Residents Recycling Behaviour in Perspective: A Case Study in Agona West Municipal District, Ghana.

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Abstracts

Describing and understanding the potential factors that affects residents recycling behaviours helps in developing efficient recycling campaigns for a community. Using an extended theory of planned behaviour (TPB) this research investigates factors associated with recycling behaviour at the residential level in Agona West Municipal, Ghana. A data sample of 330 field questionnaires were used to examine demographic variables and the extended TPB constructs (attitude, subjective norm, perceived behaviour control, intentions, moral obligations situational factors and environmental knowledge/concern). The survey data showed that attitude, subjective norm, perceived behaviour control, intentions, moral obligations and situational factors are significant predictors of residents recycling behaviour in Agona West Municipal, Ghana. Perceived behaviour control was the highest predictor of residents recycling behaviour. Residents noted a high level of favourable outcomes of recycling behaviour, yet they showed a negative effect on residents recycling behaviour. This finding is inconsistent with TPB model assumption: favourable outcome means positive engagement of the behaviour in question. Interestingly, environmental knowledge was found insignificant to predicting of residents recycling behaviour. In addition, it was also found that there is a significance difference in recycling behaviour between demographic variables such as age, location, income, education and gender. Therefore, this study concludes that a campaign targeted at attitude and environmental knowledge maybe effective to increasing recycling behaviour at the household level.

Keywords: Theory of planned behaviour; recycling behaviour; recycling campaigns; subjective norm, perceived behaviour control; situational factors; Ghana

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Abbreviations & Acronyms

AWMD	Agona West Municipal District
MMDA	Metropolis Municipals and District Assemble
MLGRD	Ministry of Local Government and Rural Development
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
GMA	Accra Metropolitan Assembly
SWM	Solid Waste Management
MSWM	Municipal Solid Waste Management
EPA	Environmental Protection Agency
ATT	Attitude
MO	Moral obligation
SN	Social norm
RB	Recycling behaviour
RQ	Research question
EK	Environmental Knowledge
RI	Recycling intention
PBC	Perceived behavioural control
QCA	Qualitative Comparative Research Analysis

1. INTRODUCTION

1.1 Introduction

Waste is seen as any unwanted substance from human activities, thus, generated from manufacture and the use of materials and products. Since 1920s, swamp lands had been used as landfills (Barbalace 2003). The reason for this method of waste disposal was the people´s belief that "…dumping the waste from nature to nature was a straightforward and reasonable solution" (Rousta 2018). These wastes were mostly food leftovers (meat, vegetables, etc) which were biodegradable. Further, the onset of industrialization and population growth accelerated the waste generation; for example, pollution from energy (coal, oil and gas), mining, toxic sewages, metal were different waste sources (thus; most of these wastes were non-biodegradable). The ocean then became the major site for disposal of waste as reports indicated a high magnitude of wastes in the ocean across the globe (Heldal et al. 2018; US EPA 2015). Apart from the issue of dumping wastes in water bodies, the shift in consumption pattern also led to generation of new types of non-biodegradable wastes (e.g. solid waste). The increasing use of products which were packed with/in either plastics, glasses, bottles, cans or paper further escalated waste generation (Rousta 2018) and also, landfills (i.e. burying of waste on land). As a result of these activities, it adversely affected the environment (climate change) (Hoffmann 2013). For example, (Aragón and Rud 2016) studied the effect of mining industries in Ghana on the agricultural productivity on lands situated near these industries. It was seen that release of environmental pollutants by mining industries reduces food productivity by almost 40% between 1997 to 2007. Hence, improper waste disposal system combined with increasing waste generation makes waste a global challenge for sustainable development in both developed and developing countries (Oteng-Ababio, Melara Arguello, and Gabbay 2013; Kaza et al. 2018; US EPA 2015; Oduro-Kwarteng, Anarfi, and Essandoh 2016; United Nations Human Settlements Programme 2010).

In 1992, in order to address the global issues (associated with waste generation and disposal) and to ensure that countries pursue economic development without exploiting the resources, the Earth Summit agreement was signed by 117 head of states and representatives from 178 nations (Britannica, T. Editors of Encyclopaedia 2021). This has led to a raise in implementation of recycling polices in many countries.

Prior before this agreement (Sustainable Development Goals, SDGs) till now, many countries had been implementing recycling (NERC 2019). In developed countries, recycling culture is well advanced in terms of policies, facilities as well as behaviour, yet, recycling remains a major challenge in developing countries (Mavropoulos and Sa 2021); (Oteng-Ababio et al. 2013); (Oduro-Kwarteng et al. 2016); (Kaza et al. 2018). To date, in advanced countries, scholars of recycling have shifted to focusing on the recycling at source(individual or household) (Liao et al. 2018; Árnadóttir et al. 2018; Wang and Mangmeechai 2021). However, little work has thoroughly examined recycling at source in developing countries such as Ghana. Recycling is dependent on individual participation, and without adequate knowledge of the factors that influence people to participate, it is very difficult to develop effective and sustainable policies with regards to waste management (Afroz et al. 2010), so not surprising of a vast difference in recycling between developed and developing countries. Hence, it is utmost important to further investigate recycling behaviour in developing countries. Also, recycling behaviour among individuals vary; thus it is important to understand the behavioural patterns among different groups of individuals (Tonglet, Phillips, and Read 2004), so that positive changes in behaviour can be brought about in these groups (Rodić and Wilson 2017).

Therefore, my thesis, "Recycling Behaviour at the Residential Level", remedies this gap by analysing *what could be relevant potential factors in describing and explaining recycling behaviour at the residential level.* Ghana is chosen for the case study, because although Ghana is one of the exemplary African developing countries, recycling is a relevant issue in Ghana where recycling activities at both the national level and individual level is low (Gyimah et al. 2019; Boadi and Kuitunen 2005; Oteng-Ababio et al. 2013). Therefore, based on the study background, the descriptive and explanatory nature of the thesis, the following research questions provide the focus and direction for the research.

1   *What are the antecedents of intention for residents recycling behaviour?*
2   *What are the potential determinants of behaviour for residents recycling behaviour?*
3   *What could be the potentials of are these determinants in explaining recycling behaviour?*
4   *If there are forms of recycling behaviour, what are they?*

Through close examination of the few studies on recycling in Ghana, limited recycling facilities has always been noted as the reason for the low recycling participation at the residential level. I argue that what makes a person to be a recycler or non-recycler is more than that and that both internal and external factors are crucial and this has been proven in many developed countries. Ultimately, my research will show some potential factors that shapes as well as understanding of recycling behaviour at the residential level in Ghana. This led to the posing of the research questions above.

The research question of "*What are the antecedents of intention for residents recycling behaviour*" was asked because scholars have shown that behaviour is psychological and that a person processed his actions in mind (intention) before engaging in it, hence, a person's recycling intention will determine whether he actually engage in a behaviour in question in this case; recycling behaviour (Ajzen 1991; Ajzen and Fishbein 1980). Therefore, I believe that finding the background of intention will help describe residents recycling behaviour.

Also, the research question (RQ) of "*What are the potential determinants of behaviour for residents recycling behaviour?* I intend to find out what will motivate or demotivate an individual to engage in a behaviour such as recycling. This RQ is important as it bring out factors that influence individual choice to recycle or not and hence, better describe recycling behaviour at the residential level. The reason for asking the research question "*what could be the potentials of are these determinants in explaining recycling behaviour?*" was to find out the main factors that better explain recycling behaviour. For example, it can be that attitude, income, moral values and environmental concern are the factors that influences recycling behaviour at the household level. Finding out if environmental concern is an important motivator to engaging in recycling than other factors will help shapes recycling intervention programme as well as better understanding of recycling at the residential level.

In addition, scholars have shown that factors that influencing recycling varies from country to country and city to city. for instance, a study by (Mavropoulos and Sa 2021) showed that behaviours towards recycling differs significantly between developed and developing countries; "In developed countries it is linked with moral values and social responsibility, where in developing countries it is usually linked with survival and daily income" and therefore, reasonable

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to ask the RQ. Lastly, the RQ, *if there are forms of recycling behaviour, what are they?* is equally important questions that helps explain and somehow understand recycling behaviour in our case study.

In summary, this research has two purposes: *to describe* recycling behaviour at the residential level (the research questions 1& 2 will address the description purpose) and *to explain* this by application of the extension of the theory of planned behaviour theory developed in figure 2.5 of the literature review (research questions 3 & 4 will be used to address the explanation side)

The theory of planned behaviour developed by (Ajzen 1991) has been found to answers questions relating to understanding recycling behaviour. These questions include: is attitude towards recycling an intention factor to participate in a behaviour like recycling? Does subjective norms and social pressures play a role? How one perceives his or her ability (difficulty) to do the behaviour can influence the intention to perform the behaviour in question (i.e. perceived behavioural control)? The theory of planned behaviour (TPB) framework was found to answer the above questions when framework theorized about the relation between attitude, social pressure and PBC to behaviour (Rousta 2018). Hence, many scholars have employed the TPB or extended the TPB to understand recycling behaviour (Tonglet et al. 2004; Shen et al. 2019; Wang and Mangmeechai 2021). Therefore, I will apply the TPB framework in this study and also, using a theory will guide the research (Blaikie 2010).

Recycling involves the collection, processing of waste materials and turning them into new items (US EPA 2015). Recycling behaviour is the act of participation in recycling activities (such as waste sorting, reusing of recyclables). In other words, recycling behaviour means participating in waste sorting and separation (Guerin, Crete, and Mercier 2001; Liao et al. 2018; Rousta 2018). Several scholars have argued that the attitudes, environmental concern, personal norms, social pressure constitutes the main reasons why people engage in RB but there are other external factors which may have an equally important effect on RB (Mamun et al. 2018; Zhang et al. 2015 ;Barr 2004; Davies et al. 2002; Strydom 2018). These external factors were storage space, convenience, recycling facilities or the whole structure of the waste management. In addition, socio-demographic variables (such as: gender, age, income, dwelling, education level/types) have been found to also influence RB (Miafodzyeva and Brandt 2013; Meneses and Palacio 2005). However,

the findings with regard to the effect of socio-demographic variables are on RB have contradictory findings (Miafodzyeva and Brandt 2013). Finally, in the literature review of this thesis, it was observed that understanding RB is complex. This is because, researches in recycling were based on case studies in a limited geographical and cultural areas. Therefore, it is difficult to generalise the factors that influence recycling behaviour. However, the study on the factors mentioned above gives a broad understanding of recycling behaviour. It is worth mentioning that none of these factors can support recycling behaviour alone as noted in the literature review.

1.2 Scope and Delimitation

The research is restricted to one municipality. The study investigates solid waste recycling at the residential level and liquid waste or electronic waste will not be discussed. It will be restricted to Theory of Planned Behaviour interpretations. Hence, the study will be constrained to social and environmental arguments and depth technical aspects not considered. It is also, not a comparative study and findings are based on filled questionnaire of which response can be overreported or biased. In addition, the study shall attempt to discuss and reflects on the TPB model as I do not have the required data and statistical skills to test the model; either to confirm or disprove the model. Hence, the discussion of the model will be geared to the extents the TPB seems to explain recycling behaviour and also identify some challenges with the model

1.3 Thesis Overview and Outline

The outline for the study of recycling behaviour in Agona West Municipal District using the TPB model is presented in the order below:

Chapter one: Introduction of the thesis and briefly described background of the study. The chapter also addresses the research questions of this master´s thesis.

Chapter two: This chapter gives the background of the study and then presents the theoretical framework: theory of planned behaviour (Ajzen 1991). The main point of departure is scholars overview of factors that has been identified in understanding recycling behaviours. Some of these factors would be used as units of analysis. Furthermore, the theoretical framework of theory of planned behaviour is expanded to include environmental concern, personal moral obligation, situational factors and socio-demographic factors. Thereby, leading to an extended TPB framework designed for investigating recycling behaviour for this study.

Chapter three: This chapter addresses the methodological and research design approach. The chapter addresses the philosophical assumption that is quantitative approach for the research design. Data collection is through survey-questionnaires with residents as respondents, data analysis and reduction are processed using SPSS and Survey Monkey. The issues relating to validity, reliability, generalizability, limitations and study area are also addressed in this chapter.

Chapter four: The chapter presents the data and results collected and analysed in chapter three. The presentation of data and results is done using analysis for each of the five-hypothesis presented in the extended TPB model.

Chapter five: The chapter will discuss the main research questions based on the results and data presented in chapter three and four. The discussion for the research question also identifies and maps the factors used to explain recycling behaviour findings into the Theory of Planned Behaviour model.

 Chapter 6: The chapter presents the conclusion and implications of the study. The main findings of the thesis, limitations and future research studies will be presented in this chapter.

Chapter 7: References
Chapter 8: Appendix

2. LITERATURE REVIEW

This chapter is divided in three sections; firstly, a brief view on current state of recycling in Ghana, secondly, understanding recycling behaviour and the third section presents the theory used for this study.

2.1 The Study Background

Ghana like any other developing countries faces the issue of increasing waste. Therefore, several studies have investigated the many sections of waste from its generation to its disposal (Tweneboah-Koduah, Adams, and Nyarku 2020; Gyimah et al. 2019; Amoah and Kosoe 2014). Scholars has shown that waste generated in Ghana is 0.47kg/person/day and hence a total waste generated up to 12710 tons of waste per day based on the current population of 27 million in 2015 (Miezah et al. 2015). Therefore, it unsurprised with the current population size of 30.7 that waste generation keeps increasing. This is because rapid population growth and financial increase are linked to the increase in per capita generation of waste (Kaza et al. 2018 ; US EPA 2015; Oduro-Kwarteng, Anarfi, and Essandoh 2016). (Miezah et al. 2015) noted that the Ghana waste composition was 61% organics, 14% plastics, 6% inert, 5% miscellaneous, 5% paper, 3% metals, 3% glass, 1% leather and rubber, and 1% textiles. However, research has shown that majority of waste get buried at landfills and this is not environmentally friendly in Ghana (Amoah and Kosoe 2014; Cobbinah, Addaney, and Agyeman 2017; Oteng-Ababio, Melara Arguello, and Gabbay 2013; Gyimah et al. 2019). Therefore, the for the purpose of this thesis, I will describe the Ghana current waste management system with focus on solid waste and recycling behaviour which formed the basic framing for the research questions of this thesis. In order to situate the need of recycling behaviour studies in Ghana.

The Issue of Solid Waste in Ghana

Several researches have noted solid waste management (SWM) is one of the most challenging problem in many developing countries including Ghana (Amoah and Kosoe 2014; Cobbinah et al. 2017; Oteng-Ababio et al. 2013 ; Gyimah et al. 2019). Particularly in Ghana, the litter along the roadside and in marketplaces consisted mostly of solid wastes. This is due to open-waste disposal, illegal dumping, uncollected waste and limited recycling activities. Research by (Amoah and Kosoe 2014) observed that in the urban city- Wa, there were 810 tonnes of solid waste generated

daily; in this group, only 216 tonnes were collected for landfilling (disposal) and the uncollected 594 tonnes of waste also posed several public health issues (esp. environmental hazards). Moreover, a study conducted in Cape Coast metropolitan observed increasing rate in total waste generation (including solid) and about 20% of the total waste remains uncollected (Gyimah et al. 2019). The authors noted that the solid waste separation among residents is hindered by the lack of recycling facilities in the metropolitan and the inability of residents to afford separate bins. Unsorted burning and burying of solid waste are the common practices in the Greater Accra Metropolitan Area (GAMA), Ghana and this was attributed to inadequate solid waste facilities (Oteng-Ababio 2011). "The current SWM practice in GAMA is clearly biased towards achieving 100% waste collection and its subsequent disposal, with very partial or no treatment or processing" (Oteng-Ababio 2011). The issue of uncollected solid waste, illegal disposal, few recycling plants and landfilling is a common trend in almost all cities in Ghana. The primary reason for improper waste management in Ghana is attributed to the structure of the waste management system. Thus, Ghana environmental and sanitation policy under the auspices of Ministry of Local Government and Rural Development (MLGRD and guidelines for SWM is landfilling (MLGRD, 2010; Boadi and Kuitunen 2005). It can be observed that there is lack of treatment of wastes and landfilling is the main form of disposal of solid waste, leaving no room for recycling in this structure. An illustrated form of MSWM is shown in figure 2.1, which indicates that SWM ends at landfills and no section of treatment or recycling. Findings of the many studies have highlighted the flaws in this structure of municipal solid waste management (MSWM) as it can hinder a country from achieving the SDGs (Boadi and Kuitunen 2005; Gyimah et al. 2019; Oteng-Ababio 2011; Cobbinah et al. 2017).

Figure 2.1 below depicts a structure of municipal assembly solid waste management (MSWM) in Ghana and figure 2.2 shows the schematic of waste hierarchy by (EPA 2017). Figure 2.2 is the waste management hierarchy which has been proposed to enable eco-friendly ways of managing waste. Thus, figure 2.2 illustrates the pyramidal options for waste hierarchy. A comparism of Ghana waste management practice in figure 2.1 and the acceptable eco-friendly waste management in figure 2.2 reveals that, the most common method for waste management in Ghana were the least preferred option of waste management in the hierarchy and this was confirmed in several scholars (Cobbinah et al. 2017; Oteng-Ababio et al. 2013).

Municipal Assembly: Waste Management Department

Figure 2.1 Ghana municipal waste management hierarchy by (MLGRG 2010)

Figure 2.2 The schematic of waste hierarchy by (EPA 2017)

Recycling Behaviour in Ghana

In 2006, Ghana government partnered with a private company i.e. ZoomLion Ghana Limited with a sole aim of management of waste in the country and Solid waste management performance has been noted to be low. One of main issue faced by the ZoomLion Company Limited is lack of waste sorting leading to company resorting to collection and dumping of waste in landfills. Researches have noted that household/industrial waste sorting is key in an effective waste management as this will lead to proper waste disposal, is rarely practiced in Ghana [(Gyimah et al. 2019); (Miezah et al. 2015)]. The few studies on waste sorting showed significant difference in sorting practices on socio-demographic factors, attitudes and participation level in the country (Adu et al. 2020). A pilot study in Ghana by (Meizah et al 2015) showed that national sorting and separation efficiency was 84% for biodegradables and 76% for other waste. The authors recommend Metropolis Municipals and District Assembles (MMDAs) or authorities or planners to start lurching source sorting process across the countries. Yet, a study by (Oteng-Ababio 2011) observed that attempts by some private SWM companies inclusive of ZoomLion company to encourage waste separation at the residence failed and this was attributed to lack of legal backing and recycling education. However, the few studies on recycling do not emphasized in-depth the recycling behaviour. Thus, insufficient to identify determining factors of RB. Hence, Recycling behaviour will remain a key factor and hence, worthwhile to study. In other words, reducing, reusing and sorting are the best options and this can be achieved by enforcing positive recycling behaviours at individual/household levels. Nevertheless, positive recycling behaviour can be instilled only if the factors that motivate people to engage in recycling are identified. Therefore, this study aims to identify what shapes recycling behaviour. Hence, it is pertinent to identify what shapes recycling behaviours toward solid waste among residents as they also contribute to total waste generation and their involvement have a vital effect on effective waste management towards sustainability. To summarize, the background of the study highlighted the need for the study on recycling behaviour in Ghana.

