◯	◯
I feel guilty when I fail to recycle at work	◯	◯	◯	◯	◯
Recycling at work is a trivial activity	◯	◯	◯	◯	◯
I feel people worry too much about recycling at work	◯	◯	◯	◯	◯
I have no control over whether I engage in recycling at work or not	◯	◯	◯	◯	◯

19. **To what extent do you agree with each of the following statements? Please click on a circle to indicate your choice for each statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I don't consider recycling to be an important issue					
I'm not interested in the idea of recycling					
I believe waste recycling could save land that would otherwise be needed for landfill					
I make every effort to recycle at work					
I'm the type of person who acts in an environmentally-friendly way					

20. **Please select the extent of your agreement with each of the following statements by clicking one circle per statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Most of my colleagues at work expect me to recycle					
It would be wrong of me not to recycle at work					
It's important for me to maintain harmony within my group					
I don't need monetary reward to recycle at work					
Acting ethically is an important part of who I am					

21. **Please click on a circle for each statement to indicate the extent to which you agree with each of the following statements.There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
When I see my colleagues recycling, I feel I should recycle as well					
Most of the people who are important to me would approve of workplace recycling					
I'm a person who considers friends and colleagues to be important					
Most of my colleagues at work recycle					
Recycling seems like the right thing to do					

22. **Please select your agreement with each of the following statements by clicking one circle per statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
It is my personal responsibility to recycle waste at work					
Recycling at work isn't worth the effort					
I'm aware that recycling at work reduces the amount of waste that goes into landfill					
It would go against my personal principles if I did not recycle at work					
I would recycle at work if it was a legal requirement					

23. **Please click one circle per statement to indicate the extent of your agreement with each of the following statements. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Recycling at work is an important part of who I am					
I'm not the type of person who is inclined to engage in recycling at work					
I know that recycling at work helps preserve natural resources					
I like being a participant in group activities					
I require more information on how to recycle at work					

24. **To what extent do you agree with each of the following statements? Please click one of the circles for each statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I have plenty of opportunities to recycle at work					
I know the items that can be recycled at work					
It is mostly up to me whether I recycle at work or not					
I understand well enough what is being said about recycling at work					
I know how to recycle at work					

25. **Please indicate the level of your agreement with each of the following statements by clicking one circle per statement. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I would recycle at work only if I was paid to do so	⬭	⬭	⬭	⬭	⬭
Recycling only benefits people in the recycling business	⬭	⬭	⬭	⬭	⬭
I require more information on what (materials) to recycle at work	⬭	⬭	⬭	⬭	⬭
I would take recycling at work more seriously if financially penalised for not doing it	⬭	⬭	⬭	⬭	⬭
I've no knowledge of my workplace's waste management strategies	⬭	⬭	⬭	⬭	⬭

26. **By clicking one circle per statement, please select the extent of your agreement with each of the following statements. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I would recycle if there was feedback about my personal contribution	⬭	⬭	⬭	⬭	⬭
I require more information on the location of recycling facilities at work	⬭	⬭	⬭	⬭	⬭
I would recycle at work if there was feedback about how much had been recycled in my workplace	⬭	⬭	⬭	⬭	⬭
I'm aware that recycling at work is good for the environment	⬭	⬭	⬭	⬭	⬭
The recycling facilities in my place of workplace are sufficient	⬭	⬭	⬭	⬭	⬭

27. **To what extent do you agree with each of the following statements? Please click on a circle for each statement to indicate your answer. There is no wrong or right answer.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
The arrangement of my work space makes recycling easy for me	⬭	⬭	⬭	⬭	⬭
There's no recycling facility in my place of work	⬭	⬭	⬭	⬭	⬭
The location of recycling bins makes it difficult to recycle at work	⬭	⬭	⬭	⬭	⬭
Recycling at work takes up too much room	⬭	⬭	⬭	⬭	⬭
It's convenient for me to recycle at work	⬭	⬭	⬭	⬭	⬭

28. **Please select the extent to which you agree with each of the following statements by clicking one circle per statement. There is no wrong or right answer in each case.** *

Mark only one oval per row.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
I'm satisfied with the current recycling scheme at my workplace	◯	◯	◯	◯	◯
My organisation should put more effort into promoting recycling	◯	◯	◯	◯	◯
In general, it takes a lot of effort to recycle at my workplace	◯	◯	◯	◯	◯
There's little concern for recycling at my place of work	◯	◯	◯	◯	◯
There's little information about recycling at my place of work	◯	◯	◯	◯	◯

This section asks for information about you and where you work currently. Please answer all of the following questions.

29. **What is your gender? Please use the dropdown arrow to choose the appropriate one from the list below.** *

Mark only one oval.

- ◯ Male
- ◯ Female
- ◯ Prefer not to say

30. **What is your age range? Please use the dropdown arrow to choose the appropriate one from the list below.**

Mark only one oval.

- ◯ Under 16
- ◯ 16-25
- ◯ 26-35
- ◯ 36-45
- ◯ 46-55
- ◯ 56-65
- ◯ Over 65
- ◯ Prefer not to say

31. **How would you describe your ethnic background? Please use the dropdown arrow to choose the appropriate one to indicate your cultural background.**

Mark only one oval.

- ◯ Asian/Asian British
- ◯ Black/African/Caribbean/Black British
- ◯ Mixed/multiple ethnic groups
- ◯ White
- ◯ Prefer not to say

32. **From the list below, please use the dropdown arrow to choose the highest level of educational qualification you have completed or received.** *

Mark only one oval.

- None
- GCSE or equivalent
- A/AS/Higher or equivalent
- HNC/HND/NVQ or equivalent
- Higher Education (such as Bachelor, Masters & Doctorate)

33. **Please use the dropdown arrow to choose your employment status from the list below.** *

Mark only one oval.

- Employed, working full-time
- Employed, working part-time
- Self-employed
- Working as a volunteer

34. **From the list below, please use the dropdown arrow to choose the category that best describes the organisation you work in.** *

Mark only one oval.

- Public
- Private
- Voluntary

35. **Using the dropdown arrow, please choose the sector within which your organisation operates.** *

Mark only one oval.

- Administrative & Support Services
- Aerospace
- Agriculture, Forestry & Fishing
- Automotive
- Business Services
- Chemicals
- Communications
- Community, Social and Personal services
- Construction
- Digital, Creative & Information Services
- Education
- Energy (including Oil & Gas)
- Engineering (i.e. Machinery, Electrical & Transport Equipment)
- Financial Services
- Food, Beverages & Tobacco
- Health & Social Care
- Hotels & Restaurants
- ICT & Precision Instruments
- Metal, plastic & non-metal mineral products
- Mining & Quarrying
- Other Manufacturing
- Pharmaceuticals
- Public Admin & Defence
- Real Estate
- Research & Development
- Retail
- Shipbuilding
- Transport, Storage & Distribution
- Utilities

36. **Using the dropdown arrow, please choose the range that best describes your personal annual income.** *

Mark only one oval.

- Less than £24,999
- £25,000-£49,999
- £50,000-£99,999
- £100,000 or more
- Prefer not to answer

37. **Please write the title of your current job in the space provided.** *

38. **Are you a member of any community, environmental, or political organisation? Please select one option using the dropdown arrow.** *
Mark only one oval.

- Yes *Skip to question 39.*
- No *Stop filling out this form.*

Stop filling out this form.

39. **How many COMMUNITY organisation are you in? (Please write number in each box below).**

40. **How many ENVIRONMENTAL organisation are you in? (Please write number in each box below).**

41. **How many POLITICAL organisation are you in? (Please write number in each box below).**

Appendix 6: Frequency Distribution for Questionnaire Items

Questionnaire Items	N		Range	Minimum	Maximum
	Valid	Missing			
Printing on both sides	367	0	4	1	5
Buy loose fruit and vegetables	367	0	4	1	5
Ways to avoid creating waste	367	0	4	1	5
Leave the tap running while washing dishes	367	0	4	1	5
Buy products that can be used again rather than buy disposable ones	367	0	4	1	5
Reuse plastic containers	367	0	4	1	5
Repair things before buying new ones	367	0	4	1	5
Use disposable cups	367	0	4	1	5
Reuse glass bottles & jars	367	0	4	1	5
Use own bag when shopping rather than buying a new one in the shop	367	0	4	1	5
Paper (including envelopes, magazines & newspapers) at home	367	0	4	1	5
Plastic (including bottles & food containers) at home	367	0	4	1	5
Glass (including bottles & jars) at home	367	0	4	1	5
Metals (including drinks cans & food tins) at home	367	0	4	1	5
Food waste at home	367	0	4	1	5
Cardboard at home	367	0	4	1	5
Garden waste at home	367	0	4	1	5
Textiles at home	367	0	4	1	5
Print/make copies on both sides of the paper	367	0	4	1	5
Switch off office equipment when not in use, especially overnight	367	0	4	1	5
Leave my computer screen on even when I'm away from my desk	367	0	4	1	5
Remember to switch lights off in unused rooms	367	0	4	1	5
Avoid eating packaged food at work	367	0	4	1	5
Make notes on paper that has already been used	367	0	4	1	5
Refill water bottles instead of using disposable cups	367	0	4	1	5
Paper (including envelopes, magazines & newspapers) at work	367	0	4	1	5
Plastic (including bottles & food containers) at work	367	0	4	1	5