As landfilling is not environmental friendly, some Ghanaian scholars argued for an extended producer responsibility and community involvement as a way of assisting the government to efficiently recover recyclable waste (plastic sachet water waste) at a low cost (Quartey et al. 2015). Also, (Oteng-Ababio 2011); (Gyimah et al. 2019) advocated that provision of sufficient recycling systems would facilitate recycling. Yet, studies have showed that the amount of solid waste

generated is beyond the waste management capacity of the existing waste management system in a case study of Accra metropolis (Boadi and Kuitunen 2005). However, the country may not have recycling as part of the MSWM, yet there is some form of recycling activities in the metropolitan areas as recycling is included in the metropolitan waste management of the country drawn up in the Ghana Environmental and sanitation policy (MLGRG 2010). Hence, there is a total number of 25 plastics recycling plants in Ghana, located in Accra metropolis, Tema, Kumasi metropolis and Takoradi (Keesman 2019) Therefore, in recent years, the management of waste in the country has seen some initiating to a more sustainable form of waste management. In addition, there has been a government allocation of $290 million annually to distil choked gutter and organizing better waste management awareness in order to reduce waste in the country (Adu et al. 2020). Also, in recent years, the waste management in the country had attracted involvement of private sectors (including waste pickers) with an impressive result of providing about 80% of waste services in Ghana (Keesman 2019). Presently, Ghana is not prepared for largescale recycling as the country lacks adequate funds for largescale recycling across its cities and therefore, recycling behaviour is the best option. This is because, RB leads to reuse and reduce of waste which limit waste in landfills, saves energy, reduce air and water pollution, environmental conservation and protection etc., hence, the study of RB is crucial in Ghana.

2.2 Understanding Recycling Behaviour

Recycling behaviour is the act of participating of people in recycling activities (Rousta 2018). Recycling behaviour includes waste sorting and separation, reducing waste generation and reuse of reusable waste (i.e. pro-environmental activity) (Guerin et al. 2001). Recycling behaviour can be practiced everywhere such as; at the workplace, in schools and at homes. The study of recycling behaviour has been investigated within many disciplines and from distinctive points of view. Thus, attributes of a person being a recycler or non-recycler may be discipline-specific (the area of the study determines the specific variables used for research). A meta-analysis of 63 empirical studies by (Miafodzyeva and Brandt 2013) reviewed few discipline-specific studies to understand recycling behaviour. Some of the examples for discipline-specific approach to recycling are: an environmental psychologist views environmental concern as a motivation factor for recycling (Barr and Gilg 2007), while fees or pricing are common variables used for measuring/understanding of recycling behaviour by economists (Hong 1999) (Pickin 2008). Also, sociologists mostly investigate social pressure (persuasive communication and public

commitment) for recycling (Burn and Oskamp 2006), and legal researchers use regulations on recycling to predict recycling behaviour (Lanza 1982).

Generally, several studies which investigated recycling behaviour among households have identified many factors that influences household's participation in recycling activities. These factors identified can be seen as determinants, reasons, barriers or motivation for recycling behaviour. The complexity and diverse nature of these factors had led to broad categorization of these factors as shown in (Miafodzyeva and Brandt 2013) and (Rousta and Dahlén 2015). (Miafodzyeva and Brandt 2013) categorized these variables (factors) into four theoretical groups; socio-psychological (internal traits of an individual), technical-organizational (resources or facilities), socio-demographic and study-specific factors. Meanwhile, the study by (Rousta and Dahlén 2015) have three-groups; namely, internal factors (factors that influence attitude and intention towards recycling behaviour), external factors (factors that induces the knowledge and action towards recycling) and sociodemographic group (factors such as age, income, gender, marital status, dwelling type etc). Both of these two broad categorizations are similar in the variable's groupings.

Therefore, The purpose of this study is to review some of the variables examined in several studies on recycling behaviour using the groupings noted by (Miafodzyeva and Brandt 2013) with exception of the study-specific group, which was excluded from the analysis by the authors.

Socio-Psychological Variables
Socio-psychological variables are also referred to as internal factors by (Rousta and Dahlén 2015). These variables consist of individuals´ beliefs, morals, values, concerns etc, which can be seen as personal attitude or character. In the study by (Miafodzyeva and Brandt 2013) 46 out of the 63 studies investigated recycling behaviour based on these internal variables. These internal variables were further categorized as motivational factors (moral norms, legal norms, social norms and general environment concern) and situational factors (past behaviour, personal effort and information and knowledge).

Moral norms
Moral norms refer to internal values or obligations that a person holds towards recycling activities. It was seen that majority of the studies found that moral norms are important in determining recycling behaviour while only five studies observed no significant relationship (Miafodzyeva and

Brandt 2013). Hence, (Miafodzyeva and Brandt 2013) concluded that moral norms was significant to explaining recycling behaviour. In congruence, (Shen et al. 2019) revealed that personal moral obligations have a positive influence on young people intentions towards MSWS.

Social norms
In the case of social norms (society expectations which can be either from family or neighbours), (Miafodzyeva and Brandt 2013) noted that 10 out of the 14 studies on social norms are of the view that there is some dependence between social norms and recycling behaviour while the remaining 4 studies do not support the view that social norms are linked to recycling behaviour.

Legal norms
Although legal norms are rarely studied, in the meta-analysis by (Miafodzyeva and Brandt 2013) 5 out of 6 studies (6 out of 63 studies) reported that legal norms predict recycling behaviour to some extent. In agreement, (Liao et al. 2018) indicated that policy implementation on waste separation and recycling led to a well formation of norms, which resulted in improved recycling behaviour. In addition, (Shen et al. 2019) noted that due to unclear legal responsibilities on recycling, young people have negative attitude towards recycling.

Environmental concern
According to the meta.-analysis by (Miafodzyeva and Brandt 2013), environmental concern was found as one of the high positive influencers of recycling behaviour (19-studies), even though few studies contradicted that it has no or weak relations to recycling behaviour (7-studies). In congruence, Studies by (Afroz et al. 2010; Tonglet, Phillips, and Read 2004 ; Guerin et al. 2001) showed environmental awareness and concern motivates people to recycle. In agreement to the above studies, (Wang et al. 2020) found that environmental concern has facilitating effect on the relationship between waste sorting and green consumption. Contradictory to the above studies (Shen et al. 2019) observed that environmental concern does not affect recycling behaviour.

Information campaigns
Campaign education through recycling workshops provides the necessary information on proper recycling activities such as sorting, disposal, reuse and reduce of waste. (Miafodzyeva and Brandt 2013) observed that all the 22 studies which analysed the impact of information campaigns and education schemes on recycling showed a positive and significant correlation to recycling behaviour among the participants. In line with this study, (Guerin et al. 2001) found that people

who engage in local programs to protect the environment (local activism) tends to engage in recycling behaviour. Also, (Hasan, Harun, and Hock 2015)observed that when students received extensive information through environmental lessons (i.e. plastic waste management), it improved pro-environmental behaviour (reduction on plastic waste). Also, (Shen et al. 2019) found that the reason why that young people (attitude) have no significance positive impact on intention toward MSWS were in two folds: lack of recycling educational guidance and unclear legal responsibilities. Initially, (Árnadóttir et al. 2018) suggested that lack of recycle education hindered pro-environmental behaviour. It was also believed that even though students may have high intention to recycling, they may not be able to participate effectively as they are limited by knowledge gap. However, a thought-provoking finding in that study showed that even with the introduction of campaign education, there was no effect or significant change on improving recycling behaviour among the student participants. Therefore, these authors concluded that there is a gap between intention to recycle and actual recycling behaviour.

Personal effort
Depending on whether personal effort variable predicts recycling behaviour, the 7 out of the 8 studies that investigated personal effort showed dependence between personal effort and recycling behaviour (Miafodzyeva and Brandt 2013).

Past behaviour
According to (Tonglet et al. 2004) pro-recycling attitudes are major contributors to recycling behaviour, However, these attitudes are also influenced by appropriate opportunities facilities, knowledge about recycling and not restricted by time, space and inconvenience. In addition, (Liao et al. 2018) found past recycling behaviour had a positive effect on recycling participation.

Technical-Organizational Variables
The technical-organizational group is also known as external factors by (Rousta and Dahlén 2015). The technological structure or systems include the containers, collection vehicles, methods, distance to collection points, design of the whole waste management system etc. Variables used to examine technical- organizational structure are convenience, unit pricing and access to kerbside (property closeness).

Convenience and access to recycling facilities
The "Convenience" variable was presented in 29 out of the 43 study sources; and in 28-independent surveys, it was identified as a vital influencer of recycling behaviour (Miafodzyeva and Brandt 2013). In addition, (Miafodzyeva and Brandt 2013) observed that access to recycling facilities results are absolutely consistent, this is because, though only 8 of the 43 sources included "access to recycling facility" as a determinants of recycling behaviour, the results showed that irrespective of the type of dwelling and family size (single-family or multi-family) of an individual, if kerbside is close to their dwelling recycling participation is high and vice versa. In congruence, (Ando and Gosselin 2005) observed that distance to recycling bins affects container-recycling intensity and (Barr 2004) found that "those who felt recycling was most convenient had access to kerbside recycling".

In support of the above findings, a study by (Tonglet et al. 2004) showed that even though people many have the intention to recycle, facilities, space, resources, convenience and time are also highly correlated to recycling behaviour. In support of (Tonglet et al. 2004), a study by (Zhang et al. 2015) observed that situational factors (such as lack of time and inconvenience) had a significant negative impact on waste separation behaviour.

Socio-Demographic Variables
Factors like age, income, education, gender, dwelling are the most used socio-demographic variables to recycling behaviour. (Miafodzyeva and Brandt 2013) observed that 24 studies that investigated socio-demographic factors effect on recycling behaviour in the meta-analysis showed ambiguity in their findings.

Age
There has been contrasting studies explaining the relationship between age factor and recycling behaviour (Miafodzyeva and Brandt 2013). According to (Afroz et al. 2010), participants in the middle-age group of (25-35years) are significant positive predictors of recycling behaviour [middle-aged people are recycling more than the young (19-24 years) or old age group (36-66 years) participants]. The reason for this finding was that "old people are more resistant to new ideas because they do not want to change their beliefs and life- style. However, young people could be encouraged at school or college by introducing the topic on different environmental problems

including waste management in their syllabus. If they learn it from at school or college, it would be easy for them to adopt recycling practices in later life" to (Afroz et al. 2010).

In yet another study done by (Chen, Wang, and Hou 2020) found that teenagers age (under 17 years) have a higher waste sorting behaviour followed by residents of ages (18-25 years) and ages (26-30 years) respectively. Meanwhile, (Mavropoulos and Sa 2021) revealed that people who fully participate in recycling are more likely to come from retired households.

Income
Most researchers have found correlation between income and recycling behaviour. For example, the study analysis by (Kurz, Linden, and Sheehy 2007) noted high recycling participation in high-income areas, followed by medium-income areas. Recyclers are more likely to be affluent and retired (residing in detached and semi-detached houses), while non-recyclers tend to be less affluent and/or have children, reflecting on the storage space and time available for recycling in these households.

In contrast, a study by (Chen et al. 2020) observed that high-income residents showed much lower sorting behaviours than low-income residents. They argued that the reason for this result may be that high-income earners focus their time and energy on creating wealth and neglect the importance of waste sorting.

Education
There is inconsistency in the relationship between educational attributes and recycling behaviour. The educational attributes can be investigated: (a) at four different levels (such as primary, secondary, college education and university degree of at least 4 years), (b) type of education (such as science and social sciences). The study by (Chen et al. 2020) revealed that the level of education is inversely propositional to the tendency to recycle (i.e. college degree holders engage more in recycling behaviours than people with university degree of at least 4 years). This is confirmed by (Zhang et al. 2015) that there was a difference in waste separation behaviours among participants with different educational levels. Undergraduate subjects (college education ≤ 4 years) (undergraduate degree in China can be 3 or 4 years depending on the field of study) exhibits better recycling behaviour than subjects in other educational levels. Conversely, a study by (Hasan et al. 2015) on the correlation between recycling of plastic waste and education level showed that there

is no significant difference in recycling behaviour between two educational levels (the authors compared only undergraduates and postgraduates) and field of study (science and social sciences).

Gender

Interestingly, studies by (Chen et al. 2020) and (Shen et al. 2019) observed that gender is insignificant in explaining recycling behaviour. According to (Shen et al. 2019) external social pressure did not affect much the difference between the female and urban group and male (rural group) in recycling involvement level. In the study by (Chen et al. 2020) , *p*-value of the gender variable exceeded 0.05, indicating that there was no significant difference in the waste-sorting behaviour of urban residents in terms of gender. Nevertheless, (Hasan et al. 2015) observed a statistically significant difference between pro-environmental behaviour and gender i.e. female students had a higher positive behaviour compared to males in engaging in pro-environmental behaviour (such as reducing the use of plastic).

Dwelling

(Ando and Gosselin 2005) found a strong relationship between recycling rates and the perceived presence of adequate space for processing recyclables. Thus, more storage space enables an individual to engage in recycling activities. In addition, availability of storage space was found as a crucial predictor of recycling behaviour by (Afroz et al. 2010).

However, can it also be that people with large storage space will rather consume more and never care about recycling since they have enough space in their homes to keep them (i.e. inorganic waste). It should be noted that storage space depends on type of dwelling and family size. Hence, in the case of family size, (nuclear family or joint family); it was seen that participants in nuclear families had better recycling practises than participants in joint families (Miafodzyeva and Brandt 2013).

In the all the discussion above, it is important to note that most of the researches in recycling were based on case studies in a limited geographical and cultural areas. Therefore, it is difficult to generalise the factors that influence recycling behaviour. However, the study on the factors mentioned above gives a broad understanding of recycling behaviour. It is worth mentioning that none of these factors can support recycling behaviour single-handedly.

2.3 Recycling Behaviour from the Theoretical Perspective

In the quest to understand the complexity of recycling behaviour, several theories had been applied such as; (a) the Motivation-Opportunity-Ability-Behaviour (MOAB) model developed by (ölander and ThØgersen 1995) using case studies from Denmark, (b) the model of recycling participation developed by (Tucker 2001) and (c) the conceptual framework of environmental behaviour, modified from and Schwartz's altruism model (1970) (Schwartz 1977). However, one of widely used theoretical approach used by several authors was the "attitude approach" (Kurz et al. 2007; Saphores et al. 2006) which attempts to account for beliefs (attitudes) in explaining behaviour. This theoretical perspective is known as the Theory of Planned Behaviour (Ajzen 1991) which is an extension of the Theory of Reasoned Action (Ajzen and Fishbein 1980). The Theory of Planned Behaviour approach focuses on analysing the cognitive determinants of recycling behaviour

2.4 The Theory of Reasoned Action

According to The Theory of Reasoned Action (TRA) developed by (Ajzen and Fishbein 1980), behaviour is determined by intention to perform the behaviour in question and the intention to perform is determined by attitude and subjective norm. The theory claimed that the stronger an individual intended to engage in a behaviour, the more likely he/she performs the behaviour (if behaviour in question is under volitional control[1]). See fig. 2.3

Figure 2.3 The Theory of Reasoned Action (TRA) by (Ajzen and Fishbein 1980)

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[1] Behaviour volitional control means a person can decide at will to perform or not perform the behaviour (Ajzen and Fishbein 1980)

- *Attitude:* (Ajzen and Fishbein 1980) claimed that person`s attitudes towards a specific behaviour are made of noticeable beliefs associated to preforming the behaviour. These beliefs are acquired through a person`s life experiences; direct observations or indirect (external information's, self-generated by inference). It is important to note that some beliefs will stay overtime, forgotten or new beliefs maybe formed. These beliefs enable the individual to evaluate the outcome (i.e. Favourable or unfavourable) of performing the behaviour (Ajzen and Fishbein 1980).

- *Subjective norm***:** A person evaluation of what important others think he/she should do. Perception holds by the person about the social expectations (normative beliefs) to perform or not to perform the behaviour. This implies that a person considers how people important and close to him/her such as family and neighbours expects of him/her and act in accordance.

Application and criticism of TRA

While studying recycling, several researches have used TRA model for analysing and measuring of various aspects of recycling; intentions, attitudes, perceived social norms and economic cost of recycling (Kim, Jeong, and Hwang 2013; Alzahrani, Hall-Phillips, and Zeng 2019; Park, Levine, and Sharkey 1998; Kok and Siero 1985). The majority of these studies found that the intention to recycle depends more on attitude toward recycling while social norms which was analysed in several studies were either not significant or had much less influence than attitude, hence criticisms arose about the validity of TRA.

These criticisms originated from the assumptions made by the theorists that attitude formation and social norm were confined to cognitive processes/structure (i.e. beliefs) (Ajzen and Fishbein 1980). This claim was challenged by scholars, for instance; study by (Olson and Fazio 2001) observed that attitude can be influenced simply by a nearby natural inducement (e.g. Person and object). Prior to this, (Liska 1984) revealed that attitudes do not facilitate completely the effect of cognitions (thoughts) on intention and that cognition are multifaceted both in people imperfections in processing cognitive into abilities. The general argument from (Olson and Fazio 2001 ; Liska 1984) and several other scholars was that behaviour is not contingent only on beliefs or volitional control (i.e. if the person can decide at will to perform or not to perform the behaviour)

but there may be other external factors that influence an achievement of a behaviour. (Liska 1984) argues that the performance of many behaviours was constrained by lack of appropriate opportunities, skills and resources. In recognition of this limitation, the Theory of Reasoned Action was extended to include a third variable "perceived behaviour control" to be called the Theory of Planned Behaviour (Ajzen 1991).