Glass (including bottles & jars) at work	367	0	4	1	5
Metals (including drinks cans & food tins) at work	367	0	4	1	5
Food waste at work	367	0	4	1	5
Cardboard at work	367	0	4	1	5
Textiles at work	367	0	4	1	5
It frustrates me that my organisation doesn't do more to encourage recycling	367	0	4	1	5
When I recycle at work, I feel good	367	0	4	1	5
I feel guilty when I fail to recycle at work	367	0	4	1	5
Recycling at work is a trivial activity	367	0	4	1	5
I feel people worry too much about recycling at work	367	0	4	1	5
I'm aware that recycling at work reduces the amount of waste that goes into landfill	367	0	4	1	5
I'm aware that recycling at work is good for the environment	367	0	4	1	5
I know that recycling at work helps preserve natural resources	367	0	4	1	5
It is my personal responsibility to recycle waste at work	367	0	4	1	5
My organisation should put more effort into promoting recycling	367	0	4	1	5
I make every effort to recycle at work	367	0	4	1	5
Recycling at work isn't worth the effort	367	0	4	1	5
Recycling should be a normal part of our life at work	367	0	4	1	5
I do not have enough items to recycle at work to make recycling worthwhile	367	0	4	1	5
I believe waste recycling could save land that would otherwise be needed for landfill	367	0	4	1	5
Recycling only benefits people in the recycling business	367	0	4	1	5
I don't consider recycling to be an important issue	367	0	4	1	5
I have no control over whether I engage in recycling at work or not	367	0	4	1	5
I have plenty of opportunities to recycle at work	367	0	4	1	5

It is mostly up to me whether I recycle at work or not	367	0	4	1	5
I understand well enough what is being said about recycling at work	367	0	4	1	5
It's convenient for me to recycle at work	367	0	4	1	5
The arrangement of my work space makes recycling easy for me	367	0	4	1	5
The location of recycling bins makes it difficult to recycle at work	367	0	4	1	5
In general, it takes a lot of effort to recycle at my workplace	367	0	4	1	5
Recycling at work takes up too much room	367	0	4	1	5
When I see my colleagues recycling, I feel I should recycle as well	367	0	4	1	5
Most of my colleagues at work recycle	367	0	4	1	5
I like being a participant in group activities	367	0	4	1	5
It's important for me to maintain harmony within my group	367	0	4	1	5
I'm a person who considers friends and colleagues to be important	367	0	4	1	5
I would recycle at work only if I was paid to do so	367	0	4	1	5
I would recycle at work if it was a legal requirement	367	0	4	1	5
I would take recycling at work more seriously if financially penalised for not doing it	367	0	4	1	5
I would recycle at work if there was feedback about how much had been recycled in my workplace	367	0	4	1	5
I would recycle if there was feedback about my personal contribution	367	0	4	1	5
I don't need monetary reward to recycle at work	367	0	4	1	5
Most of my colleagues at work expect me to recycle	367	0	4	1	5
Most of the people who are important to me would approve of workplace recycling	367	0	4	1	5

I require more information on what (materials) to recycle at work	367	0	4	1	5
I require more information on how to recycle at work	367	0	4	1	5
I know the items that can be recycled at work	367	0	4	1	5
I know how to recycle at work	367	0	4	1	5
I require more information on the location of recycling facilities at work	367	0	4	1	5
I'm not interested in the idea of recycling	367	0	4	1	5
I believe people at work should make every effort to recycle	367	0	4	1	5
I've no knowledge of my workplace's waste management strategies	367	0	4	1	5
I'm not the type of person who is inclined to engage in recycling at work	367	0	4	1	5
To me personally, recycling at work is very important	367	0	4	1	5
Recycling at work is an important part of who I am	367	0	4	1	5
Recycling seems like the right thing to do	367	0	4	1	5
I'm the type of person who acts in an environmentally friendly way	367	0	4	1	5
It would be wrong of me not to recycle at work	367	0	4	1	5
Acting ethically is an important part of who I am	367	0	4	1	5
It would go against my personal principles if I did not recycle at work	367	0	4	1	5
The recycling facilities in my place of workplace are sufficient	367	0	4	1	5
There's no recycling facility in my place of work	367	0	4	1	5
I'm satisfied with the current recycling scheme at my workplace	367	0	4	1	5
There's little concern for recycling at my place of work	367	0	4	1	5
There's little information about recycling at my place of work	367	0	4	1	5
Volume of materials you recycle at HOME & WORK	367	0	1	1	2
Range of materials you recycle at HOME & WORK	367	0	1	1	2

Compare how often you recycle at HOME & WORK	367	0	1	1	2
Age range	367	0	7	0	7
Ethnic background	367	0	4	0	4
Employment Status	367	0	3	1	4
Gender	367	0	1	1	2
Highest qualification	367	0	4	0	4
Organisation category	367	0	1	1	2
Organisational membership	367	0	1	0	1
Personal annual income	367	0	4	0	4
Sector	367	0	30	0	30
Author					

Appendix 7: Frequency Distribution for Questionnaire Items

Appendix 7: Descriptive Statistics							
	N	Mean	Std. Deviation	Skewness		Kurtosis	
Questionnaire Items	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Paper (including envelopes, magazines & newspapers) at home	367	4.72	.685	-2.917	.127	8.986	.254
Plastic (including bottles & food containers) at home	367	4.65	.746	-2.688	.127	7.977	.254
Glass (including bottles & jars) at home	367	4.72	.729	-3.079	.127	10.146	.254
Metals (including drinks cans & food tins) at home	367	4.59	.906	-2.510	.127	5.840	.254
Food waste at home	367	3.60	1.611	-.592	.127	-1.310	.254
Cardboard at home	367	4.75	.665	-3.542	.127	14.400	.254
Garden waste at home	367	4.01	1.469	-1.163	.127	-.219	.254
Textiles at home	367	3.60	1.252	-.592	.127	-.636	.254
Paper (including envelopes, magazines & newspapers) at work	367	4.61	.792	-2.532	.127	7.027	.254
Plastic (including bottles & food containers) at work	367	4.33	1.111	-1.744	.127	2.146	.254
Glass (including bottles & jars) at work	367	3.86	1.516	-.914	.127	-.778	.254
Metals (including drinks cans & food tins) at work	367	4.04	1.419	-1.171	.127	-.166	.254
Food waste at work	367	3.33	1.748	-.355	.127	-1.664	.254
Cardboard at work	367	4.51	1.055	-2.317	.127	4.441	.254
Textiles at work	367	1.97	1.431	1.189	.127	-.096	.254
It frustrates me that my organisation doesn't do more to encourage recycling	367	2.81	1.235	.196	.127	-.945	.254
Recode Item	367	4.00	.818	-.607	.127	.287	.254
I feel guilty when I fail to recycle at work	367	3.78	.956	-.759	.127	.476	.254
When I recycle at work, I feel good	367	3.84	.852	-.460	.127	.327	.254
I'm not interested in the idea of recycling	367	1.42	.622	1.818	.127	5.585	.254
Recode	367	3.92	.998	-.709	.127	-.097	.254
To me personally, recycling at work is very important	367	4.24	.835	-1.099	.127	1.383	.254
I'm aware that recycling at work reduces the amount of waste that goes into landfill	367	4.35	.642	-1.150	.127	3.740	.254

I know that recycling at work helps preserve natural resources	367	4.29	.696	-1.193	.127	3.336	.254
I believe waste recycling could save land that would otherwise be needed for landfill	367	4.24	.870	-1.312	.127	2.035	.254
I'm aware that recycling at work is good for the environment	367	4.43	.636	-1.364	.127	4.440	.254
It is my personal responsibility to recycle waste at work	367	4.18	.736	-1.042	.127	2.357	.254
I make every effort to recycle at work	367	4.22	.783	-1.227	.127	2.319	.254
Recode AR3 (Recycling at work isn't worth the effort)	367	4.35	.689	-1.144	.127	2.601	.254
I would recycle if there was feedback about my personal contribution	367	2.32	1.114	.525	.127	-.468	.254
I would recycle at work if there was feedback about how much had been recycled in my workplace	367	2.65	1.175	.156	.127	-.938	.254
The arrangement of my work space makes recycling easy for me	367	3.57	1.138	-.593	.127	-.513	.254
Recode Off_Lay2 (The location of recycling bins makes it difficult to recycle at work)	367	3.82	1.186	-.858	.127	-.218	.254
It's convenient for me to recycle at work	367	3.75	1.155	-.873	.127	-.013	.254
Recode Off_Lay4 (Recycling at work takes up too much room)	367	4.24	.832	-1.281	.127	2.055	.254
Recode Org_Com1 (I'm satisfied with the current recycling scheme at my workplace)	367	2.54	1.123	.629	.127	-.498	.254
My organisation should put more effort into promoting recycling	367	3.25	1.205	-.290	.127	-.864	.254
In general, it takes a lot of effort to recycle at my workplace	367	2.18	1.053	.848	.127	.240	.254
There's little concern for recycling at my place of work	367	2.25	1.069	.863	.127	.341	.254
There's little information about recycling at my place of work	367	2.37	1.110	.655	.127	-.382	.254
There's no recycling facility in my place of work	367	1.64	.942	2.003	.127	4.206	.254
Recode_Org_Com7 (The recycling facilities in my place of workplace are sufficient)	367	2.62	1.206	.470	.127	-.807	.254

It would be wrong of me not to recycle at work	367	4.10	.809	-.934	.127	1.114	.254
It would go against my personal principles if I did not recycle at work	367	4.09	.825	-.809	.127	.631	.254
Recycling should be a normal part of our life at work	367	4.53	.700	-2.348	.127	8.714	.254
I believe people at work should make every effort to recycle	367	4.43	.665	-1.303	.127	3.305	.254
Recode_Per_Nms5 (I don't consider recycling to be an important issue)	367	4.53	.715	-2.146	.127	6.778	.254
Recycling seems like the right thing to do	367	4.41	.588	-.734	.127	1.883	.254
Acting ethically is an important part of who I am	367	4.22	.727	-.884	.127	1.496	.254
Recycling at work is an important part of who I am	367	3.82	.960	-.551	.127	-.113	.254
I'm the type of person who acts in an environmentally friendly way	367	4.02	.757	-.521	.127	.514	.254
Recode_Per_Nms10 (I'm not the type of person who is inclined to engage in recycling at work)	367	4.30	.845	-1.604	.127	3.370	.254
I have plenty of opportunities to recycle at work	367	3.79	1.087	-1.032	.127	.457	.254
It is mostly up to me whether I recycle at work or not	367	3.88	.993	-1.038	.127	.651	.254
I understand well enough what is being said about recycling at work	367	4.01	.887	-1.121	.127	1.686	.254
Recode PC4 (I have no control over whether I engage in recycling at work or not)	367	3.82	1.065	-.786	.127	-.061	.254
Recode Sch_Know1 (I know the items that can be recycled at work)	367	1.88	.839	1.380	.127	2.571	.254
I require more information on the location of recycling facilities at work	367	2.16	1.130	.891	.127	-.071	.254
I've no knowledge of my workplace's waste management strategies	367	2.17	1.127	.839	.127	-.128	.254
Recode Sch_Know4 (I know how to recycle at work)	367	1.82	.808	1.408	.127	3.031	.254
I require more information on what (materials) to recycle at work	367	2.40	1.187	.537	.127	-.747	.254
I require more information on how to recycle at work	367	2.38	1.090	.523	.127	-.446	.254

Most of my colleagues at work recycle	367	3.52	.955	-.780	.127	.574	.254
When I see my colleagues recycling, I feel I should recycle as well	367	3.63	.858	-.416	.127	.427	.254
Most of the people who are important to me would approve of workplace recycling	367	4.01	.747	-.603	.127	1.070	.254
Most of my colleagues at work expect me to recycle	367	3.38	.947	-.212	.127	.006	.254
I'm a person who considers friends and colleagues to be important	367	4.17	.650	-.489	.127	.941	.254
I like being a participant in group activities	367	3.51	.905	-.504	.127	.344	.254
It's important for me to maintain harmony within my group	367	3.59	.870	-.241	.127	.099	.254
I would take recycling at work more seriously if financially penalised for not doing it	367	1.98	1.152	1.142	.127	.434	.254
I would recycle at work only if I was paid to do so	367	1.47	.731	1.779	.127	3.714	.254
Recode Inc3 (I don't need monetary reward to recycle at work)	367	1.59	.699	1.257	.127	2.201	.254
Recycling at work is a trivial activity	367	2.18	1.115	.920	.127	.237	.254
Recycling only benefits people in the recycling business	367	1.51	.739	1.880	.127	4.954	.254
Valid N (listwise)	367						

Appendix 8: Constructs' Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Total Recycling at Home	367	24	6	30	27.03	3.983	-1.805	.127	3.673	.254
Total Recycling at Work	367	24	6	30	24.67	5.860	-1.221	.127	.915	.254
Total Subjective Norms	367	28	7	35	25.80	3.795	-.186	.127	1.336	.254
Total Attitude	367	20	11	31	24.01	3.177	-.209	.127	.843	.254
Total Awareness of Consequences	367	16	4	20	17.30	2.285	-.992	.127	3.059	.254
Total Ascription of Responsibility	367	12	3	15	12.75	1.828	-.794	.127	1.772	.254
Total Feedback	367	8	2	10	4.98	2.041	.322	.127	-.467	.254
Total Incentives	367	12	5	17	8.74	2.745	.455	.127	-.250	.254
Total Office Layout	367	15	5	20	15.38	3.613	-.659	.127	-.257	.254
Total Organisational Commitment	367	28	7	35	16.84	6.020	.703	.127	.393	.254
Total Perceived Control	367	16	4	20	15.50	2.858	-.769	.127	1.447	.254
Total Scheme Knowledge	367	17	12	29	17.42	2.876	.685	.127	.537	.254
Total Personal Norms	367	40	10	50	42.45	5.542	-.800	.127	2.316	.254
Valid N (listwise)	367									

Appendix 9: Item Total Statistics: Internal Reliability (Cronbach's Alpha)

Constructs/Items	Constructs Cronbach's Alpha	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Recycling at Home(**Rec_H**)					
Paper	.755	26.03	15.102	.620	.712
Plastic		26.12	14.755	.594	.710
Glass		26.04	15.001	.566	.716
Metals		26.16	13.708	.635	.693
Food waste		27.17	11.038	.454	.771
Cardboard		26.00	15.543	.547	.724
Textiles		27.16	13.591	.364	.760
Recycling at Work (**Rec_W**)					
Paper	.804	22.28	32.919	.541	.789
Plastic		22.54	28.968	.697	.756
Glass		23.02	26.128	.628	.760
Metals		22.84	26.301	.683	.749
Food waste		23.55	25.897	.510	.793
Cardboard		22.36	30.622	.579	.776
Textiles		24.93	30.530	.334	.818
Attitudes (**Att**)					
Att1	.467	21.25	7.364	.101	.512
*Att2		20.04	7.138	.410	.346
Att3		20.25	6.443	.469	.297
Att4		20.19	6.722	.495	.301
Att5		22.64	11.235	-.513	.626
*Att6		20.13	7.616	.173	.453
Att7		19.80	6.925	.451	.325
Attitudes (Items 1 & 5 removed)					
*Att2	.711	15.83	6.455	.455	.668
Att3		16.04	5.842	.497	.651
Att4		15.98	6.025	.551	.631
*Att6		15.92	6.420	.310	.735
Att7		15.59	6.003	.568	.624
Awareness of Consequences (**AC**)					
AC1	.785	12.98	2.813	.677	.697
AC2		13.04	2.653	.673	.691
AC3		13.10	2.564	.443	.843
AC4		12.90	2.859	.665	.704

Ascription of Responsibility (**AR**)					
AR1	.747	8.61	1.520	.546	.695
AR2		8.57	1.354	.594	.641
*AR3		8.45	1.518	.585	.652
Perceived Control (**PC**)					
PC1	.629	11.77	4.082	.483	.501
PC2		11.70	5.131	.268	.655
PC3		11.56	4.833	.464	.531
*PC4		11.76	4.228	.442	.534
Performance Feedback (**Fedbk**)					
Fedbk1	.739	2.66	1.363	.586	
Fedbk2		2.33	1.237	.586	
Office Layout (**Off_Lay**)					
Off_Lay1	.858	11.87	6.929	.762	.793
*Off_Lay2		11.60	6.686	.787	.781
Off_Lay3		11.68	7.042	.727	.809
*Off_Lay4		11.23	9.155	.557	.874
Subjective Norms (**Subj_Nms**)					
Subj_Nms1	.739	22.37	9.989	.417	.718
Subj_Nms2		22.28	10.577	.355	.731
Subj_Nms3		21.92	10.200	.528	.694
Subj_Nms4		22.52	9.721	.462	.707
Subj_Nms5		21.75	10.886	.461	.711
Subj_Nms6		22.41	9.691	.483	.702
Subj_Nms7		22.34	9.763	.502	.697
Incentives (**Inc**)					
Inc1	.555	6.73	4.595	.275	.543
Inc2		7.23	5.204	.452	.437
*Inc3		7.15	5.491	.426	.460
Inc4		6.54	5.219	.161	.615
Inc5		7.20	5.304	.433	.449
Scheme Knowledge (**Sch_Know**)					
*Sch_Know1	.850	10.84	16.381	.622	.830
Sch_Know2		10.56	14.108	.692	.813
Sch_Know3		10.54	15.073	.558	.841
*Sch_Know4		10.91	16.543	.636	.830
Sch_Know5		10.30	13.471	.710	.810
Sch_Know6		10.33	14.593	.646	.823
Personal Norms (**Per_Nms**)					
Per_Nms1		38.46	21.904	.653	.874
Per_Nms2		38.48	21.008	.772	.865

Per_Nms3	.887	38.05	23.775	.460	.887
Per_Nms4		38.15	22.763	.669	.874
Per_Nms5		38.04	23.806	.445	.888
Per_Nms6		38.16	23.385	.665	.875
Per_Nms7		38.35	22.144	.702	.871
Per_Nms8		38.74	20.125	.753	.866
Per_Nms9		38.56	22.157	.659	.874
Per_Nms10		38.27	22.711	.493	.887
Perceived Organisational Commitment (**Org_Com**)					
*Org_Com1	.882	14.14	23.229	.811	.847
Org_Com2		13.42	24.851	.560	.881
Org_Com3		14.49	25.309	.640	.869
Org_Com4		14.43	24.926	.672	.865
Org_Com5		14.32	24.206	.712	.860
Org_Com6		15.06	27.306	.535	.881
*Org_Com7		14.07	22.876	.772	.851
*Reverse coded items					

Appendix 10: SEM AMOS Outputs

Common Latent Factor (CLF) Model: Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	149	565.037	412	.000	1.371
Saturated model	561	.000	0		
Independence model	33	6645.541	528	.000	12.586

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.030	.917	.887	.673
Saturated model	.000	1.000		
Independence model	.257	.281	.236	.264

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.915	.891	.975	.968	.975
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.780	.714	.761
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	153.037	94.700	219.430
Saturated model	.000	.000	.000
Independence model	6117.541	5857.983	6383.555

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.574	.426	.264	.611
Saturated model	.000	.000	.000	.000
Independence model	18.511	17.041	16.318	17.781

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.032	.025	.039	1.000
Independence model	.180	.176	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	863.037	894.213	1442.067	1591.067
Saturated model	1122.000	1239.378	3302.104	3863.104
Independence model	6711.541	6718.446	6839.783	6872.783

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.404	2.242	2.589	2.491
Saturated model	3.125	3.125	3.125	3.452
Independence model	18.695	17.972	19.436	18.714

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	293	307
Independence model	32	33