2.5 The Theory of Planned Behaviour

The Theory of Planned behaviour (TPB) model is an extended model of TRA (Ajzen 1991; Ajzen and Fishbein 1980). TPB framework assumes that an individual behaviour is based on individuals´ readiness to perform the behaviour (i.e. intention). Intentions (I) in TPB are determined by three factors namely: attitude, subjective norm and perceived behavioural control (Ajzen 1991; Ajzen and Fishbein 1980). The TPB in figure 4 depicts:

- *Attitude (ATT):* individual's positive or negative perception of performing a behaviour (i.e. evaluation of the behaviour- favourable or unfavourable outcome).
- *Subjective norm (SN):* individual's perception of social pressure to engage or not in a behaviour. The theory implies that subjective norm is formed by an individual taking into consideration normative beliefs/expectations of various others in his environment.
- *Perceived behavioural control (PBC):* individual's perception of his or her ability to perform a particular behaviour.
-

According to TPB, perceived behavioural control captures behaviours factors that are not under volitional control because it is influenced by resources and opportunities available (time, money, skills, cooperation of others etc). The theory has two rationales; firstly, if intention is hold constant, the effort used to execute the behaviour is likely to increase with Perceived behavioural control. Secondly, the linkage between achieving the behaviour and PBC is that PBC can be used as a substitute to measure actual control. The TPB distinguished between three types of beliefs; behavioural beliefs, normative beliefs and control beliefs with their related constructs; attitude, subjective norm and perceived behavioural control. The theorist of TPB, argued that these three beliefs are necessary to obtain a measure of a given behaviour.

However, the TPB is open to including additional variables, if it can be shown they contribute to explaining a given behaviour but the initial theory variables should be accounted first **(Ajzen 1991).** This makes TPB attractive and widely used in many disciplines.

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Figure 2.4 The Theory of Planned Behaviour, adapted from (Ajzen 1991)

2.6 The Theory of Planned Behaviour & Recycling Behaviour

The complexity of RB requires a theoretical framework which allows for including different variables, hence, TPB model was chosen for this study because it provides such possibilities. According to (Tonglet et al. 2004), the TPB provides a theoretical framework for systematically identifying the factors which influences the decision to recycle. Several studies have confirmed the effectiveness of TPB for investigation of recycling behaviour [for example, (Shen et al. 2019 ; Tonglet et al. 2004; Wang and Mangmeechai 2021). A review of few studies on the main findings which applied TPB to explain recycling behaviour are illustrated below:

(Tonglet et al. 2004) revealed pro-recycling attitudes as the highest predictor of recycling behaviour and noted that pro-recycling attitude is influenced by proper facilities, knowledge to recycle and unrestricted by situational factors (time, space and inconvenience). In agreement to this, (Zhang et al. 2015) showed attitude and residents education level are the strongest predictors of waste sorting behaviour (WSB) while the lack of time and inconvenience had negative impacts on recycling behaviour. These authors, also found that SN, PBC and intention(I) significantly predicted the waste sorting behaviour among households. In addition, study by (Liao et al. 2018)

observed that the model variables (positive Attitude, SN, PCB and past behaviour) significantly influenced the residents waste separation intention leading to performing of recycling activity. It was also noted that how residents perceived effectiveness of recycling policy really impacted the waste separation intention. The study concluded that subject norms becomes less significant when perceived effective inducement of policy was increased. In congruence, (Wang et al. 2021) found that environmental regulations had the highest effect on behavioural intention for household waste sorting behaviour followed by PBC and attitude. Well according to (Strydom 2018) intention to recycling had a smaller effect on recycling behaviour, PBC appears the most important variable that explains RB. The author confirmed that there are other variables than those proposed in the TPB that appears to play an important role in recycling behaviour.

Meanwhile, in the study by (Shen et al. 2019), personal moral obligations, PBC, SN had positive influence on young people´s intention towards engaging in recycling activities, attitude and environmental concern do not. Also, (Árnadóttir et al. 2018) observed that although students had a positive attitude and are willing to behave in pro-environmental manner, yet there was a gap between intention and actual behaviour. Interestingly, the study by (Wang and Mangmeechai 2021) observed people with strong behavioural intention are more likely to engage in pro-environmental behaviour.

Hence, most studies discussed above and previous chapters [for example, (Shen et al. 2019; Wang and Mangmeechai 2021; Afroz et al. 2010; Zhang et al. 2015) had included a number of additional variables such as; moral norms, environmental concern, pro-recycling behaviour, situational factors, sociodemographic factors and convenience. These studies confirmed the significance of including additional variables when using TPB to analyse and understand recycling behaviour.

It is important to note that with the few studies highlighted here, one can see the contradictions and confirmations among studies as well as the uniqueness of each study findings. This can be attributed to limited scope, different geographical locations and areas used and hence, difficulty to have a general statement on recycling behaviour.

Criticisms of TPB
Despites the support for TPB, several authors have argued that it does not adequately explain recycling behaviour and have suggested that additional variables should be included in the model

(Davies, Foxall, and Pallister 2002 ; Tonglet et al. 2004). However, these criticisms about the TPB model can be addressed since (Ajzen 1991) allows including variables provided these variables capture a significant influence on explanation of a given behaviour when using the TPB. For this reason, (Davies et al. 2002) recommended separation of recycling attitudes into two segments: affective and cognitive which represents; (1) feelings about recycling and (2) knowledge of the outcomes and consequences of performing the behaviour.

2.7 The Analytical Framework

The analytical framework to be used in this study is the TPB model discussed above. Therefore, in accordance with the TPB and reviewed studies, this study has incorporated additional variables: moral obligations, situational factors and environmental knowledge and constructed a model for recycling behaviour, with its indicated hypothesis below.

Figure 2.5 The extended TPB framework for this study

Attitude
According to TPB, attitudes are determined by beliefs about the outcome (favourable or unfavourable) of the behaviour and is usually measured by asking questions about how they feel

about the behaviours such as good, positive, rewarding, useful, responsible etc. Several studies including [(Mamun et al. 2018); (Zhang et al. 2015) ; (Tonglet et al. 2004] found positive effect of attitude towards recycling behaviour. Hence, I proposed the hypothesis:

H1. Attitude (ATT) is positively related to recycling behaviour

Environmental knowledge
Several studies have supported that environmental knowledge have a significant influence on environmental behaviours [(Hasan et al. 2015); (Mamun et al. 2018)]. In a particular, (Mamun et al. 2018) revealed that attitudes towards environmental products are influenced by eco-literacy, environmental concern and self-efficacy. These studies showed that an environment-oriented education or campaign are significant and positively associated to individuals' attitude. hence the proposed hypothesis:

H2. Environmental knowledge (EK) is positively related recycling behaviour

Moral obligations
In the theoretical review, there was trend in evidence that people who have high moral obligation developed a cognitive consciousness which is evidence on a better environmental attitude. For instance, (Mamun et al. 2018) observed that personal moral norms are highly internalized attitudes which governed individual RB. These internalized attitudes depended on moral obligation derived from people's beliefs, rights and responsibilities towards the environment (Barr 2004). The importance of using moral norm to attitude was also recommended by (Davies et al. 2002) in the criticism of TPB discussed earlier. Therefore, I proposed the below hypothesis:

H3. Moral obligations is positively related to attitude

H3a. Moral obligation (MO) is positively related to recycling behaviour

Subjective norm
The social acceptance of recycling behaviour can trigger a recycling activity of an individual. Hence, there are several studies supported evidence that, individual's perception of social pressure had positively influence on recycling behaviour [(Zhang et al. 2015) ; (Shen et al. 2019)]. Hence, I proposed the hypothesis:

H4. Subjective Norm is positively related to behaviour

Perceived behaviour control

Perceived behavioural control reflects an individual's past experience, personal effort and anticipates obstacles. The more resources and opportunities a person perceive in performing a specific behaviour and the fewer the expected obstacles, the stronger the perceived behaviour control, making the behaviour more likely to occur. According to (Strydom 2018) intention to recycling had a smaller effect on recycling behaviour, PBC appears the most important variable that explains RB. Therefore, I proposed the hypothesis:

H5. Perceived behavioural control (PBC) has a positively relation to Recycling behaviour.

Intention

A combination of attitude, subjective norms, and perceived behavioural control will result in the formation of a behavioural intention. It has been established that a combined impact of more favourable attitude and subjective norm together with greater perceived behavioural control lead to stronger intention to perform a given behaviour. Hence, the stronger the behaviour intentions, the more likely that people engaged in recycling behaviour. In congruence, (Wang and Mangmeechai 2021) observed that higher intention is correlated with recycling behaviour, whereas (Hasan et al. 2015) observed that there was a gap between intention and actual behaviour (pro-environmental behaviour). Therefore, I proposed the below hypothesis:

H6. An intention (I) towards RB has a positive effect on RB

Situational factors

Studies have shown that an individual's having a positive attitudes or intentions towards recycling does not usually lead to recycling behaviours [(Barr 2004); (Wang and Mangmeechai 2021)]. According to (Wang and Mangmeechai 2021), one need to have high level of intention as well as control over the action before a desired engagement of behaviour like recycling can be achieved. They may be constrained by situational factors (i.e. individual objective environment when engaging in a given behaviour) (Tonglet et al. 2004). These situational factors include variables such as: space, convenience and recycling facilities/systems. Many studies reviewed in this study [e.g. (Zhang et al. 2015), (Miafodzyeva and Brandt 2013); (Mavropoulos and Sa 2021) and (Afroz et al. 2010)] concluded that situational factors significantly influenced waste separation intentions. Thus, I proposed the following hypothesis:

H7. Situational factors (SF) have significant influence on RB

Socio demographics variables

Socio demographic factors (such as age, income, education, house type and location) have the most ambiguous results so far as the studies of recycling is concerned (Miafodzyeva and Brandt 2013). "Recycling behaviour is multidimensional and comprises the undertaking of different roles with different socio demographic and psychographic causal characteristics" (Meneses and Palacio 2005). I believe a developing country such as Ghana, recycling behaviour will definitely be influenced by socio-demographic factors. Hence, I proposed the following hypothesis:

H8. Socio demographic variables have significant influence on RB

3. METHODOLOGY

3.1 Research Design (Case Study)

Research design is the procedure that connect research questions, empirical data and research findings (Blaikie 2010 p. 39). As research questions have been are presented and elaborated in the previous chapters, research design is the next crucial part of any study. Hence, the research design used for this thesis is the case study and the reason for this choice is because when the research is about looking into a behaviour in a specific place it is best analysed when the case study design is used. (Yin 2003) point out that "case study is an empirical inquiry that investigates contemporary phenomenon in-depth and within a real-life context, especially when the boundary between phenomenon and context are not clearly evident". As already mentioned, this study is about investigating recycling behaviour of residents in Ghana and recycling behaviour is an ongoing phenomenon and an in-depth study on recycling behaviour is of utmost important in Ghanaian economy. In the review of literature, the factors that influence recycling behaviour is many and varies from country to country, however, (Yin 2014) noted that one of the strengths of case study is that it can cope with technically distinctive situation in which there will be many variables of interest and data points comes from many sources. (Yin 2009 ; Yin 2014) is also of the view that when a research is into examining current events and the relevant actions cannot be manipulated , then case study becomes the most suitable method.

In addition, a primary data will be used for the study and this raw data will not be manipulated and therefore, it seems fit to use case study. In addition, both (Blaike, 2010) and (Yin, 2003) argues that **"**how" and "why" research questions are mostly favoured the use of case studies. It is important to note that three of the research questions (3-4) in this thesis is based on "why" questions and seeks to describe, explore and understand recycling behaviour.

However, there is a general misunderstanding regarding the unsuitability of case study findings to be generalized, nevertheless, disputed it as ungrounded misconceptions. (Flyvbjerg 2004, p.222) emphasized that "context-dependent knowledge and experience are at the very heart of expert activity. Such knowledge and expertise also lie in the centre of the case study as research and teaching method or to put more generally still, as a method of learning". The author argued that generalization power depends on the case study. The aim of this thesis is not to account for all factors that influence recycling behaviour, but to provide a descriptive and understanding of

recycling behaviour using TPB. Thus, the study account for factors like attitude, moral value, environmental concern, perceived behavioural control, subject norm, situational factors and demographic factor that influence RB in this current time and space. Hence, single case study is most suitable.

3.2 The Study Population (Ghana)

Ghana is located on the coast of the Gulf of Guinea and considered one of the stable middle income in the western Africa (Davies et al. 2021). It has a land area of 238,540 km2 (EPA,2010) and is bordered by Cote D`lvoire to the west, Togo to the east, the north by Burkina Faso and the south by the Gulf of Guinea (Sosuh 2011). Ghana has a real GDP growth from 6.3% to 6.5 and a population size of about 29.6 million in 2018 and expected population of 30.7 million in 2020 (World bank 2021). Ghana population is made up three diverse religious affiliations with more than one-half of the population being Christians, and one-fifth being Muslims and a small section sticks to traditional indigenous religions. The official language is English, however, there are at least 75 distinct local language and the largest and the most common language is Akan (which comprises of Anyi, Asante, Buale, Fante and Guang) followed by Dagomba, Ewe, Adangme and Gurma (Encyclopedia Britannica 2021). Despites the many languages there is no serious dissensions when Ghana gained independence in 6th March 1957 (World bank 2021). The climate in Ghana is tropical and has two main seasons namely rainy season (May-October) and dry season (November -April) with an average temperature of 30 degrees (Miezah et al. 2015). Ghana is rich in natural resources such as minerals, animal life, forest and oceans, rivers and inland lakes.

The Research sample (study area)

Ghana is a political stable country and municipalities characteristics across the country do not vary much and therefore choosing the sample for this paper was not much of a problem. However, in order to study the in depth of RB, a sample has to be selected. In congruence with (Blaikie 2010) pointing out that population are a set of people, society or situation a scholar is studying about and in order to study in-depth of the population, a sample/random sample which is a subset of the population has to be selected. This implies instead of studying on the whole population the scholar must select a small sample to represent the whole population. Hence, the study was restricted to residents in Agona West Municipal District (Figure 2.6).

Study district

Figure 2.6 Map of Central Region, Ghana. (Wikimedia Commons 2012)

This municipality provides an ethnically heterogeneous population that should yield a relatively representative sampling of Ghanaian municipal residents. Thus, in Ghana before an area is awarded as a municipality a criteria such as population size, facilities etc has to be met. In addition, the Agona West Municipal District was chosen for this case study because it one of the fastest growing municipality in Ghana, it is faced with increased in waste generation, uncollected waste and improper disposal (landfills) (Adams, 2015). It is located in the Central Region of Ghana and a total land area of 447 square kilometres. It has a population of 149,014, a growth rate of 3.2% and a constitutes 53.15 % females and 46.9% males (AWMA, 2019).Agona Swedru is the capital for the Agona West Municipal District (AWMA). The economy of the municipal is mainly agriculture and cash crop production form the majority of the total agriculture produce e.g. cocoa, citrus, palm oil and coco nut (Agona West Municipal Assembly 2019).

3.3 Research Strategy (Abductive)

The research strategy employed for this study is the abductive strategy. It relates an observation to theory or (vice versa) and results in an interpretation (Dey 2004: 91). However, interpretations from abduction have specific interpretations/understanding unlike induction strategy that infer a generalization. The author added that abduction suggest plausible interpretation rather offering a logical result as in the case of deduction strategy. In congruence, using induction (from data to theory) and deduction (from theory to empirical data) strategies aims at logical conclusion and generalizations respectively (Blaikie 2010; Sovacool, Axsen, and Sorrell 2018). However, the aim of this thesis is to find out something specific and plausible interpretation to understand recycling behaviour among residents in Ghana, hence the choice for the abductive strategy.

This study employed the extended theory of planned behaviour model presented in **figure 2.5** and empirical data (through survey) to answer the research questions on recycling behaviour. In the discussion of the thesis, using the descriptive analysis, I intend to switched back and forth between the TPB and the empirical data in an attempt to describe and give meaning or to understand recycling behaviour among residents in Ghana. Although, abductive strategy lacks fixed criteria to assess the validity of an abductive conclusions and sometimes limited by formal logic (Danermark et al. 2002), however, (Dey 2004) pointed that "using abductive inference is thus a matter of interpreting a phenomenon in terms of some theoretical frame of inference. This can be one of several possible interpretations, depending on the theory we adopt". Hence, the TPB is one of the widely used framework in the study of behaviour and I believe using it will result in a rise in logical interpretations which maybe be a plus to this thesis.

Also, the TPB model can be used as a criterion guide and assess this study results validity as it can be compared with many other studies of recycling. In addition, the study shall attempt to discuss and reflects on the TPB model as I do not have the required data and statistical skills to test the model; either to confirm or disprove the model. Hence, the discussion of the model will be geared to the extends the TPB seems to explain recycling behaviour and also identify some challenges with the model. Again, abductive strategy is the best choice because it is a middle ground theory strategy of which I can switch between inductive and deductive strategy.

3.4 Research Method (Quantitative Research Method)

The research design for this study is single case study and the research method adopted is quantitative method. According to (Yin, 2003, p.14) "The case study strategy should not be confused with `qualitative research`… In fact, the contrast between quantitative and qualitative evidence does not distinguish the various research strategies". This implies that the researcher can decide to choose quantitative, qualitative or both methods depending on the data collected. Quantitative method refers to measuring something (events, situations, or problem) in a quantity (Neuman 2014). In addition, employing quantitative method in a study allows the study to be conducted in a fast way and the danger in collecting unreliable data is very low as well as assisting to increase a deep knowledge to understand the questions(data) required to be answered (Quinton and Smallbone 2006). Several studies of the recycling behaviour used quantitative method [(Shen et al. 2019); (Tonglet et al. 2004); (Zhang et al. 2015); (Árnadóttir et al. 2018)], hence, this study employs quantitative survey with some element of qualitative responses by inclusion of open-ended questions. When open-ended questions are included, it enables respondents to give details, qualify, clarify responses and in the end the research is able to discover unanticipated findings (Neuman 2014)

3.5 Data Reduction and Analysis

The data reduction ensure that information collected for a study is transformed in a way (such as numbers) that fit into data analysis (Neuman 2014). Therefore, the data collected will be coded following the coding guidelines in (Blaikie and Priest 2019). Data collected in this research were converted to numbers and analysed through the IBM SPSS statistics programme for descriptive and explanatory analysis. The SPSS has been widely used because it output results are trustworthy and when it comes to large data, employing SPSS is the best it application steps are simple, straight forward, data transformation/reduction and data variables are made meaningful etc (Pallant 2016). Furthermore, output from the SPSS will then subjected to TPB model and abductive discussions. The descriptive and explanatory statistics, regression analysis as well as abduction discussion were employed to guide and to focused on the objectives of the study and the research questions that need to be answered. The regression analysis was done to reconfirm the findings on the descriptive statistics and hence checking of the reliability and validity of the findings.