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Rec_H	<-->	Org_Com	.009	.020	.465	.642	par_28
Off_Layout	<-->	Org_Com	-.803	.080	-10.051	***	par_29
Org_Com	<-->	Per_Nms	-.090	.041	-2.188	.029	par_30
Rec_W	<-->	Org_Com	-.190	.044	-4.351	***	par_31
Sch_Know	<-->	Org_Com	.560	.067	8.347	***	par_32
Org_Com	<-->	AC	-.068	.030	-2.292	.022	par_33
Org_Com	<-->	AR	-.154	.033	-4.647	***	par_34
Org_Com	<-->	Fedbk	.196	.065	3.022	.003	par_35
Org_Com	<-->	Subj_Nms	-.421	.056	-7.466	***	par_36
Rec_H	<-->	Off_Layout	-.013	.021	-.628	.530	par_37
Rec_H	<-->	Per_Nms	.061	.015	3.977	***	par_38
Rec_H	<-->	Rec_W	.027	.010	2.682	.007	par_39
Rec_H	<-->	Sch_Know	-.027	.019	-1.406	.160	par_40
Rec_H	<-->	AC	.018	.010	1.768	.077	par_41
Rec_H	<-->	AR	.037	.011	3.386	***	par_42
Rec_H	<-->	Fedbk	-.003	.022	-.154	.878	par_43
Rec_H	<-->	Subj_Nms	.001	.014	.053	.958	par_44
Off_Layout	<-->	Per_Nms	.162	.044	3.642	***	par_45
Rec_W	<-->	Off_Layout	.155	.042	3.657	***	par_46
Off_Layout	<-->	Sch_Know	-.586	.071	-8.265	***	par_47
Off_Layout	<-->	AC	.125	.032	3.889	***	par_48
Off_Layout	<-->	AR	.189	.036	5.214	***	par_49
Off_Layout	<-->	Fedbk	-.246	.068	-3.597	***	par_50
Off_Layout	<-->	Subj_Nms	.352	.055	6.385	***	par_51
Rec_W	<-->	Per_Nms	.066	.021	3.098	.002	par_52
Sch_Know	<-->	Per_Nms	-.117	.039	-2.978	.003	par_53
Per_Nms	<-->	AC	.231	.026	8.977	***	par_54

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Per_Nms	<-->	AR	.245	.029	8.338	***	par_55
Per_Nms	<-->	Fedbk	-.012	.045	-.271	.786	par_56
Per_Nms	<-->	Subj_Nms	.077	.030	2.566	.010	par_57
Rec_W	<-->	Sch_Know	-.121	.033	-3.680	***	par_58
Rec_W	<-->	AC	.036	.014	2.516	.012	par_59
Rec_W	<-->	AR	.065	.019	3.390	***	par_60
Rec_W	<-->	Fedbk	-.054	.026	-2.079	.038	par_61
Rec_W	<-->	Subj_Nms	.119	.030	3.952	***	par_62
Sch_Know	<-->	AC	-.122	.029	-4.211	***	par_63
Sch_Know	<-->	AR	-.190	.033	-5.782	***	par_64
Sch_Know	<-->	Fedbk	.495	.068	7.279	***	par_65
Sch_Know	<-->	Subj_Nms	-.293	.048	-6.098	***	par_66
AC	<-->	AR	.166	.021	8.031	***	par_67
AC	<-->	Fedbk	-.055	.032	-1.686	.092	par_68
AC	<-->	Subj_Nms	.042	.021	1.956	.050	par_69
AR	<-->	Fedbk	-.049	.032	-1.531	.126	par_70
AR	<-->	Subj_Nms	.082	.023	3.504	***	par_71
Fedbk	<-->	Subj_Nms	-.070	.046	-1.529	.126	par_72
e12	<-->	e7	.079	.028	2.841	.005	par_11
e1	<-->	e6	.074	.014	5.263	***	par_14
e9	<-->	e10	.245	.095	2.573	.010	par_15
e17	<-->	e50	.179	.060	2.988	.003	par_16
e54	<-->	e55	.145	.046	3.161	.002	par_73

Full Measurement Model: Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	116	660.741	445	.000	1.485
Saturated model	561	.000	0		
Independence model	33	6645.541	528	.000	12.586

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.035	.903	.877	.716
Saturated model	.000	1.000		
Independence model	.257	.281	.236	.264

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.901	.882	.965	.958	.965
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.843	.759	.813
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	215.741	150.834	288.629
Saturated model	.000	.000	.000
Independence model	6117.541	5857.983	6383.555

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	1.841	.601	.420	.804
Saturated model	.000	.000	.000	.000
Independence model	18.511	17.041	16.318	17.781

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.037	.031	.043	1.000
Independence model	.180	.176	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	892.741	917.012	1343.529	1459.529
Saturated model	1122.000	1239.378	3302.104	3863.104
Independence model	6711.541	6718.446	6839.783	6872.783

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.487	2.306	2.690	2.554
Saturated model	3.125	3.125	3.125	3.452
Independence model	18.695	17.972	19.436	18.714

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	270	282
Independence model	32	33

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Rec_H	<-->	Org_Com	-.002	.020	-.122	.903	par_28
Off_Layout	<-->	Org_Com	-.836	.077	-10.848	***	par_29
Org_Com	<-->	Per_Nms	-.111	.039	-2.830	.005	par_30
Rec_W	<-->	Org_Com	-.283	.037	-7.629	***	par_31
Sch_Know	<-->	Org_Com	.577	.066	8.767	***	par_32
Org_Com	<-->	AC	-.084	.029	-2.926	.003	par_33
Org_Com	<-->	AR	-.182	.032	-5.708	***	par_34
Org_Com	<-->	Fedbk	.150	.063	2.365	.018	par_35
Org_Com	<-->	Subj_Nms	-.434	.054	-8.022	***	par_36
Rec_H	<-->	Off_Layout	-.001	.021	-.029	.977	par_37
Rec_H	<-->	Per_Nms	.067	.016	4.324	***	par_38
Rec_H	<-->	Rec_W	.045	.012	3.831	***	par_39
Rec_H	<-->	Sch_Know	-.033	.020	-1.647	.100	par_40
Rec_H	<-->	AC	.022	.010	2.096	.036	par_41
Rec_H	<-->	AR	.045	.011	3.944	***	par_42
Rec_H	<-->	Fedbk	.006	.023	.247	.805	par_43
Rec_H	<-->	Subj_Nms	.007	.014	.521	.603	par_44
Off_Layout	<-->	Per_Nms	.188	.043	4.371	***	par_45
Rec_W	<-->	Off_Layout	.261	.037	6.984	***	par_46
Off_Layout	<-->	Sch_Know	-.619	.069	-8.903	***	par_47
Off_Layout	<-->	AC	.143	.031	4.547	***	par_48
Off_Layout	<-->	AR	.226	.035	6.443	***	par_49
Off_Layout	<-->	Fedbk	-.197	.068	-2.889	.004	par_50
Off_Layout	<-->	Subj_Nms	.386	.053	7.272	***	par_51
Rec_W	<-->	Per_Nms	.101	.022	4.536	***	par_52
Sch_Know	<-->	Per_Nms	-.129	.039	-3.300	***	par_53
Per_Nms	<-->	AC	.234	.026	9.165	***	par_54

Covariances: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
Per_Nms	<-->	AR	.259	.029	8.894	***	par_55
Per_Nms	<-->	Fedbk	.006	.044	.134	.893	par_56
Per_Nms	<-->	Subj_Nms	.089	.029	3.094	.002	par_57
Rec_W	<-->	Sch_Know	-.185	.033	-5.689	***	par_58
Rec_W	<-->	AC	.058	.016	3.712	***	par_59
Rec_W	<-->	AR	.111	.018	6.013	***	par_60
Rec_W	<-->	Fedbk	-.031	.033	-.925	.355	par_61
Rec_W	<-->	Subj_Nms	.183	.028	6.598	***	par_62
Sch_Know	<-->	AC	-.129	.029	-4.445	***	par_63
Sch_Know	<-->	AR	-.209	.033	-6.395	***	par_64
Sch_Know	<-->	Fedbk	.483	.068	7.077	***	par_65
Sch_Know	<-->	Subj_Nms	-.311	.047	-6.572	***	par_66
AC	<-->	AR	.176	.021	8.523	***	par_67
AC	<-->	Fedbk	-.041	.032	-1.284	.199	par_68
AC	<-->	Subj_Nms	.051	.021	2.450	.014	par_69
AR	<-->	Fedbk	-.028	.032	-.857	.391	par_70
AR	<-->	Subj_Nms	.100	.023	4.432	***	par_71
Fedbk	<-->	Subj_Nms	-.045	.045	-1.002	.317	par_72
e12	<-->	e7	.100	.026	3.879	***	par_11
e1	<-->	e6	.080	.014	5.556	***	par_14
e9	<-->	e10	.453	.077	5.893	***	par_15
e17	<-->	e50	.272	.051	5.355	***	par_16
e54	<-->	e55	.172	.045	3.790	***	par_73

Full Structural Model: Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	103	742.602	458	.000	1.621
Saturated model	561	.000	0		
Independence model	33	6645.541	528	.000	12.586

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.046	.891	.867	.728
Saturated model	.000	1.000		
Independence model	.257	.281	.236	.264

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.888	.871	.954	.946	.953
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.867	.770	.827
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	284.602	213.971	363.140
Saturated model	.000	.000	.000
Independence model	6117.541	5857.983	6383.555

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.069	.793	.596	1.012
Saturated model	.000	.000	.000	.000
Independence model	18.511	17.041	16.318	17.781

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.042	.036	.047	.995
Independence model	.180	.176	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	948.602	970.153	1348.870	1451.870
Saturated model	1122.000	1239.378	3302.104	3863.104
Independence model	6711.541	6718.446	6839.783	6872.783

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.642	2.446	2.861	2.702
Saturated model	3.125	3.125	3.125	3.452
Independence model	18.695	17.972	19.436	18.714

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	247	257
Independence model	32	33

Models

Default model (Default model)

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	561
Number of distinct parameters to be estimated:	103
Degrees of freedom (561 - 103):	458

Result (Default model)

Minimum was achieved
Chi-square = 742.602
Degrees of freedom = 458
Probability level = .000

Group number 1 (Group number 1 - Default model)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
AR	<---	AC	.805	.072	11.209	***	par_31
Per_Nms	<---	AR	1.268	.109	11.672	***	par_32
Rec_W	<---	Rec_H	.327	.143	2.293	.022	par_21
Rec_W	<---	Org_Com	-1.230	1.681	-.731	.464	par_22
Rec_W	<---	Sch_Know	.263	.311	.848	.397	par_23
Rec_W	<---	Off_Layout	-.579	.971	-.596	.551	par_24
Rec_W	<---	Fedbk	-.114	.157	-.727	.467	par_34
Rec_W	<---	Subj_Nms	-.164	.595	-.276	.783	par_36
Rec_W	<---	Per_Nms	-.121	.102	-1.187	.235	par_37
Rec_W	<---	AR	.586	.247	2.369	.018	par_38
Rec_W	<---	AC	-.025	.348	-.071	.943	par_39
Rec_H2	<---	Rec_H	1.618	.155	10.452	***	par_1
Rec_H1	<---	Rec_H	1.219	.101	12.071	***	par_2
Rec_W4	<---	Rec_W	2.019	.163	12.360	***	par_3
Rec_W6	<---	Rec_W	1.185	.099	11.906	***	par_4
Off_Lay1	<---	Off_Layout	1.000				
Sch_Know2	<---	Sch_Know	1.000				
Sch_Know3	<---	Sch_Know	.764	.065	11.737	***	par_5
Org_Com6	<---	Org_Com	.610	.050	12.114	***	par_6
R_Org_Com7	<---	Org_Com	1.043	.042	24.795	***	par_7
R_Off_Lay2	<---	Off_Layout	.885	.048	18.276	***	par_8
Sch_Know5	<---	Sch_Know	.915	.070	12.995	***	par_9
Sch_Know6	<---	Sch_Know	.811	.064	12.673	***	par_10
R_Org_Com1	<---	Org_Com	1.000				
Rec_H3	<---	Rec_H	1.341	.140	9.547	***	par_13
Rec_H4	<---	Rec_H	2.093	.196	10.687	***	par_14
Rec_H6	<---	Rec_H	1.000				
Per_Nms7	<---	Per_Nms	.766	.049	15.759	***	par_15
Per_Nms8	<---	Per_Nms	1.173	.061	19.350	***	par_16
Per_Nms9	<---	Per_Nms	.819	.051	16.164	***	par_17
AC4	<---	AC	1.000				
Rec_W2	<---	Rec_W	1.850	.134	13.772	***	par_18
Rec_W1	<---	Rec_W	1.000				
Rec_W3	<---	Rec_W	1.675	.174	9.607	***	par_19
AC1	<---	AC	.972	.062	15.580	***	par_25
AC2	<---	AC	1.081	.069	15.756	***	par_26
Fedbk1	<---	Fedbk	1.000				
Fedbk2	<---	Fedbk	1.767	.284	6.223	***	par_28
Per_Nms2	<---	Per_Nms	1.000				
AR1	<---	AR	1.000				
R_AR3	<---	AR	1.014	.091	11.158	***	par_29
AR2	<---	AR	1.216	.102	11.873	***	par_30
Subj_Nms1	<---	Subj_Nms	1.000				
Subj_Nms4	<---	Subj_Nms	.833	.075	11.123	***	par_33

Full Hypothesised Model: Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	102	748.203	459	.000	1.630
Saturated model	561	.000	0		
Independence model	33	6645.541	528	.000	12.586

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.047	.891	.866	.729
Saturated model	.000	1.000		
Independence model	.257	.281	.236	.264

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.887	.870	.953	.946	.953
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.869	.771	.828
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	289.203	218.199	368.109
Saturated model	.000	.000	.000
Independence model	6117.541	5857.983	6383.555

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2.084	.806	.608	1.025
Saturated model	.000	.000	.000	.000
Independence model	18.511	17.041	16.318	17.781

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.042	.036	.047	.994
Independence model	.180	.176	.184	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	952.203	973.544	1348.585	1450.585
Saturated model	1122.000	1239.378	3302.104	3863.104
Independence model	6711.541	6718.446	6839.783	6872.783

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	2.652	2.455	2.872	2.712
Saturated model	3.125	3.125	3.125	3.452
Independence model	18.695	17.972	19.436	18.714

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	245	256
Independence model	32	33

Models

Default model (Default model)

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	561
Number of distinct parameters to be estimated:	102
Degrees of freedom (561 - 102):	459

Result (Default model)

Minimum was achieved

Chi-square = 748.203

Degrees of freedom = 459

Probability level = .000

Group number 1 (Group number 1 - Default model)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)							
			Estimate	S.E.	C.R.	P	Label
AR	<---	AC	.816	.072	11.300	***	par_31
Per_Nms	<---	AR	1.255	.107	11.774	***	par_32
Rec_W	<---	Rec_H	.339	.153	2.220	.026	par_21
Rec_W	<---	Org_Com	-1.349	1.873	-.720	.471	par_22
Rec_W	<---	Sch_Know	.259	.345	.750	.453	par_23
Rec_W	<---	Off_Layout	-.645	1.084	-.595	.552	par_24
Rec_W	<---	Fedbk	-.111	.175	-.632	.528	par_34
Rec_W	<---	Subj_Nms	-.204	.655	-.311	.755	par_36
Rec_W	<---	Per_Nms	.076	.060	1.269	.204	par_37
Rec_W	<---	AC	.257	.359	.716	.474	par_38
Rec_H2	<---	Rec_H	1.615	.155	10.455	***	par_1
Rec_H1	<---	Rec_H	1.219	.101	12.080	***	par_2
Rec_W4	<---	Rec_W	2.021	.160	12.628	***	par_3
Rec_W6	<---	Rec_W	1.186	.097	12.166	***	par_4
Off_Lay1	<---	Off_Layout	1.000				
Sch_Know2	<---	Sch_Know	1.000				
Sch_Know3	<---	Sch_Know	.764	.065	11.755	***	par_5
Org_Com6	<---	Org_Com	.611	.050	12.142	***	par_6
R_Org_Com7	<---	Org_Com	1.043	.042	24.805	***	par_7
R_Off_Lay2	<---	Off_Layout	.886	.048	18.285	***	par_8
Sch_Know5	<---	Sch_Know	.912	.070	12.969	***	par_9
Sch_Know6	<---	Sch_Know	.809	.064	12.660	***	par_10
R_Org_Com1	<---	Org_Com	1.000				
Rec_H3	<---	Rec_H	1.341	.140	9.559	***	par_13
Rec_H4	<---	Rec_H	2.092	.196	10.696	***	par_14
Rec_H6	<---	Rec_H	1.000				
Per_Nms7	<---	Per_Nms	.767	.049	15.768	***	par_15
Per_Nms8	<---	Per_Nms	1.173	.061	19.321	***	par_16
Per_Nms9	<---	Per_Nms	.820	.051	16.158	***	par_17
AC4	<---	AC	1.000				
Rec_W2	<---	Rec_W	1.850	.131	14.101	***	par_18
Rec_W1	<---	Rec_W	1.000				
Rec_W3	<---	Rec_W	1.679	.171	9.833	***	par_19
AC1	<---	AC	.972	.063	15.551	***	par_25
AC2	<---	AC	1.083	.069	15.762	***	par_26
Fedbk1	<---	Fedbk	1.000				
Fedbk2	<---	Fedbk	1.768	.284	6.218	***	par_28
Per_Nms2	<---	Per_Nms	1.000				
AR1	<---	AR	1.000				
R_AR3	<---	AR	1.010	.090	11.275	***	par_29
AR2	<---	AR	1.189	.101	11.827	***	par_30
Subj_Nms1	<---	Subj_Nms	1.000				
Subj_Nms4	<---	Subj_Nms	.826	.075	11.066	***	par_33

Bootstrap (Default model)

Summary of Bootstrap Iterations (Default model)

(Default model)			
Iterations	Method 0	Method 1	Method 2
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	1
8	0	0	5
9	0	0	12
10	0	0	44
11	0	0	81
12	0	0	55
13	0	0	68
14	0	0	42
15	0	0	44
16	0	0	50
17	0	1	38
18	0	1	33
19	0	4019	506
Total	0	4021	979

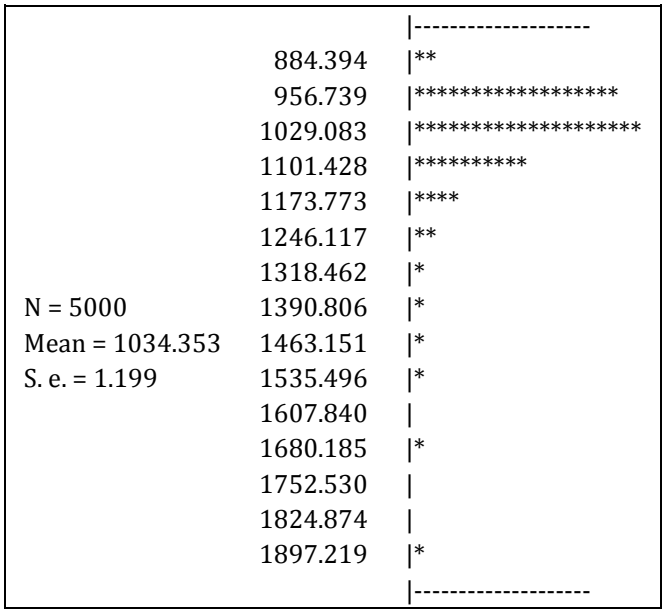
0 bootstrap samples were unused because of a singular covariance matrix.
2992 bootstrap samples were unused because a solution was not found.
5000 usable bootstrap samples were obtained.