3.6 Validity and Reliability

The quality of every research depends on reliability and validity of the measurements used and this ensures whether findings of a study can be reproduced or not (Blaikie, 2010); (Neuman, 2014). Reliability is a way of showing how a scale[2] free from random error and this can be achieved by test-retest reliability and internal consistent. Hence, the Survey (questionnaire) will be pre-test on ten people of which this case study is investigating and questions that needs reframing will be done. However, in the case of internal consistency which focuses on the extent to which the questions which makes up the scale (e.g. attitude) will be done using the Cronbach´s coefficient Alpha (using the IBM SPSS). In addition, the questions pertaining to measuring the same attribute mentioned in the figure 2.5 (attitude, social norm, perceived behavioural control, moral norm, environmental concern and demographic) will be taken into consideration and grouped together as a doing that ensuring internal consistency. Also, Pearson Correlation, correlation and t-test will also be performed among the items in the questionnaire.

According to (Sovacool et al. 2018) validity recounts to if the result or interpretation of a study is correct. In ensuring the validity of the scale which is a way of knowing the degree to which it measures what is supposed to measure can be done in several ways as there is no clear-cut indicator (Pallant 2016). When doing a quantitative method case study, the theoretical or content and measurement (operational) definitions must be well defined and applied throughout the research as this indicates the trustworthiness of the study findings. Hence, both reliability and validity criteria's will be adhered to in this study.

3.7 Limitations

The study was limited by lack of time, resources and enough data. Usually, with regards to self-reporting surveys, it is not possible to verify the data, but the questionnaire survey is frequently used in behaviour studies as it is one of the fastest and cheapest methods for covering a large sample size of respondents. Therefore, there may be some biasedness in the data. Also, the study findings cannot be generalized to the entire population of Ghana. But, since this is not the objective of the thesis but rather to describe and explore what shapes recycling behaviour in the limited geographical location (i.e. Agona West Municipal District). The study is also, constrained to descriptive arguments and depth technical aspects not considered

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[2] It refers to what has been designed to "operationalise" some underlying construct or attribute that is not directly measurable (e.g. Behaviour, self-esteem) (Pallant, 2016)

3.8 Ethics

During this research the following codes of ethics adhered: voluntary participation, obtaining informed consent of research participants, protecting the interest of the research participants and researching with integrity. Also, to ensure participants privacy, the survey questions were anonymous, with nor requirement of name, contact information as well as questions regarding sensitive information will not asked. Although, some part of the data collection was through online survey in which it is traceable to an email or IP address, however, SurveyMonkey application used has an option where respondents are made anonymous and it function is to not to collect IP address of respondent.

3.9 Data collection

The type of data that used in this study is primary data and source of data was semi-natural settings; thus "individuals are asked to report their activities that occurs in natural settings" (Blaikie 2010). In addition, (Blaikie 2010; Blaikie and Priest 2019) stated that semi-natural setting is the choice if data seeks after individual´s characteristics, individual as informant, individuals as representative, life histories and individuals as the case study. This study is a case study on recycling behaviour and hence the choice of semi-natural setting is a plausible choice because self-reported survey is the how the data for this study will be collected. Furthermore, in social science research like this study, one of the most common primary data collection tool used in quantitative study is by survey; where questionnaire can be answered online, paper, telephone, mail, fax, interviews etc (Blaikie 2010); (Neuman 2014). Considering the limited time and lack of enough resources, online and paper questionnaire is an easy and fast way to get data and also, the respondents have enough time to read and answer the questions to the best of their knowledge as less literate respondents are not at a disadvantage (Neuman 2014).

Another, vital decision has to be made regarding how the data will be collected. Therefore, based on the questionnaire guide or suggestions in (Blaikie 2010); Neuman 2014; Blaikie and Priest 2019), closed-ended questions and an open-ended questions were constructed, with a cross-sectional structure (i.e. confined to the present time) being considered. The questions or statements was carefully constructed to measure the six input variables of the extended TPB model in **figure 5**. Thus, the questionnaire captured these six variables; attitude, subjective norm, perceived

behavioural control, environmental concern and demographic factors. The questionnaire was also influenced or guided by recent social science studies on recycling behaviour studies such as (Tonglet et al. 2004); (Davies et al. 2002); (Mamun et al. 2018); (Zhang et al. 2015) and (Barr 2004), so that questions constructed measures what they are intended to measure.

Survey/Questionnaire design

The questionnaire for this thesis was based on the recycling literature and previous applications of the TPB reviewed in the previous chapters [see for example, (Tonglet et al. 2004); (Barr 2004); (Ajzen 1991); (Shen et al. 2019); (Zhang et al. 2015); (Davies et al. 2002)]. As suggested by (Ajzen 1991), I used eight-point assessments to measure the variables of the TPB (attitudes of recycling, intention of recycling, the subjective norm and perceived behavioural control) and the variables (environmental knowledge, moral norm, situational factors and socio-demographic factors) were included for the purpose of this thesis. The 5-point Likert Scale (1-Strongly disagree, 2- disagree, 3-nuetral, 4-agree and 5-Strongly agree) were used to scale the section B part of the questionnaire. The section A is collects information on demographic of respondents and section C is open-ended questions which asks the respondents to give reasons for their choice.

SECTION A:

Socio-demographic factors: Demographic information which is individual details gives the general background of resident's status which is needful for analysis of this study. The information requested are: gender, age, education level, type of education, income, employment status, location and number of children.

SECTION B:

Attitudes: The recycling attitudes refers to feeling about something. Based on the review of literature, I used the following statements to measure attitude:

- recycling is good
- recycling is hygienic
- recycling is useful
- recycling is responsible

Subjective norm: The subjective norm which refers to social pressure to recycling waste and was operationalized into three questions:

- My family expects me to recycle household waste
- my neighbours expect me to recycle household waste
- my community expects me to recycle my household waste.

Perceived behaviour control: Perceived behaviour control refers to the ability to do a behaviour in question (in this case – recycling behaviour) or the efforts a person uses to perform a behaviour. Studies recommends a more specific measure. Therefore, the following statements used are:

- Recycling is easy
- I have plenty of opportunities to recycle
- Recycling is inconvenient
- The municipal council provides facilities/resources for recycling
- I know what items of household waste that can be recycled
- I know where to take my household waste for recycling,
- I know how to recycle my household waste.

Moral norm: The following questions was used to measure how respondents perceived moral obligation.

- I feel it is wrong not to recycle my household waste
- I should not discard anything if it can be reused again
- It goes against my principles for not recycling
- I would feel guilty if I don't recycle my household waste
- I recycle for the sense of responsibility to protect the environment
- It is everyone responsibility to recycle his/her household waste

Situational factors: The following questions was used to measure situational factors.

- I do not have enough space to store recyclable items
- Recycling is too complicated

- Recycling takes too much time
- Recycling is convenient because I have recycling facility(s) in my community
- There is recycling programme organized in my community

Environmental Knowledge & concern: The following questions was used to measure how environmental knowledge & concern.

- I think environmental issues are related to improper waste management such as recycling
- I think human activities affects the environment always
- recycling is good activity to create a better community environment
- recycling reduces waste generated & landfilling

Personal recycling behaviour: The following statements were asked:

- I separate household solid waste before disposal
- I separate household solid waste in order to reuse it myself
- I separate household solid waste in order to send/sell it to recycling facilities
- I separate household solid waste in order to send/sell it to door to door collectors (scavengers)
- I often recycle my household solid waste
- I recycle household solid waste only when there are economic incentives

SECTION C:

- I recycle my household waste voluntary even if there are no economic incentives. If yes, give reasons
- Moral norms influence my attitude to engage in recycling. Give reason for the choice of answer?
- If recycling is legalized in your community will it influence you to recycle more? Yes or No, give reasons for the choice of answer.
- Do you think your involvement in recycling contributes to making the world a better place to live? Give reason for the choice of your answer.

- Does environment knowledge and concern influence your attitude to engage in recycling? Yes or No, give reasons for the choice of answer.

- Do you feel annoyed if your neighbour does not recycle his/her household waste? Yes or No, Give reason for choice of answer

- Which of the following seems to be the most relevant to improving recycling behaviour in your community (select your top 4)

  - Recycling facilities/resources in your community
  - Education on waste sorting and reusing of recyclables
  - Education on the environmental effects of non -recycling
  - Consequences of not recycling on health
  - Legalizing recycling
  - Households and community-based recycling programmes

Questionnaire fieldwork details

Prior to conducting the online questionnaire and paper questionnaire, the questionnaire was piloted on the 30th of April, 2021 and 1st May, 2021 respectively to assess the validity and reliability of the questions. The paper questionnaire was for residents in the rural areas of the municipality who do not have access to internet. This is because municipality comprises of urban cities and rural areas and therefore, if rural areas are not captured then the data sample collected will be biased towards urban residents who had access to internet in the municipal. The questionnaire has to be pretested in order to refine the questions that respondents find it difficult to answering as well as removing the problem of recoding after submission. In addition, the questionnaire has a cover letter which outlines instructions and purpose of the questionnaire. In accordance to (Blaikie 2010); (Neuman 2014) study participants must be given clear instructions and aware of the context of the question been asked, as this is also a way of ensuring validity, trustworthiness and reliability of the data collected.

The questionnaire was constructed using SurveyMonkey and the questionnaire survey link was generated by the SurveyMonkey programme, then it was sent through electronic means (Facebook,

email and WhatsApp). The online questionnaire was also converted from the SurveyMonkey app into a word pdf documents and printed for the paper & pen questionnaire. Two trained personnel were contacted to go to some of the rural areas in the municipality to recruits participants for the study and the minimum criteria for participants are all residents, all genders and an age not less than 14years. The training of these two personals were from the researcher, who introduced the topic and information needed from the participants. They were also equipped with incentives, smart phone as well as both soft and hard copies of questionnaire. These two personnel main task was to focus some rural areas in the Agona West Municipal District, who do not have access to internet. These two personnel interact with participants in the rural areas who wishes to partake in this research and the interested residents were then asked to filled the paper questionnaire. Also, the paper questionnaires were also be available at the end of church services, at schools, work places in both the urban and rural areas in order to get as many respondents as possible. This is because quantitative research requires a substantial large data. In the end, both online and paper survey were made available for a period of two weeks, thus (3rd of May, 2021 to 17th of May, 2021). Further, the filled paper questionnaires collected was put into SurveyMonkey, so that I can have both the online data and paper data at one place this ensured easy data reduction and analysis. The details of the questionnaire structure will be presented in the appendix.

3.10 Survey and Demographic Characteristics

Variable	Item	*f*	%
Gender	Missing	35	10.6
	Male	190	57.6
	Female	105	31.8
Age	Missing	34	10.3
	12-24 years	98	29.7
	25-34 years	109	33
	35-44 years	56	17
	45-54 years	15	4.5
	55 above	18	5.5
Level of education	Missing	34	10.3
	Junior high & Below	30	9.1
	Senior high	38	11.5
	College & University	166	50.3
	Masters & above	62	18.8
Type of education	Missing	54	16.4
	Sciences	54	16.4
	Health	71	21.5
	Administration	17	5.2
	Business	48	14.5
	Law	4	1.2
	Education & Humanities	82	24.8
Work status	Missing	38	11.5
	Student & retired	106	32.1
	Employment	137	41.5
	Unemployment	49	14.8
Income	Missing	94	28.5
	Below 1200	89	27
	1,200-2500	93	28.2
	Above 2,500	54	16.4
Marital status	Missing	34	10.3
	Single	177	53.6
	Married	108	32.7
	Divorced	7	2.1
	widowed	4	1.2
Children in household	Missing	38	11.5
	No child	98	29.7
	1 child	34	10.3
	2 children	47	14.2
	3 children	50	15.2
	4 or more child	63	19.1
Location	Missing	38	11.5
	Urban	158	47.9
	Rural	138	41.8
	Total	330	100

Table 1 Overall demographic factors of respondents

In the table 1 above, we observe that the questionnaire which was administered both online as well as paper & pen to residents in Agona West Municipal District had a total response of 330 questionnaires of which males constituted 57.6% and females being 31.8% respectively.

Regarding the ages of respondents, the range from 25-34 years were the highest participant of 33%, followed by age group of 12-24 years with a participation rate of 29.9% and with the range 35-44 years having the lowest participation rate of 4.5%.

More than 50% of the respondents have college, university and master's level of education and only 9.1% had junior & below level of education. The area of college and university education were science (16.4%), health (21.5%), administration (5.2%), business (14.5%), law (1.2%) and education & humanities having the highest participants level of 24.8% respectively.

A percentage of 41.5 were employed in both formal and informal sector. Also, 14% of the respondents were unemployed while 32.1% constitutes both students and retired respondents.

Interestingly, a percentage as high as 28.5% of respondents did not disclose their income level however, majority of respondents earn from GHS 1,200 – GHS 2500 with a close 97% earning from GHS 1200 & below while few respondents forming 16.5% earning above GHS 2500.

Single marital status has the highest percentage of 53.6% and this can be related to the fact that majority of respondents were student and between the age of 12 and 34 years of age. Therefore, it is no surprise that 29.7% of respondents have zero (0) number of children in their home.

In the end, data also showed that 47.9% and 41.8% lives in urban and rural areas of the Agona West Municipal District respectively.

Please note that in all of the charts, percentages of response do not add up to 100% due to respondents having skipped over certain questions. However, missing data in all the charts included in the chart to see the % of missing data which will be needed in the analysis in case the need arises in discussion section of this study.

4. EMPIRICAL FINDINGS

4.1 Commentary on Recycling without Incentives & Legalizing Recycling

These set of survey questions related to why residents recycle without incentives and recycling regulatory. The questions were either requires respondents to answer "Yes or No" and short answers (open-ended questions). The short answers are coded, summarized and presented below.

Recycling without incentives

The next question asked residents if they recycle household waste voluntary even if there are no economic incentives. Give reason for their choice of answer, if they answer "Yes" to the question.

		Frequency	Valid Percent
Valid	Yes	198	100
Missing		132	
Total		330	

Table 2 Recycling without incentives

Table 2 shows that out of the 330 respondents, 198 answered yes to the question and zero (0) response for the choice of "No" answer, unfortunately, as high as 132 participants did not answer the question. The possible reasons for a high number of residents not answering this question, could be economic incentives (money) is what motivates them to recycle or simple did not really want to disclose it. However, respondents' reasons for engaging in voluntary recycling showed environmental knowledge/concern was the major reason, followed by health concern and next, reuse and home cleanliness. Interestingly, moral values & responsibility reasons constituted the least of all the reasons. The above discussion is graphically shown in coded responses presented in table 3.

Reasons for recycling without incentives

Item	Number of responses	Frequency (%)
Environment knowledge/concern	86	46%
Health concern	29	16%
Moral values & responsibility	14	8%
Reuse and home cleanliness	20	11%
Do not answer/others	36	19%
Total	185	100%

Table 3 Why recycling without incentives

What can motivate you to recycle or recycle more aside incentives

The next question asked residents opinions on what can be done to motivates them to engage in recycling or improve their recycling behaviour

Item	Number of responses	Frequency
Recycling facilities/supportive government policies	40	37%
Home collection & distance to Recycling facility	12	11%
Education/how to recycle	20	18%
Do not answer/Others	37	34%
Total	109	100%

Table 4 What can motivate residents recycling behaviour

Table 4 indicates the coded categorization based on residents' opinions to what can motivates them to engage in recycling or increase their recycling aside money. We observed that having recycling facilities/supportive government policies had the highest frequency of 37%, followed by recycling education with 18% and finally, home collection & distance to recycling facility constitutes 11%. Notably, residents also had a high preference for "education on how to recycle" as a motivation factor that will make them to increase their recycling behaviour or engage in recycling if they are not into recycling. Differently put, a community may have recycling facility but without technical know-how on recycling, it will definitely will have no effect on recycling behaviour or recycling participation in general. This goes on to say that recycling education is crucial so far as recycling is concerned.

Recycling regulation on behaviour

The next question asked residents that if recycling is legalized or regulated in their community whether it will influence them to recycle now. They were asked to give reason for their choice of answer.

		Frequency	Valid Percent
Valid	Yes	1	0.7
	No	135	99.3
Missing		194	
Total		330	100

Table 5 Recycling is legalized

In Table 5, we observe only 1 participant responded yes, 135 responded NO and 194 responded did not answer the residents respectively to question "*if recycling is legalized in their community whether it will influence them to recycle now*".
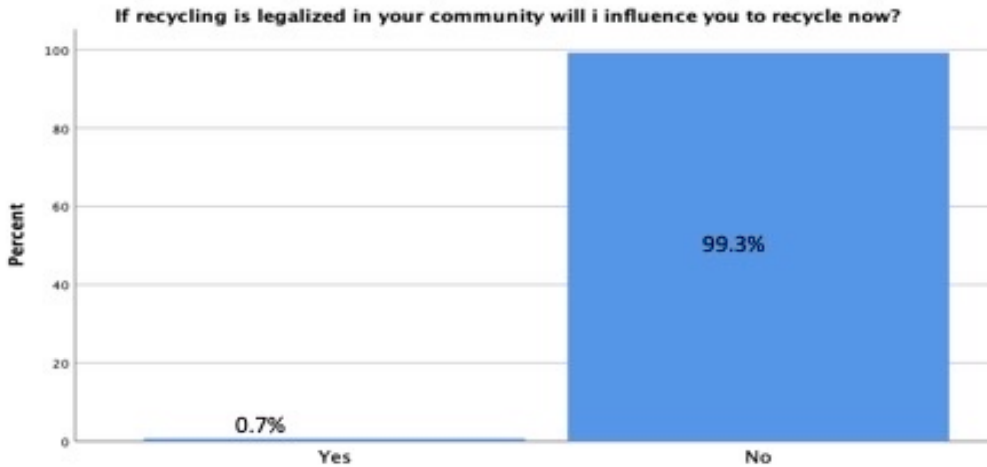

Figure 1 Legalizing recycling on recycling behaviour

Figure 1, indicated that only 0.7% of resident answered "yes" to the question that when there is regulation on recycling it would make him/her engage in recycling while 99.3 participants indicated that regulating recycling in their community will have absolutely no influence on their recycling behaviour. This finding is quite interesting, as it is a general phenomenon to see people change in people behaviour towards an issue when there is regulation backing it but in the case of recycling it absolutely has less than 1% positive effect on recycling behaviour.

However, further analysis in table 5 showed that respondents reasons for not recycling even if recycling is legalized were lack of recycling facilities, lack of recycling knowledge/skills, no law enforcements, no incentives, lack of time and storage space. Among these reasons, lack of recycling knowledge or skill was the main reason given by residents followed by lack recycling facilities. These two main reasons were also indicated as major motivating factors to recycling in figure 4 by residents. Remarkably, lack of time, lack storage space and lack of home pickup seems to contributes quiet high frequency why residents said they will not be able to recycle even after recycling regulations. Hence, these reasons are important concerns that hinders recycling.

No recycling even if recycling is legalized, reasons

Item	Number of responses	Frequency
lack of recycling facilities	22	16%
Lack of recycling knowledge & skills	31	22%
No law enforcement	9	6%
No incentives	9	6%
Lack of time	18	13%
Lack of storage space	4	3%
Lack of pickup or home collectors	17	12%
Others	15	11%
Total	139	100%

Table 5 Reasons for not recycling

In your opinion, which of the following seems to be relevant to improving your recycling participation in your community

ANSWER CHOICES	RESPONSES	
Providing of recycling facilities/resources in your community	83.33%	250
Education on how waste is sorted and reusing of recyclables	79.33%	238
Education on the environmental effects of non -recycling	67.67%	203
Public education on consequences of not recycling on health & energy	67.00%	201
Legalizing recycling in the community	53.00%	159
Households and community-based recycling programmes	57.00%	171
Total Respondents: 300		

Table 6 frequency distribution

In table 6 above, residents indicated education is the most relevant factor in improving recycling in their communities. This observation showed that residents stress over and over again about the importance of recycling education to them. To confirm, the above, legalizing recycling had the least preferred choice. In my opinion, reason for this observation might be that if recycling is legalized residents will think of it as burden or responsibility and therefore would not want to carry extra burden as behaviour usually change takes time. Also, they may prefer to do it willingly instead being forced to do it and this can be achieved if residents are educated on recycling.

4.2 Highlights on Recycling Behaviour Indicators

The next of part of survey questions asked residents questions relating to recycling. These questions were made up of 28 statements categorized into 7 concepts or variables namely moral obligation, environmental knowledge, attitude, subject norm, perceived behaviour control, situational factors and personal engagement relating recycling. The aim was to find out how these variables influences the recycling behaviour of respondents. As previously mentioned, five-point Likert scale was used to categorized participants respondents i.e. (1-Strongly disagree, 2- disagree, 3-nuetral, 4-agree and 5-Strongly agree). Frequency tables with bar-charts, tabulations or pie charts were used to examine how participants responded to each question on recycling variables and demographic.

Attitude

There are four set of statements here that were used to measure attitude. These statements are related to residents' attitudes towards recycling. The statements are presented in table 7 with their response as well as bar charts and cross tabulations is illustrated below.

	Recycling is good	Recycling is hygienic	Recycling is useful	Recycling is responsible
Valid	330	329	329	330
Missing	0	1	1	0

Table 7 Statistics on respondents for the concept of Attitude

Table 7 depicts the overall statistics on attitude with no missing values in statements 1 & 4 but both statements 2 &3 have one missing value.

Figure 2 & 3 statements was general perception of outcomes of recycling. The frequency distribution shown in figure 2 indicates how residents measure the outcome of recycling by the statement; recycling is good. It is interesting to see that only 0.3% strongly disagree and 0.9% disagree with the statement and this indicates that less than 2% of residents do not think recycling is good. Whereas, 33% agree and 62.7% strongly agree to how good recycling is.

45

Figure 2 Frequency distribution

Figure 3 Cross tabulation

Further evaluation was carried-out to see gender breakdown on the question using cross tabulation bar chart in figure 3. The findings showed that 61.8% of males strongly agree and 52.3% agree while females noted that 26.1% strongly agree and 41.3% agree to the question. We can observe that males showed higher agreement than females, interestingly, males have some percentage of disagreement, females had absolutely no percentage of disagreement.

Recycling is hygienic

Figure 4 Frequency distribution

The frequency distribution shown in figure 4 indicates if residents thinks recycling is hygienic. The results showed that 41.9% and 46.2% of residents strongly agrees and agree to the statement and just 1.2% of the resident strongly disagree to it.

Recycling is useful

Figure 5 Frequency distribution

In the frequency table labelled figure 5, It was found that 56.5% and 37.1% of residents strongly agrees and agree to the statement that recycling is useful respectively with less than 3% of residents when we sum the percentages of residents who disagree and strongly disagree.

Recycling is responsible

Figure 6 Frequency distribution

When it comes to the statement "recycling is responsible" in figure 6, we observe that 38% strongly agree and 45.8% agree respectively with 16.1% neutral and less than 1% strongly agreed.

In the observation of the all the frequency distributions figures above showed that all the questions/statements used to measure the concept of attitude towards recycling had a high percentage agreement to the questions.
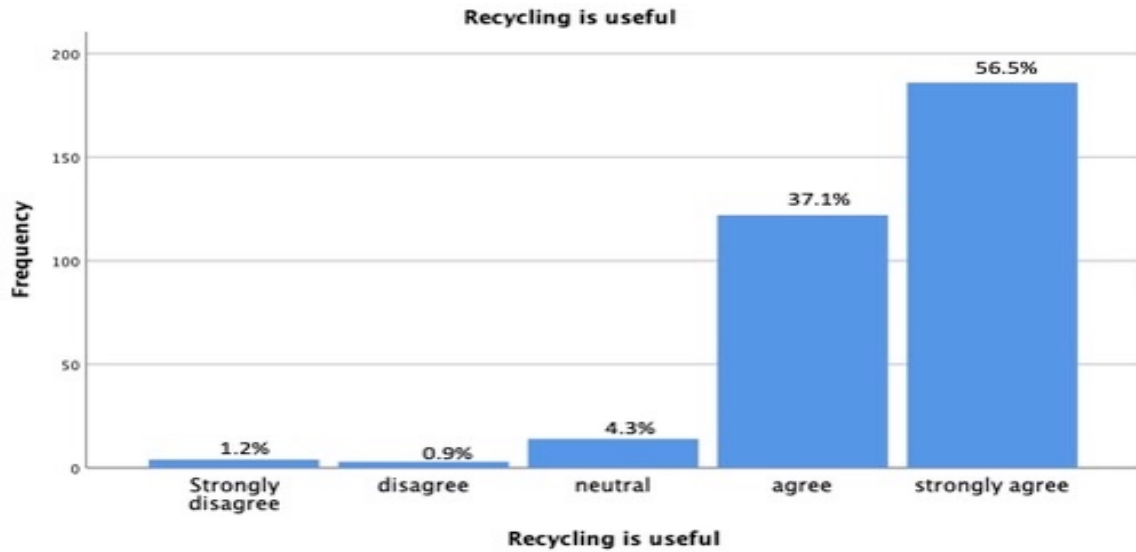
General comment on ATT

The overall measurement of responses in figure 2,3,4,5 & 6 showed that residents gave favourable outcome to recycling activities. From TPB, we will say respondents should engage in RB in a positive way which implies attitude should have a positive effect on RB. Further analysis in this chapter later will show if this positive attitude really has a positive influence on recycling behaviour.

Social Norm

The next set of survey questions relate to resident´s social norm regarding recycling. The statistics of the questions are shown in table 4.3 and with pie charts showing their frequency distributions below.

	My family expects me to recycle household waste	My neighbours expect me to recycle household waste	My community expects me to recycle my household waste.
Valid	330	330	330
Missing	0	0	0

Table 4.3 Statistics on respondents for the concept of social norm

Table 4.3 shows the three statements used to measure the factor "social norm". It displays the overall statistics on social norm with an observation of no missing values in all questions.

Figure 7, 8 & 9 illustrates the finding of the concept of social norm in frequency distribution to see how residents' rates how their immediate family, neighbours and community expects of them when it comes to recycling respectively.

Figure 7 Family expectation   *Figure 8 Neighbours' expectation*

Figure 7 above indicated that 11.2% of residents strongly agree, 35.8% agree that their family expects them to recycle their waste. On the other hand, 5.2% and 16.1% strongly disagree and disagree to the statements. This implies that, over 20% of residents noted that their family do not expects them to recycle. In addition, 31.1% of residents were neutral to the statement. The reason can be either they are unsure or did not want to disclose.

While figure 8 shows that 33.3% agreed and 9.4% strongly agreed that their neighbor expectation of them engaging in recycling while 23% disagreed and 6.7% strongly disagreed including a high percentage of people of about 28% who are neutral to the statement.

In figure 9, we observe that 33.6% agreed and 13.9% strongly agreed that the community they live expects them engaging in recycling while 22.7% disagreed and 7% strongly disagreed including a high percentage of people of about 23% who are neutral to the statement.

Figure 9 Community expectation

Remarkable, residents had high percentages of 16.1%, 23% and 22.7%, disagreed in all the questions response above in the frequency distribution pie charts above on recycling expectations.

Overall Comment on SN

It can be observed residents' expectations of others in figure 7, 8 & 9 respectively are relatively low. This implies that quiet a number of residents´ noted that their immediate family, neighbours and community expectation of them recycling is low. The reason could be that recycling behaviour is not a formed societal norm which is practiced regularly. Hence, SN will definitely have influence on RB.

Perceived behaviour control
The next set of survey questions relate to residents' perceived behaviour control towards recycling. The questions are presented in table 4.4 with their response statistics and further frequency distribution for each of the questions are illustrated below.

Table 4.4 shows the overall statistics on perceived behavioural with an observation of no missing data in questions/statements 1 & 4.

	Recycling is easy	I have plenty of opportunities to recycle	Recycling is inconvenient	The municipal council provides resources (such as facilities & materials) for recycling	I know what items of household waste that can be recycled	I know how & where to take my household waste recycling
Valid	330	326	329	330	329	329
Missing	0	4	1	0	1	1

Table 4.4 Statistics on respondents for the concept of perceived behavioural control

Figure 10 Easy to recycle

In figure 10, we observed that 34.6% (strongly agree & agree) of residents finds recycle to be easy whilst 38.5% (strongly disagree and disagree) of the residents do not find recycling easy as well as 27% are neutral. This means majority of residents find recycling not easy.

51

Figure 11 Opportunity to recycle

Figure 11, shows that 50% (strongly agree and agree) noted that they had opportunity to engage in recycling whilst 8.2% strongly disagree and 21.3% disagree to them having an opportunity to recycling. Comparing figure 10 & 11, it can be noted that 38.5% of residents who find recycling not easy in figure 10, a similar percentage of 29.4% of residents do not have opportunities to recycling in figure 11.

Figure 12 Municipality provision of recycling resources

Figure 12 above showed that 27.3% of the total respondent strongly disagree and 30.6% disagree to the statement about their municipalities providing recycling resources for them to recycle. While, 20.6% and 5.8% agreed and strongly agreed respectively.

Figure 13 Knowing what items that can be recycled

Although, in figure 13 above, residents responded have a high percentage of 76.9% (strongly agree and agree) knowing what items to separate for recycling.

Figure 14 Where to recycle

Figure 14 showed that 31% disagree and 15.2% strongly disagree to the question about knowing where to send items for recycling. Recall, in figure 12, residents indicated that lack of recycling recourses provision. Therefore, it not obvious that majority of residents noted that they do not know how & where to take their household recycled items to for recycling in the figure 14 with a frequency percentage of 46.2% even if they want to participate in recycling.

Figure 15 Recycling is inconvenient

Figure 15 indicates, 35% agree and 4.9% strongly agree that recycling is inconvenient. If residents first do not have recycling resources (see figure 12) and therefore do not know where to send their recyclables (see figure 14), even if they know what items to be recycled (figure 13), they will definitely see recycling as inconvenient.

Overall Comment on PBC

In the above figures 10, 11, 12, 13, 14 & 15 we can observe thought-provoking responses. Such as majority of residents noted that recycling is inconvenient, even though more than half of the respondents indicated they know what items to recycle. Possible reasons could be that most of communities' lack recycling facilitates (figure 12) and so even if residents know what items to recycle, they are hindered lack of recycling facilities and this will make recycling to be inconvenient to them.

Moral obligation

The next set of survey questions related to residents' moral obligation towards recycling. The questions are presented in table 4.5 with their response statistics as well as frequency distribution pie charts are illustrated below.

	I feel it is wrong not to recycle my household waste	I should not discard anything if it can be reused again	It goes against my principles for not recycling	I would feel guilty if I don't recycle my household waste	I recycle for the sense of responsibility to protect the environment	It is everyone responsibility to recycle his/her household waste
Valid	329	329	328	330	330	330
Missing	1	1	2	0	0	0

Table 4.5 Statistics on respondents for the concept of moral Obligation

Figure16 Wrong not to recycle

Figure 17 Not to discard reusables

In Figure 16, we observe that resident's response to the statement of feeling it is wrong not to recycle their household waste showed 41.6% agreement and 13.1% strongly agreement. However, 22.8% disagree and 6.4% strongly disagree to the statement.

Remarkable, in figure 17, 81.1% (strongly agree & agree) of the participants noted that they should not discard anything that can be reusable again.

Figure 18 Principles for not recycling   *Figure 19 Guilty based on non-recycling*

From figure 18, about 31.7% agreed and 8.8% of residents of Agona West Municipal District agreed that it goes against their principle for not recycling however, a high percentage around 4.9% and 28% strongly disagree and disagree respectively to this.

Similar findings were also noted in figure 19 where 33.9% disagree to the feel of guilty for non-recycling of their household waste with only 26.7% agreeing to the feeling of guilty if they do not recycle.

Figure 20 Responsibility to the environment   *Figure 21 Everyone responsible to recycle*

Figure 20 and 21 indicates that participants gave a high positive response to statements confirming that it is the responsibility of all to recycle their household waste and this is a responsible way to protect the environment with over 68% (strongly agree and agree) in both statements.

Overall Comment on MO

The summary of the MO variables in the above figures 16, 17, 18, 19, 20 & 21 showed that residents have a high MO towards the recycling. Differently put, residents noted that recycling is responsible behaviour for themselves and everyone.

Situational factors

The next set of survey questions related to residents' situational factors associated to recycling. The questions are presented in table 4.6 with their response statistics as well as frequency distribution pie charts are illustrated below.

	I do not have enough space to store recyclable items	Recycling is complicated	Recycling takes too much time	There is recycling programme organized in my community	There are people who come home to home to buy solid waste in my community
Valid	329	330	329	329	329
Missing	1	0	1	1	1

Table 4.6 Statistics on respondents for the concept of situational factors

In table 4.6, there is a high response rate to all statements measuring the variable situational factor, with the exception of one of statements missing one respondents' value.

Figure 22 and 23 shows response to the statements about having enough storage space and recycling is complicated respectively. Here we see much more variety as about 17.9% and 26% of residents are unsure or neutral about whether they have enough storage space and recycling being complicated. However, in figure 22, 51.7% of the residents agree and 16.7% strongly agree that they do not have enough storage space for recyclables.

Figure 22 limited storage space

Figure 23 Recycling is complicated

Similarly, in figure 23, 43.6% of the residents agree and 10% strongly agree. One explanation could be education or type of housing. Recycling is practiced in Ghana, but has not been able to develop where there are mass educations on recycling at the community level. In addition, lack of storage space could also be a reason as most residents live in shared apartments with limited space.

Figure 24 Recycling time

Figure 25 Recycling programme

Figure 24 shows that although 40.1% of the resident agrees to the statement that recycling takes too much time however, 29.5% are unsure or neutral to the statements. With this high percentages for agree and neutral by residents, it confirms to the high percentage of residents revealing in figure 23 (43.6%) that recycling is complicated. One explanation for this is if residents finds recycling to be complicated then it can logical that residents see recycling as time consuming or it can be that

residents will rather use their time for other economic activity. Hence, residents view recycling as both complicated and time consuming.

In figure 25, one can also observe that 30.1% strongly disagree and 34% disagree to the statement of recycling programme being organized in their community. This implies that communities in the municipality have very little or lacks recycling programmes and this could be the reason for high agreement to figure 24 (recycling time) or figure 23 (recycling is complicated).

There are people who come home to home buy solid waste in my community

- Strongly disagree
- disagree
- neutral
- agree
- strongly agree

12.8%

16.4%

16.4%

11.6%

42.9%

Figure 26 Door to door recyclables pickup

The statement in figure 26 was about door to door buying of recyclables. Where, response shows that 16.4% and 42.9% of residents strongly agree and agree respectively while only 12.8% strongly disagree to the statement. It is interesting to know, although recycling programmes are not organized in the community as observed in figure 25, however, there is some form of door to door collection of recyclables from individuals who have need of such recyclables.

Overall Comment on SF

The measures of SF presented in the above figures 22, 23, 24, 25 & 26 indicated that majority of residents noted that recycling is time consuming as well as had limited storage space for recyclables. This confirms to the high percentage of residents revealing in figure 23 (43.6%) that recycling is complicated. One explanation for this is if residents finds recycling to be complicated

then it can logical that residents see recycling as time consuming or it can be that residents will rather use their time for other economic activity. Hence, residents view recycling as both complicated and time consuming. In addition, although recycling programmes are rarely organised in communities, however, there are some private individuals who go to homes to buy or collects recyclables. This is a good thing as residence have the option to store their recyclables and sell it later, however, the issue will be how often do these doors to door collectors goes to residents' homes to pick up.