Bootstrap Distributions (Default model)

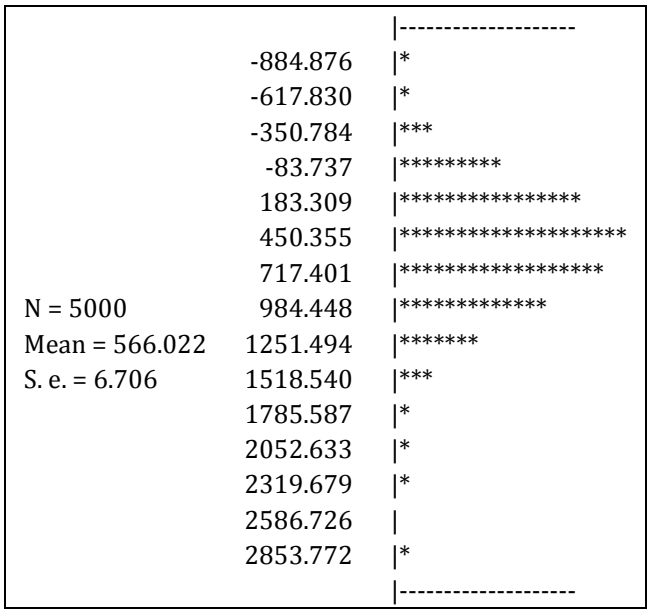
ML discrepancy (implied vs sample) (Default model)

```
                                |--------------------
                      977.301   |*
                     1031.124   |*
                     1084.947   |***
                     1138.770   |********
                     1192.593   |****************
                     1246.416   |********************
                     1300.239   |********************
N = 5000             1354.062   |***************
Mean = 1283.221      1407.885   |*********
S. e. = 1.400        1461.708   |****
                     1515.531   |**
                     1569.354   |*
                     1623.176   |*
                     1676.999   |*
                     1730.822   |*
                                |--------------------
```

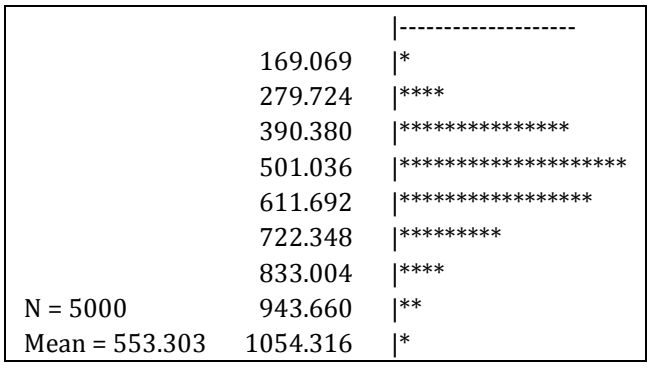
ML discrepancy (implied vs pop) (Default model)



K-L overoptimism (unstabilized) (Default model)



K-L overoptimism (stabilized) (Default model)



S. e. = 2.296	1164.972	|*
	1275.628	|*
	1386.284	|*
	1496.940	|*
	1607.595	|*
	1718.251	|*
		|----------

PROCESS Output: Mediated-Moderation Model

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Per_N
    V = ZT_Sch_K

Sample size
        360

**************************************************************************
Outcome: ZT_Per_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .248      .061      .941    23.426     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .248      .051     4.840      .000      .147      .349

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .421      .178      .834    15.294     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.006	.049	.124	.901	-.090	.102
ZT_Per_N	.205	.051	4.058	.000	.106	.305
ZT_Rec_H	.151	.050	3.009	.003	.052	.250
ZT_Sch_K	-.254	.049	-5.175	.000	-.350	-.157
int_1	.009	.048	.196	.845	-.085	.104
int_2	.060	.047	1.267	.206	-.033	.153

Covariance matrix of regression parameter estimates

	constant	ZT_Per_N	ZT_Rec_H	ZT_Sch_K	int_1	int_2
constant	.002	.000	.000	.000	.000	.000
ZT_Per_N	.000	.003	-.001	.000	.000	.000
ZT_Rec_H	.000	-.001	.003	.000	.000	.000
ZT_Sch_K	.000	.000	.000	.002	.000	.000
int_1	.000	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_Per_N	X	ZT_Sch_K
int_2	ZT_Rec_H	X	ZT_Sch_K

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Sch_K	Effect	SE	t	p	LLCI	ULCI
-1.421	.066	.088	.748	.455	-.108	.240
-.858	.100	.068	1.465	.144	-.034	.233
-.295	.133	.054	2.487	.013	.028	.239
.549	.184	.054	3.420	.001	.078	.289
1.393	.234	.078	3.006	.003	.081	.387

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Sch_K	Effect	Boot SE	BootLLCI	BootULCI
ZT_Per_N	-1.421	.048	.021	.012	.099
ZT_Per_N	-.858	.049	.017	.021	.089
ZT_Per_N	-.295	.050	.015	.024	.086
ZT_Per_N	.549	.052	.019	.021	.098

```
ZT_Per_N     1.393      .054      .028      .008      .121

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

********************* INDEX OF MODERATED MEDIATION ************************

Mediator
             Index  SE(Boot)  BootLLCI  BootULCI
ZT_Per_N      .002      .014     -.024      .031

********************* ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Per_N ZT_Sch_K

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Per_N
    V = ZT_Org_C

Sample size
        360

**************************************************************************
Outcome: ZT_Per_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .248      .061      .941    23.426     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .248      .051     4.840      .000      .147      .349

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .561      .315      .695    32.568     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.001	.044	-.025	.980	-.089	.086
ZT_Per_N	.172	.046	3.732	.000	.081	.263
ZT_Rec_H	.188	.045	4.138	.000	.099	.278
ZT_Org_C	-.459	.045	-10.283	.000	-.546	-.371
int_1	-.007	.045	-.146	.884	-.095	.082
int_2	.050	.048	1.035	.301	-.045	.144

Covariance matrix of regression parameter estimates

	constant	ZT_Per_N	ZT_Rec_H	ZT_Org_C	int_1	int_2
constant	.002	.000	.000	.000	.000	.000
ZT_Per_N	.000	.002	-.001	.000	.000	.000
ZT_Rec_H	.000	-.001	.002	.000	.000	.000
ZT_Org_C	.000	.000	.000	.002	.000	.000
int_1	.000	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_Per_N	X	ZT_Org_C
int_2	ZT_Rec_H	X	ZT_Org_C

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Org_C	Effect	SE	t	p	LLCI	ULCI
-1.361	.121	.078	1.549	.122	-.033	.274
-.625	.157	.053	2.942	.003	.052	.262
-.257	.176	.047	3.762	.000	.084	.267
.848	.230	.062	3.707	.000	.108	.352
1.216	.249	.075	3.303	.001	.101	.396

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Org_C	Effect	Boot SE	BootLLCI	BootULCI
ZT_Per_N	-1.361	.045	.022	.008	.098
ZT_Per_N	-.625	.044	.015	.020	.079
ZT_Per_N	-.257	.043	.014	.021	.075
ZT_Per_N	.848	.041	.022	.004	.094

```
ZT_Per_N     1.216      .041      .027     -.006      .102

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

********************* INDEX OF MODERATED MEDIATION ************************

Mediator
             Index  SE(Boot)  BootLLCI  BootULCI
ZT_Per_N     -.002      .016     -.035      .029

********************* ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Per_N ZT_Org_C

------ END MATRIX -----

restore.
```

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 ******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Per_N
    V = ZT_Off_L

Sample size
        360

**************************************************************************
Outcome: ZT_Per_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .248      .061      .941    23.426     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .248      .051     4.840      .000      .147      .349

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .474      .224      .787    20.488     5.000   354.000      .000

Model
```

	coeff	se	t	p	LLCI	ULCI
constant	.008	.048	.156	.876	-.087	.102
ZT_Per_N	.162	.050	3.256	.001	.064	.260
ZT_Rec_H	.191	.048	3.940	.000	.096	.286
ZT_Off_L	.345	.048	7.145	.000	.250	.440
int_1	-.032	.049	-.652	.515	-.130	.065
int_2	.011	.047	.223	.824	-.082	.103

Covariance matrix of regression parameter estimates

	constant	ZT_Per_N	ZT_Rec_H	ZT_Off_L	int_1	int_2
constant	.002	.000	.000	.000	-.001	.000
ZT_Per_N	.000	.002	-.001	-.001	.000	.000
ZT_Rec_H	.000	-.001	.002	.000	.000	.000
ZT_Off_L	.000	-.001	.000	.002	.000	.000
int_1	-.001	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_Per_N	X	ZT_Off_L
int_2	ZT_Rec_H	X	ZT_Off_L

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Off_L	Effect	SE	t	p	LLCI	ULCI
-1.638	.174	.090	1.928	.055	-.003	.351
-.688	.184	.058	3.191	.002	.070	.297
.261	.194	.050	3.846	.000	.095	.293
.736	.199	.060	3.286	.001	.080	.318
1.211	.204	.076	2.678	.008	.054	.353