Environmental knowledge relating to recycling
The next set of survey questions related to residents' environmental knowledge associated to recycling. The questions are presented in table 4.7 with their response statistics as well as frequency distribution pie charts are illustrated below.

	I think environmental issues are related to improper waste management such as recycling	I think human activities affects the environment always	recycling is good activity to create a better community environment	recycling reduces waste generation & landfilling
Valid	330	328	330	329
Missing	0	2	0	1

Table 4.7 Statistics on respondents for the concept of environment knowledge

Table 4.7 gives the statistics on four statements measuring environmental knowledge and it is observed that only statement had missing values.

Figure 27 Environment problem   *Figure 28 Human activities affect the environment*

60

Figure 27, regards the statement on environment problem related to improper waste management. Here, residents showed strongly agree with 53% and agree of 39.4%. Similar response was also observed in figure 28 about the effect human activities on the environment with 54% strongly agreeing and 38.1% agreeing noted by the residents. This quiet a high percentage and this means residents have a pretty good knowledge about the negative environmental consequences of waste.

Figure 29 Better community environment   Figure 30 Everyone responsible to recycle

Also, figure 29 shows that 53.6% of the residents strongly agree to the statement that one of the benefits of recycling is that it creates a better community environment and 41.8% agreeing to this statement with only less than 1% disagreeing. Similarly, figure 30 also indicated 53.2% strongly agree, 39.2% agree with just 2.1% disagreeing to the statement that recycling reduces waste generation and landfilling.

Overall Comment on EK

In the above figures 27, 28, 29 & 30, it is observable that residents are knowledgeable about environment and the effects of negative human activities (increasing rate of waste) and how recycling can help reduce the negative effects on the environment. The question here is, will this knowledge residents hold about the environmental really have influence on their recycling behaviour. Differently put, with majority of residents showing that they are knowledgeable about the environment. Do they have concerns for the environment and do these concerns evidence on their recycling behaviour? This is because, it is different to know something and letting the knowledge affect your behaviour.

Personal recycling behaviour

The next set of survey questions related to residents' individual waste sorting engagement. The questions are presented in table 4.8 with their response statistics as well as frequency distribution pie charts are illustrated below.

	I separate my household solid waste before disposal	I separate my household solid waste in order to reuse it myself	I separate my household solid waste in order to send/sell it to recycling facilities	I separate my household solid waste in order to send/sell it to door to door collectors (scavengers)	I often recycle my household solid waste	I recycle household solid waste only when there are economic incentives
Valid	330	330	329	326	327	329
Missing	0	0	1	4	3	1

Table 4.8 Statistics on respondents for the concept of personal recycling engagement.

Table 4.8 displays the six (6) statements used to measure the concept personal recycling behaviour. There are some statements that have missing values, however their number is not enough to affects the findings.

Figure 31 waste separation before disposal   Figure 32 Reuse recyclables myself

Figure 31, shows resident's response to the statement about waste sorting before disposal. We observed that 41.8% agree and 9.1 strongly agree to this statement. However, a quiet number of residents also noted that they do not with about 33.1% and 16.1% were neutral about this statement. The 16% of residents who indicated neutral for this statement could be they are unsure or did not really want to disclose it.

In figure 32, residents 41.5% noted that their separate their waste in order to reuse the recyclable themselves while about 37.3% says otherwise and 21.2% residents responded neutral to this statement.

Figure 33 Send/sell recyclables to facilities   Figure 34 Give/sell recyclables to door collectors

In figure 33, we observe that 37.1%, 10.3%, and 18.2% of residents agree, strongly agree and neutral respectively to the statements that they separate their solid waste in order to send/sell to recycling facilities. On the other, 34.4% (disagree & strongly disagree) of the residents noted that they do not send/sell their recyclables to recycling facilities hence, responded otherwise. However, in figure 32, about 37.3% (agree & strongly agree) of residents noted that they separate their waste and reuse it themselves. What we can observe from these two responses is that the response in figure 32 and 33 verify each other or are highly correlated.

Interestingly, in figure 34 resident indicated 39% and 11.2% agree and strongly agree to the statement of selling or giving recyclables to door to door collectors. This response percentages are

slightly above the response noted in figure 33. This indicated, residents prefer home recyclables collections than they travelling or covering a distance to be able to recycle their recyclables.

Figure 35 Recycling often

Figure 36 Recycling only if there are incentives

Figure 36 shows the frequency distribution on the statement about recycling only when there is economic incentives. The response percentages are 8.8% strongly disagree, 37.7% disagree, 23.4% neutral, 24.8% agree and only 5.2% strongly agree to the statement. We can observe that that more than 46% of residents are of the view that they recycle even if there are no economic incentives. It will be interesting to know the reasons for their choice of answer and this will be discussed later.

Figure 35 shows how often a resident recycle his or her waste. We observed that less than 29% of the residents indicated that they often do it while 44.6% of residents note they do not and 26.6% residents were neutral; either they are unsure or do not want to disclose.

Interestingly, when we consider, the overall high positive responses for the concepts of attitude, social norm, moral obligation, environmental knowledge and perceived behaviour control, we may assume that residents will have a higher percentage for recycling often than the percentage of 28.8% observed in figure 35. The reason for this is not a straight forward answer also we have notice that when it comes to recycling many factors affects recycling behaviour of a person. However, further discussion will be made on it later in this chapter.

4.3 The Hypothesis Findings, Regression Model with Commentary

This section presents the overall Pearson Correlation that analysed six hypotheses of this research in figure 38. Each hypothesis will be selected and elaborated. The regression model is also presented in figure 39.

Figure 38 Correlations

		Total_RB	Total_ATT	Total_SN	Total_PBC	Total_MO	Total_SF	Total_EK
Total_RB	Pearson Correlation	1	-.218**	.398**	.624**	.302**	.401**	-0.042
	Sig. (2-tailed)		0	0	0	0	0	0.46
	N	321	319	321	315	318	317	319
Total_ATT	Pearson Correlation	-.218**	1	.150**	-.131*	.320**	-.234**	.396**
	Sig. (2-tailed)	0		0.006	0.02	0	0	0
	N	319	328	328	322	325	324	326
Total_SN	Pearson Correlation	.398**	.150**	1	.551**	.450**	.182**	0.01
	Sig. (2-tailed)	0	0.006		0	0	0.001	0.89
	N	321	328	330	324	327	326	328
Total_PBC	Pearson Correlation	.624**	-.131*	.551**	1	.366**	.394**	-0.04
	Sig. (2-tailed)	0	0.019	0		0	0	0.44
	N	315	322	324	324	321	320	322
Total_MO	Pearson Correlation	.302**	.320**	.450**	.366**	1	-0.05	.179**
	Sig. (2-tailed)	0	0	0	0		0.347	0
	N	318	325	327	321	327	323	325
Total_SF	Pearson Correlation	.401**	-.234**	.182**	.394**	-0.05	1	-0.01
	Sig. (2-tailed)	0	0	0.001	0	0.35		0.88
	N	317	324	326	320	323	326	325
Total_EK	Pearson Correlation	-0.04	.396**	0.008	-0.04	.179**	-0.01	1
	Sig. (2-tailed)	0.459	0	0.886	0.44	0	0.878	
	N	319	326	328	322	325	325	328

**. Correlation is significant at the 0.01 level (2-tailed).

Attitude and recycling behaviour

A Pearson correlation coefficient was computed to assess the relationship between attitude and recycling behaviour. In figure 38, It is observed that there was a significance correlation between attitude and recycling behaviour with r = -0.218, n = 319, p = 0.000. The negative correlation coefficient (r = -0.218) implies that residents have negative attitude towards recycling and hence recycling is not being encouraged or practiced. In other words, according to TPB, ATT has two categories: (favourable outcome and unfavourable outcome), positive attitude (favourable outcome) towards recycling and therefore recycling is been practiced or encourages. However, in figure 2,3,4,5 & 6 we observed overall attitude to be positive (favourable outcome) but, in the end, this positive attitude has negative correlation on RB. This finding contradicts the assumption in TPB model. Therefore, both figuren38 & 39 confirms each other findings.

Subjective norm and recycling behaviour

In figure 38, we observed that a Pearson correlation coefficient was computed to assess the relationship between SN and RB. Results indicated that there was a strong positive correlation between the two variables, r = 0.398, n = 315, p = 0.000. A positive subjective norm towards recycling behaviour increase the rate at which recycling behaviour is practiced. In the regression model in figure 39, we can also observe that SN significant predictor of RB. Hence, the analysis shows there was a significant relationship between subjective norm and recycling behaviour.

Perceived behavioural and recycling behaviour

The Pearson correlation coefficient computed to assess the relationship between perceived behavioural control and recycling behaviour in figure 38, showed that there is a strong positive correlation between the two variables, r = 0.624, n = 315, p = 0.00. In the regression model in figure 39, we can also observe that PBC significant predictor of RB. A positive perceived behavioural control towards recycling behaviour increase the rate at which recycling behaviour is practiced. The analysis shows there was a significant relationship between perceived behavioural control and recycling behaviour. In Figure 38, It is observable that r = 0.624 for PBC is the highest value in the correlation table.

Intention and recycling behaviour
In the testing of the hypothesis above, I do a regression; regression the variable "recycling intention" (RI) on attitude (ATT), social norm (SN) and perceived behavioural control (PBC); » COMPUTE RI= Total_ATT+Total_SN+Total_PBC «.

Then, a person correlation was computed to assess the relationship between RI and RB, to find out how much recycling intentions explains recycle behaviour.

Correlations

		Total_RB	RI
Total_RB	Pearson Correlation	1	.833**
	Sig. (2-tailed)		.008
	N	321	321
RI	Pearson Correlation	.833**	1
	Sig. (2-tailed)	.008	
	N	321	321

**. Correlation is significant at the 0.01 level (2-tailed).
Figure 41 Recycling intention on recycling behaviour

Figure 4.1 shows the correlation of RI on RB, we observe that there was a significance relationship between RI and RB r = 0.833, n = 321, p = 0.08. Hence, there is a positive relationship between RI and RB which confirms the hypothesis recycling intention is positively related to recycling behaviour. The value 0.833 implies that RI has the strongest correlation to recycling behaviour in this study.

Moral obligation and recycling behaviour
The Pearson correlation coefficient computed to assess the relationship moral obligation and recycling behaviour in figure 38, showed that there is a strong positive correlation between the two variables, r = 0.302, n = 318, p = 0.00. In the regression model in figure 39, we can also observe that MO significant predictor of RB. A positive moral obligation towards recycling behaviour increase the rate at which recycling behaviour is practiced. The analysis shows there was a significant relationship between moral obligation and recycling behaviour.

Situational factor and recycling behaviour
In figure 38, we observed that a Pearson correlation coefficient was computed to assess the relationship between situational factors and recycling behaviour. Results indicated that there was a strong positive correlation between the two variables, r = 0.401, n = 317, p = 0.000. In the

regression model in figure 39, we can also observe that SF significant predictor of RB. A positive situational factor towards recycling behaviour increase the rate at which recycling behaviour is practiced. Hence, the analysis shows there was a significant relationship between subjective norm and recycling behaviour. In Figure 38, It is observable that r = 0.401 for SF is the second highest value in the correlation table.

Environmental knowledge and recycling behaviour

In Figure 38 above, we see that r=-.042, n = 319, p= .46, this implies that there was no significant relationship between environmental knowledge and recycling behaviour because p>o.5. In the regression model in figure 39, we can also observe that EK not significant predictor of RB. There was a no positive relationship between environmental knowledge & concern and recycling behaviour.

The regression analysis for the study

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.615	2.482		1.86	0.064
	Total_ATT	-0.371	0.113	-0.171	-3.27	0.001
	Total_SN	0.15	0.095	0.088	1.571	0.117
	Total_PBC	0.516	0.071	0.422	7.243	0
	Total_MO	0.201	0.066	0.165	3.066	0.002
	Total_SF	0.286	0.074	0.188	3.887	0
	Total_EK	0.015	0.099	0.007	0.147	0.883

a. Dependent Variable: Total_RB

Figure 39 Regression model

Note: sig (significance: p<0.5)

In figure 39, the simple model used was: RB= β+ATT+SN+PBC+MO+SF+EK, where β denotes constant, the explanatory variables are ATT, SN, PBC, MO, SF and EK and the dependent variable is RB. It is also evident that all the independent/explanatory variables are significant predictors of RB (p<0.5) except EK (p>0.5). Therefore, the regression model showed that 17% of RB is explained by ATT, 8% of RB is explained by SN, 42% of RB is explained by PBC, 16% of RB is explained by MO, 18% of RB is explained by SF and 0% of RB is explained by EK. Hence, one of the interesting observations about the simple linear regression performed showed that EK has

approximately zero influence on recycling behaviour among the residents. The plausible reason could be that, although residents have pretty fair knowledge on the effects of solid waste on the environment, however, residents have lack of concern for the environment. Hence, EK does not have influence on residents to participate in recycling. Another, notably finding was the fact that ATT have a negative influence on RB. The concept of ATT, was observed to be favourable previously (see figure 2,3,4,5 & 6) however, it effects on RB was negative, such an observation contradicts the assumption of the TPB model. This is because, according to the TPB if an individual ascribes a favourable outcome to an activity or behaviour, it will influence them to engage in it positively however, data analysed for this study proved otherwise. Furthermore, these findings observed in figure 39 is confirmed by the correlation findings in figure 38.

Attitude (MO & EK) and recycling behaviour
Attitude (AT) here is measured by Moral Obligation (MO) and Environmental Knowledge (EK). To find the correlation between recycling behaviour (RB) and attitude (AT) illustrated in figure 40 below. A Pearson product-moment correlation coefficient was computed to assess the relationship between attitude and Recycling behaviour. There was a positive correlation between the two variables, $r = 0.167$, $n = 319$, $p = 0.003$. This finding is quite the opposite to the initial finding in figure 38 & 39. This implies that if a resident's attitude is influenced by MO and EK, then the effect if attitude on RB will be positive.

Correlations

		Total_RB	Total_AT
Total_RB	Pearson Correlation	1	.167**
	Sig. (2–tailed)		.003
	N	321	319
Total_AT	Pearson Correlation	.167**	1
	Sig. (2–tailed)	.003	
	N	319	328

**. Correlation is significant at the 0.01 level (2–tailed).

Figure 40 Correlation between attitude (AT) and recycling behaviour (RB)

A scatterplot summarizes the results in Figure 40.1 Overall, there was a positive correlation between attitude and recycling behaviour. However, in this scenario where attitude is explained

by EK and MO, attitude effects on RB is positive. Hence the analysis confirms the hypothesis that attitude has positive relationship with recycling behaviour or attitude is positively related to recycling behaviour.

Figure 40.1 Scatter plot between recycling behaviour and attitude

Demographics factor and recycling behaviour
In the testing of the hypothesis above, I run a t-test on demographic factors: location, marital status, education, income, age and gender to show if there are significance differences in recycling behaviour among these variables mentioned. Significance is when p-value is not greater than 0.5. Further, cross tabulations were analysed to see RB differences within the demographic's variables group.

Location
Figure 42 depicts a summary of independent t-test showing the difference in recycling behaviour of people living in rural and urban communities.

Location	N	Mean	SD	df	t	P
Urban	157	16.85	4.99	285	-5.53	0
Rural	130	20.03	4.62			

Figure 42 location

The above figure 42 shows a result which reveals that there is a significant difference between recycling behaviour of people in Urban *(M=16.85, SD=4.99)* and Rural (M=20.03, SD=4.62), [t $_{(285)}$ =-5.53, p<0.5] communities. This result suggests that recycling behaviour of people of Urban and rural communities do differ. We can observe from figure 42.1 that residents who live in the

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urban areas do recycle more than rural residents. So, the hypothesis, "socio demographics have a significant influence on recycling behaviour" was supported.

Figure 42.1 Cross tabulation for location & RB

Marital status

Figure 43 depicts a summary of independent t-test showing the difference in recycling behaviour Marital status. Figure 43 shows the summary of independent t-test showing the difference in recycling behaviour and marital status of residents. We can observe that p<0.5 among the variables; single, married, divorced and widowed, this means there is a significance difference in recycling behaviour between these groups. Evidently, in the cross tabulation in figure 43.1 showed that single residents do recycle more than married, divorced or widowed residents. Hence, "socio demographics have a significant influence on recycling behaviour" was supported.

Marital status	N	Mean	SD	df	t	P
Single	172	18.92	4.96	275	2.42	0.016
Married	105	17.42	17.42			
Marital status	N	Mean	SD	df	t	P
Divorced	7	14.28	6.07	8	0.072	0.082
widowed	3	22	4			

Figure 43 Marital status

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Figure 43.1 Cross tabulation for marital status & RB

Education

Figure 44 shows the summary of independent t-test showing the difference in recycling behaviour and residents' level of education. We can observe that $p<0.5$ which suggests that recycling behaviour of education level among Junior high & below, Senior high, college & university and Masters & above students do differ. One can observed from figure 44.1 that college & bachelor degree holders had the highest level of recycling, followed by residents with masters & above qualification. Hence, there is a significance difference in recycling behaviour between these groups. Therefore, "socio demographics have a significant influence on recycling behaviour" was supported.

Education level	N	Mean	SD	df	t	P
Senior high	37	21.48	4.35	195	4.22	0.000
College& University	160	17.7	5.03			
Education level	N	Mean	SD	df	t	P
Junior High & below	28	22.03	2.33	88	6.01	0.000
Masters & Above	62	16.24	4.84			

Figure 44 Education level

Figure 44.1 Cross tabulation for education level and RB

Income

Figure 45 presents the summary of independent t-test showing the difference in recycling behaviour and incomes (GHC 1,200 & below and above GHC 2,500)

Income	N	Mean	SD	df	t	P
1200 &Below	86	17.68	4.99	138	2.19	0.03
Above 2500	54	15.87	4.37			

Figure 45 Income

The above figure shows a result which reveals that there is a significant difference between recycling behaviour of income level between workers with 1,200 & below (M=17.68, SD=4.99) and Above 2,500 (M=15.87, SD=3.37), [t $_{(138)}$ =2.19, p<0.5]. We can also observe in figure 45.1 below that, residents with middle income (GHC 1200 – GHC 2500) had the highest level of recycling while high income earners (GHC 2500) have low recycling behaviour followed by low income earners (GHC 1200 & below). This result suggests that recycling behaviour of salary level between do differ, thus the hypothesis, "socio demographics have a significant influence on recycling behaviour*"* was supported. Note that the section "marked blue" are the residents who

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didn't give their income. These can be students or pensioners but I cannot add them to the analysis which is on income levels and RB.