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Off_L	Effect	Boot SE	BootLLCI	BootULCI
ZT_Per_N	-1.638	.053	.038	-.010	.141
ZT_Per_N	-.688	.046	.023	.008	.100
ZT_Per_N	.261	.038	.013	.016	.068
ZT_Per_N	.736	.034	.014	.011	.065
ZT_Per_N	1.211	.031	.018	-.003	.069

```
Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

********************* INDEX OF MODERATED MEDIATION ************************

Mediator
             Index  SE(Boot)  BootLLCI  BootULCI
ZT_Per_N     -.008      .017     -.046      .023

********************* ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Per_N ZT_Off_L

------ END MATRIX -----
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AC
    V = ZT_Sch_K

Sample size
        360

**************************************************************************
Outcome: ZT_AC

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .120      .014      .988     5.192     1.000   358.000      .023

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .052      .000     1.000     -.103      .103
ZT_Rec_H      .120      .052     2.279      .023      .016      .223

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .396      .157      .855    13.157     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.004	.050	.076	.939	-.095	.103
ZT_AC	.138	.051	2.672	.008	.036	.239
ZT_Rec_H	.185	.050	3.731	.000	.088	.283
ZT_Sch_K	-.252	.052	-4.840	.000	-.354	-.149
int_1	-.003	.051	-.068	.946	-.104	.097
int_2	.064	.048	1.349	.178	-.029	.158

Covariance matrix of regression parameter estimates

	constant	ZT_AC	ZT_Rec_H	ZT_Sch_K	int_1	int_2
constant	.003	.000	.000	.000	.001	.000
ZT_AC	.000	.003	.000	.001	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Sch_K	.000	.001	.000	.003	-.001	.000
int_1	.001	.000	.000	-.001	.003	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_AC	X	ZT_Sch_K
int_2	ZT_Rec_H	X	ZT_Sch_K

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Sch_K	Effect	SE	t	p	LLCI	ULCI
-1.421	.094	.089	1.053	.293	-.081	.269
-.858	.130	.068	1.902	.058	-.004	.264
-.295	.166	.053	3.115	.002	.061	.271
.549	.220	.053	4.160	.000	.116	.325
1.393	.275	.078	3.543	.000	.122	.427

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Sch_K	Effect	Boot SE	BootLLCI	BootULCI
ZT_AC	-1.421	.017	.013	.000	.053
ZT_AC	-.858	.017	.011	.002	.047
ZT_AC	-.295	.017	.010	.003	.042
ZT_AC	.549	.016	.010	.002	.044

```
ZT_AC     1.393      .016      .013     -.003      .053

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AC      .000      .007     -.016      .012

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AC    ZT_Sch_K

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AC
    V = ZT_Org_C

Sample size
        360

**************************************************************************
Outcome: ZT_AC

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .120      .014      .988     5.192     1.000   358.000      .023

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .052      .000     1.000     -.103      .103
ZT_Rec_H      .120      .052     2.279      .023      .016      .223

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .551      .304      .706    30.915     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.008	.045	-.170	.865	-.096	.081
ZT_AC	.127	.046	2.764	.006	.037	.217
ZT_Rec_H	.218	.045	4.877	.000	.130	.306
ZT_Org_C	-.453	.046	-9.774	.000	-.545	-.362
int_1	-.046	.045	-1.039	.300	-.134	.042
int_2	.059	.047	1.243	.215	-.034	.152

Covariance matrix of regression parameter estimates

	constant	ZT_AC	ZT_Rec_H	ZT_Org_C	int_1	int_2
constant	.002	.000	.000	.000	.000	.000
ZT_AC	.000	.002	.000	.000	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Org_C	.000	.000	.000	.002	-.001	.000
int_1	.000	.000	.000	-.001	.002	.000
int_2	.000	.000	.000	.000	.000	.002

Product terms key:

int_1	ZT_AC	X	ZT_Org_C
int_2	ZT_Rec_H	X	ZT_Org_C

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Org_C	Effect	SE	t	p	LLCI	ULCI
-1.361	.138	.077	1.788	.075	-.014	.290
-.625	.181	.053	3.431	.001	.077	.285
-.257	.203	.046	4.414	.000	.113	.293
.848	.268	.061	4.399	.000	.148	.388
1.216	.290	.074	3.922	.000	.144	.435

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Org_C	Effect	Boot SE	BootLLCI	BootULCI
ZT_AC	-1.361	.023	.016	.001	.064
ZT_AC	-.625	.019	.011	.002	.047
ZT_AC	-.257	.017	.010	.002	.041
ZT_AC	.848	.010	.011	-.004	.041

```
ZT_AC     1.216      .008      .013     -.011      .043

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AC     -.006      .009     -.028      .007

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AC    ZT_Org_C

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AC
    V = ZT_Off_L

Sample size
        360

**************************************************************************
Outcome: ZT_AC

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .120      .014      .988     5.192     1.000   358.000      .023

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .052      .000     1.000     -.103      .103
ZT_Rec_H      .120      .052     2.279      .023      .016      .223

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .462      .214      .798    19.227     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.008	.048	.169	.866	-.087	.103
ZT_AC	.107	.050	2.153	.032	.009	.205
ZT_Rec_H	.217	.048	4.553	.000	.123	.310
ZT_Off_L	.363	.049	7.408	.000	.267	.459
int_1	-.034	.045	-.747	.456	-.123	.055
int_2	.014	.046	.309	.758	-.076	.105

Covariance matrix of regression parameter estimates

	constant	ZT_AC	ZT_Rec_H	ZT_Off_L	int_1	int_2
constant	.002	.000	.000	.000	.000	.000
ZT_AC	.000	.002	.000	-.001	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Off_L	.000	-.001	.000	.002	.000	.000
int_1	.000	.000	.000	.000	.002	.000
int_2	.000	.000	.000	.000	.000	.002

Product terms key:

int_1	ZT_AC	X	ZT_Off_L
int_2	ZT_Rec_H	X	ZT_Off_L

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Off_L	Effect	SE	t	p	LLCI	ULCI
-1.638	.193	.088	2.183	.030	.019	.367
-.688	.207	.057	3.647	.000	.095	.318
.261	.220	.049	4.469	.000	.123	.317
.736	.227	.059	3.852	.000	.111	.343
1.211	.234	.074	3.159	.002	.088	.379

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Off_L	Effect	Boot SE	BootLLCI	BootULCI
ZT_AC	-1.638	.019	.017	-.004	.067
ZT_AC	-.688	.016	.011	.000	.047
ZT_AC	.261	.012	.008	.001	.034
ZT_AC	.736	.010	.008	-.001	.033

```
ZT_AC     1.211      .008      .010     -.006      .035

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AC     -.004      .008     -.023      .008

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AC    ZT_Off_L

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AR
    V = ZT_Sch_K

Sample size
        360

**************************************************************************
Outcome: ZT_AR

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .238      .057      .946    21.554     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .238      .051     4.643      .000      .137      .339

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .440      .194      .818    17.017     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	-.002	.051	-.032	.974	-.101	.098
ZT_AR	.262	.054	4.888	.000	.156	.367
ZT_Rec_H	.146	.049	2.950	.003	.049	.243
ZT_Sch_K	-.188	.052	-3.618	.000	-.290	-.086
int_1	-.015	.046	-.322	.748	-.105	.076
int_2	.058	.048	1.209	.228	-.036	.151

Covariance matrix of regression parameter estimates

	constant	ZT_AR	ZT_Rec_H	ZT_Sch_K	int_1	int_2
constant	.003	.000	.000	.000	.001	.000
ZT_AR	.000	.003	-.001	.001	.000	.000
ZT_Rec_H	.000	-.001	.002	.000	.000	.000
ZT_Sch_K	.000	.001	.000	.003	.000	.000
int_1	.001	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_AR	X	ZT_Sch_K
int_2	ZT_Rec_H	X	ZT_Sch_K

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Sch_K	Effect	SE	t	p	LLCI	ULCI
-1.421	.064	.088	.731	.465	-.109	.237
-.858	.097	.067	1.433	.153	-.036	.229
-.295	.129	.053	2.441	.015	.025	.233
.549	.178	.053	3.321	.001	.072	.283
1.393	.226	.078	2.882	.004	.072	.380

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Sch_K	Effect	Boot SE	BootLLCI	BootULCI
ZT_AR	-1.421	.067	.028	.025	.138
ZT_AR	-.858	.065	.023	.028	.125
ZT_AR	-.295	.063	.021	.030	.116
ZT_AR	.549	.060	.021	.026	.113

```
ZT_AR     1.393      .057      .026      .016      .120

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AR     -.004      .012     -.029      .021

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AR    ZT_Sch_K

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AR
    V = ZT_Org_C

Sample size
        360

**************************************************************************
Outcome: ZT_AR

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .238      .057      .946    21.554     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .238      .051     4.643      .000      .137      .339

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .563      .317      .693    32.853     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.010	.046	.222	.824	-.080	.101
ZT_AR	.180	.049	3.685	.000	.084	.276
ZT_Rec_H	.185	.045	4.070	.000	.096	.275
ZT_Org_C	-.420	.047	-8.908	.000	-.512	-.327
int_1	.031	.042	.731	.466	-.052	.113
int_2	.029	.049	.593	.554	-.067	.124

Covariance matrix of regression parameter estimates

	constant	ZT_AR	ZT_Rec_H	ZT_Org_C	int_1	int_2
constant	.002	.000	.000	.000	.001	.000
ZT_AR	.000	.002	-.001	.001	.000	.000
ZT_Rec_H	.000	-.001	.002	.000	.000	.000
ZT_Org_C	.000	.001	.000	.002	.000	.000
int_1	.001	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_AR	X	ZT_Org_C
int_2	ZT_Rec_H	X	ZT_Org_C

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Org_C	Effect	SE	t	p	LLCI	ULCI
-1.361	.146	.078	1.863	.063	-.008	.300
-.625	.167	.053	3.130	.002	.062	.272
-.257	.178	.047	3.818	.000	.086	.269
.848	.210	.063	3.333	.001	.086	.333
1.216	.220	.076	2.884	.004	.070	.370

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Org_C	Effect	Boot SE	BootLLCI	BootULCI
ZT_AR	-1.361	.033	.022	-.004	.087
ZT_AR	-.625	.038	.016	.012	.077
ZT_AR	-.257	.041	.015	.017	.077
ZT_AR	.848	.049	.022	.014	.102

```
ZT_AR     1.216      .052      .026      .010      .116

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AR      .007      .015     -.021      .038

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AR    ZT_Org_C

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_AR
    V = ZT_Off_L

Sample size
        360

**************************************************************************
Outcome: ZT_AR

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .238      .057      .946    21.554     1.000   358.000      .000

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .051      .000     1.000     -.101      .101
ZT_Rec_H      .238      .051     4.643      .000      .137      .339

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .493      .243      .767    22.779     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.034	.050	.685	.494	-.064	.132
ZT_AR	.198	.053	3.755	.000	.094	.302
ZT_Rec_H	.181	.048	3.783	.000	.087	.276
ZT_Off_L	.297	.051	5.856	.000	.197	.396
int_1	-.086	.046	-1.870	.062	-.176	.004
int_2	.028	.046	.606	.545	-.062	.118