Figure 45.1 Cross tabulation income & RB

Gender

Figure 46 depicts a summary of independent t-test showing the difference RB between Gender groups (Males & Females)

Gender	N	Mean	SD	df	t	P
Male	185	17.84	5.07	284	-2.06	0.04
Female	101	19.13	5.01			

Figure 46 Gender

Figure 46.1 Cross tabulation of gender and RB

The above figure 46 showed a result which reveals that there is a significant difference between recycling behaviour between Male (M=17.84, SD=5.07) and Female (M=19.13, SD=5.01), [$t_{(284)}$ =.04, p<0.5]. This is evidence in figure 46.1, which shows that males do recycle more than females. This result suggests that recycling behaviour between males and females do differ hence the hypothesis, "socio demographics have a significant influence on recycling behaviour" was supported.

Age

Age	N	Mean	SD	df	t	P
12-24 years	95	20.33	4.81	200	4.82	0.000
25-34 years	107	17.06	4.79			
Age	N	Mean	SD	df	t	P
35-44 years	54	17.46	5.08	66	0.746	0.459
45-55 years	14	16.35	4.7			
Age	N	Mean	SD	df	t	P
45-55 years	14	16.35	4.7	29	-1.36	0.183
above 55 years	17	18.82	5.17			

Figure 47 Age

Figure 47 depicts a result which reveals that there is a significant difference between recycling behaviour and age. This result suggests that recycling behaviour of residents varies among age groups. This is evidence in figure 47.1 below, which depicts that residence of age 25-34 years have better recycling behaviour than all ages. Interestingly, people above 45 years have the lowest level of recycling. So, the hypothesis, "socio demographics have a significant influence on recycling behaviour" was not supported.

Figure 47.1 Cross tabulation age and RB

4.5 Reliability and Validity Tests

The Cronbach's alpha(α) is a reliability statistics test and this was conducted to measure the degree to which the questions or statements used as a scale related and hang/fitted together with each other and how reliable were the variables.

Table 48 below shows that the Cronbach's alpha(α) coefficient of 0.739, this indicates there is a level of internal consistency relationship among the questions used to measure each concept/factor (ATT, SN, PBC, MO, EK and SF). This mean the questions were reliable, this is because Cronbach's alpha(α) has limit value of 0.7. Therefore, having a value above the limit means the scale is reliable, hence reliability test is met.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.739	.729	35

Table 48 Cronbach's alpha(α) in reliability statistics

Furthermore, the result of an ANOVA depicts that $F_{(5,304)} = 42.393$, p-value = 0 this shows that there is a significant difference between the construct ATT, SN, PBC, MO, EK and SF. This is good fit for validity.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3605.945	6	600.991	42.393	.000^b
	Residual	4224.625	298	14.177		
	Total	7830.57	304			

a. Dependent Variable: Total_RB

b. Predictors: (Constant), Total_EK, Total_SF, Total_MO, Total_ATT, Total_SN, Total_PBC

Figure 49 ANOVA test

In addition, Pearson correlation coefficients is bivariate correlations conducted in figure 38 and this showed that the constructs that were correlated in parameter estimated the regression analysis. The questions in each construct were examined to in order to measure and to know the level of relationship between ATT, SN, PBC, MO, EK, SF and overall RB of residents. The results indicated there is a good correlations coefficient relationship with significant p-value<0.5 except EK which although had a correlation with RB but not significant.

In conclusion, the above findings in table 48, figure 49, 38 and 39 indicates that study is reliable and valid. Differently put, there is reliability and validity in the findings of this study.

5. DISCUSSION AND RECOMMENDATIONS

Concern with increasing solid waste generation represents an important social, environmental and health problem in both developed and developing country. Recycling of solid waste has become a very unprecedent strategy to this problem. Although, solid waste which usually comes from product packages has direct environmental and economic benefits, however, it is possible to reduce considerably amount that are disposed at landfills or burnt. Hence, recycling contributes to minimizing this form of waste disposal with its associated social, environment and health issues. However, to achieve the desired recycling participation, the study of behaviour is of utmost prominence. Scholars has shown that recycling differs among individuals, communities and countries. Therefore, it is crucial to understand the behavioural patterns among different groups of individuals (Tonglet et al. 2004), so that positive changes in behaviour can be brought about in these groups (Rodić and Wilson 2017). With this in mind, I begin with descriptive detailed analysis of the findings presented in chapter four with focus on the underlying hypothesis posted in examining the research questions target to "analysing *what could be relevant potential factors in describing and explaining recycling behaviour at the residential level"* for this study. Conclusion and recommendations on further recycling behaviour studies will be presented here as well.

5.1 Attitude & Recycling Behaviour

The results from the survey of 330 residents at Agona West Municipal District, Ghana does not support the expected hypothesis "**Attitude is positively related to recycling behaviour"**. The findings showed that attitude is negatively related to recycling behaviour. It also showed that although residents ascribed positive attitude, however, when it comes to the actual recycling resident's behaviour was negative toward recycling. It was also found that, although attitude is a significant predictor but does not have the highest predictor of recycling behaviour in this case study. The result from this study seems inconsistent with previous findings done on similar subjects. In a study done by (Tonglet et al. 2004), about understanding recycling behaviour among households, it was found that pro-recycling attitudes are major contributors to recycling behaviour. In a recent study done by (Zhang et al. 2015) on understanding the factors that affects residents waste sorting behaviours, it was found that attitude was one of the strongest predictors of waste sorting behaviour. In one aspect, there is some form of agreement that attitude is predictor of recycling behaviour between (Tonglet et al. 2004), (Zhang et al. 2015) and this thesis study

findings. Nevertheless, the inconsistent lies on, attitude not being the major predictor of recycling behaviour and also the attitude effect on RB is negative. There is also, the fact that there is difference in sample size, location etc which may have an influences on the differences in the findings, for instance, whiles (Tonglet et al. 2004) used the sample 19 households, this thesis used 330 individual residents.

In yet another study, it showed that attitude has no significance positive on recycling intention in MSWS by (Shen et al. 2019) that explored the determinants that affect young people's intention toward municipal solid waste sorting (MSWS). However, in the study by (Shen et al. 2019) the focus was on young people age 15 to 30 years and a sample of 524, while in this thesis age from 12years and above and a sample of 330 were used. (Shen et al. 2019) gave two possible reasons for his findings: lack of recycling educational guidance and unclear legal responsibilities. I can agree with the reason; lack of recycling education as a reason for insignificance of attitude in the study by (Shen et al. 2019). This is because, further findings in this thesis showed that over 50% of the residents do not have access to any community recycling programmes. However, I bet to disagree in unclear legal regulation being one of the reasons for residents' negative attitude towards recycling. This is because, to further investigate done to find out residents' opinions on effect of regulations on recycling was that only 0.7% agreed that recycling regulation will influence him/her to recycle while 99.3% says otherwise. One of the residents commented in this section that recycling resources are not available so regulating recycling will not make him recycle even if he wants to do it. Another resident commented that participation in recycling involves how to do it, which to her is not something she grew up with. While another commented "...and the environment will replenish itself". These are quiet an interesting opinions and comments of some residents.

Well, attitude according to TPB theory, is the evaluation of the behaviour in question which can be favourable or unfavourable. The finding in my case-study, showed that residents in Agona West Municipal District evaluated the overall outcomes of recycling was favourable/positive. This was very evidence in the four questions used to measure attitude (high number of agree & strongly agree frequencies for positive outcomes of recycling see figure 3,4,5&6). Interestingly, this favourable outcome did not make residents to be positively involve in recycling. Differently put, the residents noted favourable to recycling however, attitude to actual recycling was negative. Perhaps, a person may have the highly positive attitude but there may be other external factors that

is beyond the persons control to engage in the activity. For further understanding, the coded summary from opened-ended questions on what can motivates a person to recycling, showed that recycling facilities, supportive government policies, home collection & distance to recycling facility and education how to recycle were what residents said can influence them to either engage in recycling or increase their level of recycling participation. The issue of limited and lack recycling facilities were noted in across many cities in Ghana by several researches (Gyimah et al. 2019 ; Oteng-Ababio et al. 2013). In particular, (Oteng-Ababio et al. 2013) observed that attempt for solid waste management (waste sorting for recycling) in Ghana failed because of lack of recycling facilities and education. Hence, this study finding is in congruence to (Tonglet et al. 2004) study which pointed out that attitudes is also influenced by appropriate opportunities facilities, knowledge about recycling and not restricted by time, space and inconvenience.

In addition, (Liska 1984) also revealed that attitudes do not facilitate, completely, the effect of cognitions (thoughts) on intention and that cognition are multifaceted both in people imperfections in processing cognitive into abilities. The general argument from (Olson and Fazio 2001) and (Liska 1984) and several other scholars was that behaviour is not contingent only on beliefs or volitional control (i.e. if the person can decide at will to perform or not to perform the behaviour) but there may be other external factors that influence an achievement of a behaviour. (Liska 1984) argues that the performance of many behaviours was constrained by lack of appropriate opportunities, skills and resources. Therefore, the plausible reason that can be given to this study findings on attitude relation on recycling behaviour is that attitude is influenced by external factors in this case study and not based only evaluation of the recycling behaviour.

5.2 Environmental Knowledge & Recycling Behaviour

The expected hypothesis was that "**environmental knowledge/concern is positively related to attitude**". It was found that this hypothesis was not supported. This study found that environmental knowledge is not significantly related to recycling behaviour. This study results is consistent with a study by (Shen et al. 2019), the authors observed that environmental concern does not affect recycling behaviour and recommends recycling education. In another study by (Kurz et al. 2007) that compared the influence of individualistic attitudinal factors with more community-level (or ecological) variables on recycling behaviour, it was found that general environmental concern being found to have no effect on recycling behaviour. In another study by

(Oteng-Ababio et al. 2013) observed that lack of recycling education is one of the factor that led to failure in the attempt for solid waste management (waste sorting for recycling) in Ghana

In yet other studies showed environmental awareness and concern motivates people to recycle [(Afroz et al. 2010), (Tonglet et al. 2004) and (Guerin et al. 2001)]. In agreement to these studies, (Wang et al. 2020) found that environmental concern has facilitating effect on the relationship between waste sorting and green consumption. In another study which is kind of environment discipline specific, (Barr and Gilg 2007) found that environmental concern is a motivation factor for recycling.

An interpretation of this thesis study findings from the TPB theory, I argue that environmental knowledge and concern are internal traits and if one is not taught, it will be difficult to effect any change. Therefore, to investigate further, residents were asked if they received any form of community recycling campaigns or programmes. It was indicated that more than 54% of the residents do not have no access to community recycling campaigns or programmes (figure 25). So maybe, one can say lack of recycling information campaign as the reason for not recycling and hence, insignificance of EK on RB. I stand with the question/reason that; how can one have environmental concern if the knowledge of the environment is not taught or known. This reason can be supported by (Hasan et al. 2015) who observed that when students received extensive information through environmental lessons (i.e. plastic waste management), it improved pro-environmental behaviour (reduction on plastic waste usage and disposal). Therefore, this thesis study findings are logical as majority of residents indicated of no access to recycling environmental education programmes. In most of the studies that showed that environmental concern were significant predictors were conducted in developed countries, where recycling information campaigns are readily available as well as resources. Therefore, I conclude that environmental knowledge has no influence on a residents recycling behaviour in this case study and the right concern as well as positive effect will only materialized if recycling campaigns or education are made available to the communities in the district.

5.3 Moral Obligation & Recycling Behaviour

The study findings supported the hypothesis **"Moral obligation is positively related to recycling behaviour"**. The study noted that moral obligation is positively significance to recycling behaviour. It was found that moral norm has more positive influence on recycling than attitude.

The results from this study appears to be very consistent with other studies. In a study done by (Mamun et al. 2018), about the factors that influence recycling intention and behaviour among low-income households, it was found that personal moral norms are highly internalized attitudes which governed individual RB. In another study by (Barr 2004) on attitude-behaviour inconsistency in environmental issues, it was observed that internalized attitudes depended on moral obligation derived from people's beliefs, rights and responsibilities towards the environment. In a meta-analysis of 63 empirical studies by (Miafodzyeva and Brandt 2013) on understand recycling behaviour showed that majority of the studies found that moral norms are important in determining recycling behaviour while only five studies observed no significant relationship. Hence, (Miafodzyeva and Brandt 2013) concluded that moral norms was significant to explaining recycling behaviour. In a recent study by (Shen et al. 2019) on exploring the determinants that affect young people's intention toward municipal solid waste sorting (MSWS), it was revealed that personal moral obligations have a positive influence on young people intentions towards MSWS.

In the theoretical review, there has been trend in evidence that people who have high moral obligation developed a cognitive consciousness which is evidence on a better environmental attitude. The TPB theory argued that internal traits are developed overtime and this cognitive consciousness is what built attitude. It is important to note that these inner traits become evidence by the way one acts and in time the acts are done without any effort or consciously. In one of the recommendations of TPB theory by (Davies et al. 2002) on analysing TPB model, it was recommended to separate recycling attitudes into two segments: affective and cognitive which represents; (1) feelings about recycling and (2) knowledge of the outcomes and consequences of performing the behaviour. For this reason, this thesis study test this by using environmental knowledge and moral obligation as explanatory variables to attitude and then proceed to find how attitude influences recycling behaviour (see figure 40 & 40.1). Interestingly, it was found that attitude effect on recycling is a positive significance to recycling behaviour. This means that attitude is indeed an internal traits and moral norm and knowledge has a direct influence on it. Therefore, for an attitude to have positive influence on recycling behaviour, moral norm and environmental knowledge plays an important role of influencing it.

5.4 Subjective Norm & Recycling Behaviour

The study findings supported the hypothesis **"Subjective norm is positively related to recycling behaviour"**. The study noted that subjective norm is significant predictor of recycling behaviour. It was found that a positive social norm towards recycling behaviour increases the rate at which recycling behaviour is practiced in the Agona West Municipal District. The result from this study is consistent with previous studies on similar subjects. In a study by (Shen et al. 2019) on determinants that affect young people's intention toward municipal solid waste sorting (MSWS), it was found that subjective norm had positive influences on young people's intention toward MSWS. In another study by (Zhang et al. 2015), about examining factors associated with waste separation behaviours by analysing data drawn from 208 of 1000-field questionnaires, found that social norm significantly predicted household waste behaviours. In yet another study, (Liao et al. 2018) on investigating key factors influencing rural residents' separation intention, as well as analysing the moderating effects of perceived policy effectiveness, it was found that subjective norm becomes less important when perceived effective inducement policy is high.

According to the TPB theory, we can say that residents in Agona West Municipal District, perception on what their family members, neighbours and community influences them to either engage or not to engage in recycling. This implies that a person considers how people important and close to him/her such as family and neighbours expects of him/her about recycling and act in accordance thus recycling. Hence, this study findings support the model TPB on subjective norm as an influencer of a behaviour. This is because, communities in Ghana are normally influence by what other think of them and what they can do to gain respects or not to be criticized by another. So, residents tend to behaviour in accordance to the what his or neighbour does. However, in addition the study by (Liao et al. 2018), emphasized that policy implementation in one way will reduce the effects of SN on RB, well at the moments communities in Ghana has no policy implementation for intensive recycling at the household level, but if it happens then it may be a possible that SN influence on RB might reduce.

5.5 Perceived Behavioural Control & Recycling Behaviour

The study findings supported the hypothesis **"perceived behavioural control is positively related to recycling behaviour"**. This study noted that perceived behavioural control is positively significant to recycling behaviour. It was found that PBC was the major predictor of recycling behaviour (figure 38 & 39). The findings from this study is consistent with previous studies on

similar subjects. In a study done by (Strydom 2018) on investigating recycling behaviour at household level at a given point in time, it was found that intention to recycling had a smaller effect on recycling behaviour, PBC appears the most important variable that explains RB. In a recent study done by (Shen et al. 2019) mentioned early, also found that perceived behavioural control is significant influencer on young people's intention toward MSWS. In congruence, the study done by (Zhang et al. 2015) found PBC as a significantly predictor of household waste recycling behaviours. In a study done by (Hasan et al. 2015) about identifying the relationship between variables that affect behavioural intention among university students in reducing plastic consumption, it was observed that PCB shows the highest relationship with behaviour compared to other variables.

This study findings and the support findings from other scholars mentioned above implies that PCB is crucial in explaining a behaviour like recycling behaviour. From the perspective of the TPB theory, I interpret this study findings that resident's perception of his or her ability to perform a recycling will actually influence him to participate in recycling or not. If the residents feel they are equipped or have the skills to recycle then he or she will definitely will but if not then he or she will not engage in recycling. This finding is in line with one of the comments by the residents who stated that knowledge on how to recycle is crucial to motivating him to recycle or not.

5.6 Intention & Recycling Behaviour

The expected hypothesis was that "**Intention have significance influence on recycling behaviour"**. It was found that this hypothesis was supported. The study findings showed that intentions to recycling is significance to recycling behaviour. It was found that intentions had the highest influence on recycling behaviour. This study finding is consistent with a study by (Wang and Mangmeechai 2021) on exploring the relationship between intention and pro-environmental behaviour on the new waste sorting policy, it was found that people with strong behavioural intention are more likely to engage in pro-environmental behaviour (recycling). Yet in a study by (Strydom2021) about understanding the relationships between the determinants of household recycling, it was found that intention to recycling had a smaller effect on recycling behaviour. A recent study by (Árnadóttir et al. 2018) on understanding the determinants of cafeteria waste separation behaviour among university students, it was observed that although students had a

positive attitude and are willing to behave in pro-environmental manner, yet there was a gap between intention and actual behaviour.

The difference between this study and that of the study by (Wang and Mangmeechai 2021) were that sample data of 330 residents and single self-reported survey were used in this study, while sample data of 3113 residents, two-stage survey and an experimental research before and after the implementation of a policy. Also, the study by (Strydom2021) was similar to this thesis, however, it was conducted in large urban area while this study was conducted in both urban and rural communities. In the case of , the study was conducted on only one university students with sample 121, however, it was an experimental research, 2 stage test (pre-/post design) to find the effect on a small intervention. Although, these studies have similarities and differences, yet it is interesting to see diverse findings with regard to recycling intention and the actual recycling behaviour.