Covariance matrix of regression parameter estimates

	constant	ZT_AR	ZT_Rec_H	ZT_Off_L	int_1	int_2
constant	.002	.000	.000	.000	-.001	.000
ZT_AR	.000	.003	-.001	-.001	.000	.000
ZT_Rec_H	.000	-.001	.002	.000	.000	.000
ZT_Off_L	.000	-.001	.000	.003	.000	.000
int_1	-.001	.000	.000	.000	.002	-.001
int_2	.000	.000	.000	.000	-.001	.002

Product terms key:

int_1	ZT_AR	X	ZT_Off_L
int_2	ZT_Rec_H	X	ZT_Off_L

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Off_L	Effect	SE	t	p	LLCI	ULCI
-1.638	.136	.088	1.545	.123	-.037	.309
-.688	.162	.057	2.865	.004	.051	.273
.261	.189	.050	3.790	.000	.091	.286
.736	.202	.059	3.394	.001	.085	.319
1.211	.215	.074	2.888	.004	.069	.361

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Off_L	Effect	Boot SE	BootLLCI	BootULCI
ZT_AR	-1.638	.081	.035	.025	.164
ZT_AR	-.688	.061	.022	.025	.115
ZT_AR	.261	.042	.015	.017	.078
ZT_AR	.736	.032	.016	.006	.071

```
ZT_AR     1.211      .022      .019     -.012      .067

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

****************** INDEX OF MODERATED MEDIATION ************************

Mediator
          Index  SE(Boot)  BootLLCI  BootULCI
ZT_AR     -.020      .015     -.057      .004

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_AR    ZT_Off_L

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Su_N
    V = ZT_Sch_K

Sample size
        360

**************************************************************************
Outcome: ZT_Su_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .023      .001     1.002      .188     1.000   358.000      .664

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .053      .000     1.000     -.104      .104
ZT_Rec_H      .023      .053      .434      .664     -.081      .127

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .515      .265      .745    25.532     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.048	.048	.985	.325	-.048	.143
ZT_Su_N	.373	.050	7.490	.000	.275	.472
ZT_Rec_H	.197	.046	4.274	.000	.106	.288
ZT_Sch_K	-.114	.051	-2.228	.027	-.214	-.013
int_1	.112	.041	2.743	.006	.032	.192
int_2	.050	.043	1.161	.247	-.035	.136

Covariance matrix of regression parameter estimates

	constant	ZT_Su_N	ZT_Rec_H	ZT_Sch_K	int_1	int_2
constant	.002	.000	.000	.000	.001	.000
ZT_Su_N	.000	.002	.000	.001	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Sch_K	.000	.001	.000	.003	.000	.000
int_1	.001	.000	.000	.000	.002	.000
int_2	.000	.000	.000	.000	.000	.002

Product terms key:

int_1	ZT_Su_N	X	ZT_Sch_K
int_2	ZT_Rec_H	X	ZT_Sch_K

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Sch_K	Effect	SE	t	p	LLCI	ULCI
-1.421	.125	.082	1.534	.126	-.035	.286
-.858	.154	.063	2.443	.015	.030	.278
-.295	.182	.049	3.685	.000	.085	.279
.549	.225	.049	4.576	.000	.128	.321
1.393	.267	.071	3.753	.000	.127	.408

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Sch_K	Effect	Boot SE	BootLLCI	BootULCI
ZT_Su_N	-1.421	.005	.012	-.014	.035
ZT_Su_N	-.858	.006	.014	-.020	.036
ZT_Su_N	-.295	.008	.017	-.027	.041
ZT_Su_N	.549	.010	.021	-.034	.051

```
ZT_Su_N     1.393      .012      .026     -.043      .061

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

********************* INDEX OF MODERATED MEDIATION ************************

Mediator
            Index  SE(Boot)  BootLLCI  BootULCI
ZT_Su_N      .003      .006     -.008      .017

********************* ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Su_N  ZT_Sch_K

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Su_N
    V = ZT_Org_C

Sample size
        360

**************************************************************************
Outcome: ZT_Su_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .023      .001     1.002      .188     1.000   358.000      .664

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .053      .000     1.000     -.104      .104
ZT_Rec_H      .023      .053      .434      .664     -.081      .127

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .599      .359      .650    39.618     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.090	.047	1.929	.055	-.002	.182
ZT_Su_N	.207	.052	3.992	.000	.105	.309
ZT_Rec_H	.232	.043	5.455	.000	.149	.316
ZT_Org_C	-.281	.055	-5.151	.000	-.389	-.174
int_1	.159	.034	4.619	.000	.091	.227
int_2	.076	.045	1.709	.088	-.011	.164

Covariance matrix of regression parameter estimates

	constant	ZT_Su_N	ZT_Rec_H	ZT_Org_C	int_1	int_2
constant	.002	.000	.000	.000	.001	.000
ZT_Su_N	.000	.003	.000	.001	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Org_C	.000	.001	.000	.003	.001	.000
int_1	.001	.000	.000	.001	.001	.000
int_2	.000	.000	.000	.000	.000	.002

Product terms key:

int_1	ZT_Su_N	X	ZT_Org_C
int_2	ZT_Rec_H	X	ZT_Org_C

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Org_C	Effect	SE	t	p	LLCI	ULCI
-1.361	.129	.074	1.751	.081	-.016	.273
-.625	.185	.051	3.658	.000	.085	.284
-.257	.213	.044	4.845	.000	.126	.299
.848	.297	.057	5.176	.000	.184	.410
1.216	.325	.069	4.681	.000	.188	.462

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Org_C	Effect	Boot SE	BootLLCI	BootULCI
ZT_Su_N	-1.361	.000	.004	-.010	.007
ZT_Su_N	-.625	.002	.006	-.007	.018
ZT_Su_N	-.257	.004	.008	-.012	.023
ZT_Su_N	.848	.008	.017	-.025	.043

```
ZT_Su_N     1.216      .009      .020     -.029      .051

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

********************* INDEX OF MODERATED MEDIATION ************************

Mediator
            Index  SE(Boot)  BootLLCI  BootULCI
ZT_Su_N      .004      .008     -.011      .022

********************* ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Su_N  ZT_Org_C

------ END MATRIX -----

restore.
```

Matrix

```
Run MATRIX procedure:

************** PROCESS Procedure for SPSS Release 2.15 *******************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2013). www.guilford.com/p/hayes3

**************************************************************************
Model = 15
    Y = ZT_Rec_W
    X = ZT_Rec_H
    M = ZT_Su_N
    V = ZT_Off_L

Sample size
        360

**************************************************************************
Outcome: ZT_Su_N

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .023      .001     1.002      .188     1.000   358.000      .664

Model
             coeff        se         t         p      LLCI      ULCI
constant      .000      .053      .000     1.000     -.104      .104
ZT_Rec_H      .023      .053      .434      .664     -.081      .127

Covariance matrix of regression parameter estimates
          constant  ZT_Rec_H
constant      .003      .000
ZT_Rec_H      .000      .003

**************************************************************************
Outcome: ZT_Rec_W

Model Summary
         R      R-sq       MSE         F       df1       df2         p
      .563      .317      .693    32.836     5.000   354.000      .000
```

Model

	coeff	se	t	p	LLCI	ULCI
constant	.071	.047	1.523	.129	-.021	.163
ZT_Su_N	.287	.050	5.782	.000	.190	.385
ZT_Rec_H	.234	.044	5.319	.000	.148	.321
ZT_Off_L	.198	.050	3.933	.000	.099	.297
int_1	-.160	.036	-4.445	.000	-.231	-.089
int_2	-.033	.042	-.770	.442	-.115	.050

Covariance matrix of regression parameter estimates

	constant	ZT_Su_N	ZT_Rec_H	ZT_Off_L	int_1	int_2
constant	.002	.000	.000	.000	-.001	.000
ZT_Su_N	.000	.002	.000	-.001	.000	.000
ZT_Rec_H	.000	.000	.002	.000	.000	.000
ZT_Off_L	.000	-.001	.000	.003	.000	.000
int_1	-.001	.000	.000	.000	.001	.000
int_2	.000	.000	.000	.000	.000	.002

Product terms key:

int_1	ZT_Su_N	X	ZT_Off_L
int_2	ZT_Rec_H	X	ZT_Off_L

********** DIRECT AND INDIRECT EFFECTS **********

Conditional direct effect(s) of X on Y at values of the moderator(s):

ZT_Off_L	Effect	SE	t	p	LLCI	ULCI
-1.638	.288	.081	3.568	.000	.129	.446
-.688	.257	.052	4.948	.000	.155	.359
.261	.226	.046	4.932	.000	.136	.316
.736	.210	.055	3.840	.000	.103	.318
1.211	.195	.069	2.841	.005	.060	.330

Conditional indirect effect(s) of X on Y at values of the moderator(s):

Mediator

	ZT_Off_L	Effect	Boot SE	BootLLCI	BootULCI
ZT_Su_N	-1.638	.013	.028	-.042	.072
ZT_Su_N	-.688	.009	.020	-.030	.052
ZT_Su_N	.261	.006	.012	-.018	.032
ZT_Su_N	.736	.004	.009	-.011	.025

```
ZT_Su_N     1.211      .002      .006     -.005      .023

Values for quantitative moderators are 10th, 25th, 50th, 75th, and 90th percen
tiles
Values for dichotomous moderators are the two values of the moderator.

******************** INDEX OF MODERATED MEDIATION ************************

Mediator
            Index  SE(Boot)  BootLLCI  BootULCI
ZT_Su_N     -.004      .009     -.023      .012

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence intervals:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: The following variables were mean centered prior to analysis:
 ZT_Rec_H ZT_Su_N  ZT_Off_L

------ END MATRIX -----

restore.
```

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