In the perspective of the TPB theory, the findings in this study can be explained that attitude, subjective norm and perceived behavioural control indeed explained recycling intention and this intention either lead to recycling participation or no recycling participation. This means if a residents recycling intention is high, then recycling will be engaged while low recycling intention implies low or no recycling. In this study, there was high correlation of 83% between recycling intention and recycling behaviour. However, there might be some residents who might have had high recycling intentions but other variable factors like inconvenience, time and storage space may reduce or hinders recycling participation. This can be explained by other external variables like MO, and SF.

5.7 Situational Factors & Recycling Behaviour

The expected hypothesis was that "**Situational factors have significance influence on recycling behaviour"**. It was found that this hypothesis was supported. The findings showed that more than 67% of the residents noted lack of storage space, 43.6% noted recycling is complicated, 41.7% noted time factor as situational factors that hinders RB. This study findings in consistent with several scholars on similar subjects. In the study by (Zhang et al. 2015), it was found that situational factors such as lack of time and inconvenient had a significant negative impact on waste separation. In another study lack of time and storage space restricts recycling (Tonglet et al. 2004).

In the framework of TPB, it did not factor in items like time and storage space as a variable hinders a behaviour to be engaged. However, findings in this study showed that these items including availability of recycling education, distance to recycling facilities, door to door pick-ups of recyclables contributes to 18.8% (figure 39) of the explanatory variables to RB. These factors contribution is high and therefore should be taking into consideration when it comes to recycling.

5.8 Demographics & Recycling Behaviour

The expected hypothesis was that "**demographics variables have significance influence on recycling behaviour"**. It was found that this hypothesis was totally supported. The findings showed significance difference between level of income, age, gender, location and level of education on residents recycling behaviour. This study findings are in consistent in other similar studies. In a study done by (Adu et al. 2020) showed a significant difference in sorting practices on socio-demographic factors, attitudes and participation level in Ghana.

Income: The study finding observed a significant difference in recycling behaviour between income levels. It showed that residents with middle income (GHC 1200 – GHC 2500) had the highest level of recycling while high income earners (GHC 2500) have low recycling behaviour followed by low income earners (GHC 1200 & below) (see figure 45 & 45.1). The study finding is consistent in other similar studies. In the study done by (Chen et al. 2020) on exploring the mechanism of individual and group preference framework in the impact path of product facilities on residents' waste-sorting behaviour, it was observed that high-income residents showed much lower sorting behaviours than low-income residents. The authors argued that the reason for this result may be that high-income earners focus their time and energy on creating wealth and neglect the importance of waste sorting. In yet another study, it showed that high-income residents or areas have high recycling participation, followed by medium-income areas (Kurz et al. 2007). I argue that the reason for lower RB among low income could be they would want to use their time to engage in other income related activities. While in the case of high income having low recycling behaviour could be reasoned as they would rather pay other people to do their recycling for them. It could also be that high-income earners used their time to engage in more incentive activates as noted by (Chen et al. 2020).

Gender: The study finding showed that males do recycle more than females. This finding is inconsistent with similar studies. In a study by (Shen et al. 2019) found that gender was not important. In congruence, another study done by (Chen et al. 2020) found that gender have no significance in waste sorting behaviour between the urban and rural residents. In the community like Ghana, most of house chores are done by females, so could it be that males have a lot of time available to engage in recycling. While females are busy with other chores like cooking, washing, baby-sitting, home cleaning etc. It could also be that men over reported and the fact that men say they do does not mean they really do. The culture in Ghana has male's involvement in household waste to be low, most cleaning and dumping of waste are done by females. Therefore, this finding needs further investigation.

Age: The study findings revealed that residents of age 25-34 years has better recycling behaviour than all ages. Interestingly, people above 45 years have the lowest level of recycling. This study finding is inconsistent with other similar studies. In the study done by (Chen et al. 2020) showed that young age has higher waste sorting behaviour than others. Thus, residents under 17 years exhibited highest waste sorting behaviour followed by residents age 18-25years and 26-30 years respectively. The reason for this thesis finding can be that the older generation have some permanent behaviour and therefore, maybe unyielding to change their behaviour. With the younger generation, from age 14-24 years can be reasoned as them not having the necessary recycling education to engage in recycling or it could also be attributed to the lack of motivational factors like moral norms and incentives.

Marital status: The study findings depicts that single residents do recycle more than married, divorced or widowed residents. This could be that single residents are students, young adults and probably live alone and therefore, these residents do have time, no children, enough storage space and hence do recycle more.

Education: This study found that there is significant difference between RB among education level of residents. The findings observed that college & bachelor degree holders had the highest level of recycling, followed by residents with masters & above qualification as well as below. This study finding is consistent with other study. In the study by (Chen et al. 2020), it showed that college degree holders have highest waste sorting behaviour. In yet another study by (Hasan et al.

2015), it indicated that the correlation between recycling of plastic waste and education level showed that there is no significant difference in recycling behaviour between two educational levels (the authors compared only undergraduates and postgraduates).

Location: This study result suggests that recycling behaviour of people of Urban and rural communities do differ, thus, residents who live in the urban areas do recycle more than rural residents. The reason could be that those in the urban do generates more solid waste than those who live in the rural communities and therefore, urban residents are fully abreast with the effects of uncollected waste, open dumping and also urban cities may have recycling facilities available.

The similarities between these scholars and this study is usage of self-reported questionnaire and difference in location, sample (over 1000) except (Kurz et al. 2007) and (Shen et al. 2019) with a sample of N=765 and N=534 respectively. These findings showed that demographics effects on recycling behaviour has the most ambiguous results as findings varies from different factors as well as limited to locations where the research was conducted. However, it was important to investigate demographic variables in this study as it gives an in-depth overview of recycling behaviour.

5.9 Research Questions in Perspective

(1) What are the antecedents of intention for residents recycling behaviour? The findings from this study showed that attitude, perceived behavioural control, social norm are the antecedents to intention to recycle. The findings showed that recycling intention has the strongest correlation of 83% with recycling participation or behaviour. In addition, attitude was found to be influenced by moral obligation and environmental knowledge.

(2) What are the determinants of behaviour for residents recycling behaviour?

Attitude, perceived behavioural control, social norm, moral obligation, situational factors were found to be the potential determinant factors of recycling behaviour in the Agona West Municipal District. Environmental knowledge was noted to have no effect on recycling behaviour. The reason being that recycling education campaign is rarely organized in communities. Therefore, residents, do not have environmental concern towards the consequences of lack of RB as compared to in

advanced countries. Thus, residents are not much concerned about their environment and therefore recycling is rarely practiced. It was also found that attitude was the only potential determinants factor that had negative influence on recycling behaviour.

(3) What could be the potentials of are these determinants to explaining recycling behaviour?

It is observable form the regression model in figure 39 that; -17% of RB is explained by ATT, 8% of RB is explained by SN, 42% of RB is explained by PBC, 16% of RB is explained by MO, 18% of RB is explained by SF and 0% of RB is explained by EK. Hence, the potential of EK was insignificant to explaining RB. The find of the study showed that attitude have a negative effect on recycling behaviour in among residents. In addition, recycling is rarely practiced among residents based on the study, hence the negative attitude towards recycling is to be expected.

(4) If there are forms of recycling behaviour, what are they?

The findings showed that there are two forms of recycling behaviour among residents. Firstly, residents who recycle for their own personal use (household- based recycling) and secondly, residents who recycle to give or sell to the community (community-based recycling). It was found that high percentage (41.5%) of residents who do recycle are engaged in it for their own personal usage (figure 32), one of the several reasons was because of lack of limited recycling facilities the residents finds ways to make use of things that can be reused again or change into other forms by themselves. On the other hand, over 45% of residents prefers giving or selling to recyclables to facilities or door to door collectors (figure 32 & 34). It quite understandable that some recyclable items can be properly be recycled into a new form of things with appropriate facilities and if one has a facility available it was the easiest choice. However, it was found that, there was not much difference between the percentage of residents who recycle at the household-level or at the community-level. The findings also showed that, only 30% of residents recycle only when there are economic incentives (figure 36), also moral values explain about 17% of RB among residents. This finding is may not be in a position to challenge the study done by (Mavropoulos and Sa 2021), which showed that behaviours towards recycling differs significantly between developed and developing countries; "In developed countries it is linked with moral values and social responsibility, where in developing countries it is usually linked with survival and daily income".

However, it is possible to say that with 17% of moral norms predicting recycling behaviour among this survey, in the population of AWMD recycling is linked to moral values. Another interesting finding was that majority of the participants indicated that recycling regulation in their community will have absolutely no influence on their recycling behaviour. The main reason was lack of recycling education followed by limited/lack of recycling facilities.

It is important to mention that, among the potential predictors of RB as well as the forms of RB among resident, RB in relation to socio-demographics of residents had some interesting findings worth to be taken into consideration. The study findings showed that residents who live in the urban areas do recycle more than rural residents. It was also found that residents of age 25-34 years have better recycling behaviour than all ages. Interestingly, people above 45 years have the lowest level of recycling. It was also found that males are more significantly do recycle more than females. There was also significant difference found in the level of income. Residents with middle income (GHC 1200 – GHC 2500) had the highest level of recycling while high income earners (GHC 2500) have low recycling behaviour followed by low income earners (GHC 1200 & below). Findings also revealed that single residents do recycle more than married, divorced or widowed residents. And finally, residents with college & bachelor degree holders had the highest level of recycling, followed by residents with masters & above qualification were also among the interesting findings in this study.

5.10 Research Limitations
The research hypothesis and questions for the study have been examined, however, there are some limitations which must be acknowledged. The first limitation of this study is that the research was focused on one municipality in Ghana and this limit the generalizability of the findings, although the finding results can be applied to another municipality in Ghana. Secondly, the research was based on online questionnaire and quantitative method, whereas there are other research methods that can be used such as qualitative, comparative research analysis (QCA), discourse analysis method, etc but only quantitative method was applied due to time, words count and financial constraint. However, if there are time, mixed methods or QCA will be considered. Lastly, the analysis is based on self-reported questionnaire, therefore the items in the recycling behaviour construct is most likely to be over-reported/biased. Nevertheless, the resident's participants were

encouraged to do their best in given trustworthy answers and the questionnaire were done by the participants willingly and anonymously.

5.11 Research Recommendation

The recommendations for the future purpose are: This study findings showed that there is a significance difference in recycling behaviour between demographic variables such as age, location, income, education and gender. Hence, further study can investigate recycling Behaviour among the demographic variables into details as it will help in different policy and recycling education programmes to target groups difference in recycling. Another, unusual finding that needs further investigation is why residents evaluated favourable outcomes for recycling but had a negative attitude towards recycling. This study used only quantitative method and online survey, future researcher can use other methods such as qualitative and Qualitative Comparative Analysis method to enhance in-depth study of recycling behaviour among residents in Ghana. Finally, the key strength of this study is that it describes and explain recycling behaviour at the individual level in this way for the first time in Ghana. It will also provide municipal leaders with valuable factors that explains residents recycling behaviours when developing recycling intervention programmes at the municipal level.

6. CONCLUSION

The aim of this research was to analyse *what could be relevant potential factors in describing and explaining recycling behaviour at the residential level.* The concern for the environment and importance of recycling which has taking root in many countries. Yet, recycling at both the national and the residential level remains very low.

Through close examination of the few studies on recycling in Ghana, lack of recycling facilities has always been noted as the reason for the low recycling participation at the residential level. I argue that what makes a person to be a recycler or non-recycler is more than that and that both internal and external factors are crucial and this has been proven in many developed countries. So, based on the literature reviews led to the investigating recycling behaviour at the residential level in Ghana. This study was done in Agona West Municipal District. After, data analysis using SPSS and coding, the results showed the following about residents recycling behaviours.

First, there are six potential determinants factors that describes and explains recycling behaviour in the district, these are attitude, subjective norm, perceived behaviour control, moral obligations, situational factors and demographics.

Another finding was that, environmental knowledge/concern was found not to be an influencer on residents' decision to either engage or not to engage in recycling behaviour, however, perceived behavioural control was found to be the highest influencer to residents' decision to residents recycling.

Also, this study observed that the education on how to recycle was the major motivating factor to making resident engage in recycling or increasing recycling among residents, followed by recycling facilities and next incentives.

The next finding, showed that residents have negative attitude towards recycling. Although, residents depicted favourable outcome (attitude) to recycling however, it is logical to have a positive effect on recycling participation, however, findings depicted attitude has a negative on recycling. According to TPB theory, if a person ascribes a favourable outcome to an activity then it expected that the person will do the behaviour in question but this was not the case in this study.

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Hence, this finding contradicts the assumption of the TPB model. Therefore, future studies should further investigate this finding.

The finding also depicted that, household-based recycling is largely practiced by residents and it is usually for their own use. Even though, community-based recycling has a slightly higher than household-based recycling. It is still notable that with lack of recycling facilities, residents practice recycling at home. Another interesting finding was that majority of the participants indicated that legalizing recycling in their community will have absolutely no influence on their recycling behaviour.

In summary, using the TPB theory to investigate recycling behaviour at the residential level in Agona West Municipal District showed that attitude, subjective norm, perceived behaviour country, moral obligations and situational factors are significant predictors of residents recycling behaviour. Perceived behaviour control was the highest predictor of recycling behaviour. Also, residents noted a high level of favourable outcome of recycling yet it showed a negative effect on residents recycling behaviour, hence this finding is inconsistent with TPB model assumption: favourable outcome means positive engagement of the behaviour in question. Environmental knowledge was not a significant predictor of residents recycling behaviour. In addition, it was also found that there is a significance difference in recycling behaviour between demographic variables such as age, location, income, marital status, education level and gender. This study observed that the education on how to recycle was the major motivating factor to making resident engage in recycling or increasing recycling participation among residents, followed by recycling facilities and next incentives. Therefore, based on this study finding, I recommend that a campaign targeted at attitude where the positive attitude will have a positive influence on RB. Campaign on environmental effects of recycling which will initiate a concern maybe effective to increasing recycling behaviour at the household level and finally, education on how to recycle will very much yield an effective result in the level of recycling participation in the district when constructing recycling campaign.

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8. APPENDIX

The Survey

INFORMATION FOR VOLUNTEER PARTICIPANTS

This study is a thesis that is required for my Master's degree (MSc Energy, Environment and Society). The aim of this study is to describe and understand recycling behaviour among residents in Ghana, therefore, your participating contributes to the above academic research. Participation should not take any longer than around 5-10 minutes.

You do not put your name or any other identification information on this questionnaire anywhere so your responses will remain confidential, hence, no risks in participating in the study and participation is completely **voluntary.**

For further enquiry, contact Lydia Hanson, University of Stavanger. Telephone: +47 48663438/email: l.hanson@uis.no or (Hanson 2021).

Questionnaire instructions
Waste in this questionnaire refers to solid waste (i.e. glass, metal, paper, plastics, bottles, cans & textiles). Recycling refers to (separation of waste before disposal and reusing of recyclables or giving them to recycling facilities/collectors)

The questionnaire consists of **three sections**
Section A & B: These parts consist of different questions relating to general recycling.
Section C: A general background of respondent's which is needful for completion of this study.

Section A: Below are statements and each statement are followed by a series of possible responses. Read each statement carefully and tick the responses that best describes you. Please answer to every statement as honestly as possible. Do not spend too long on each statement

Q1. ATT Statements	Strongly disagree	disagree	Neutral	Agree	Strongly agree
Recycling is good					
Recycling is useful					
Recycling is hygienic					
Recycling is responsible					

Q2. SN Statements	Strongly disagree	disagree	Neutral	Agree	Strongly agree
My family expects me to recycle household waste					
My neighbours expect me to recycle household waste					

	Strongly disagree	disagree	Neutral	Agree	Strongly agree
My community expects me to recycle my household waste					

Q3. PBC *Statements*	Strongly disagree	disagree	Neutral	Agree	Strongly agree
Recycling is easy					
I have plenty of opportunities to recycle					
Recycling is inconvenient					
The municipal council provides resources (such as facilities & materials) for recycling					
I know where to take my household waste for recycling					
I know what items of household waste that can be recycled					

Q4. MO *Statements*	Strongly disagree	disagree	Neutral	Agree	Strongly agree
I feel it is wrong not to recycle my household waste					
I should not discard anything if it can be reused again					
It goes against my principles for not recycling					
I would feel guilty if I don't recycle my household waste					
I recycle for the sense of responsibility to protect the environment					
It is everyone responsibility to recycle his/her household waste					

Q5. SF *Statements*	Strongly disagree	disagree	Neutral	Agree	Strongly agree
I do not have enough space to store recyclable items					
Recycling is complicated					
Recycling takes too much time					
There is recycling programme organized in my community					
There are people who come home to home buy solid waste in my community					

Q6. EK *Statements*	Strongly disagree	disagree	Neutral	Agree	Strongly agree
I think environmental problems are related to improper waste management					
I think human activities affects the environment always					
Recycling is good activity to create a better community environment					
Recycling reduces waste generated & landfilling					

Q7. RB *Statements*	Strongly disagree	disagree	Neutral	Agree	Strongly agree
I separate my household solid waste before disposal					
I separate my household solid waste in order to reuse the recyclable myself.					
I separate my household solid waste in order to send/sell to recycling facilities					
I separate my household solid waste to give/sell to door to door collectors (scavenger)					
I **often** recycle my household solid waste					
I recycle my household solid waste **only** when there are economic incentives					

SECTION B: statements requires YES & NO answer with short reasons or selections.

Q8. I recycle my household waste voluntary even if there are **NO** economic incentives	YES	NO

Q9. What can motivate or make you recycle your waste even if there is **NO** economic incentives. **What will be your reasons for not recycling even if recycling is legalized in your community?**
Reason 1:
Reason 2:

Q10. If recycling is legalized in your community will it influence you to recycle more?	YES	NO

Q11. What will be your reasons for **NOT** recycling even if recycling is legalized in your community?
Reason 1:
Reason 2:

Q12. In your opinion, which of the following seems to be relevant to improving your recycling participation in your community (select at least 4)
o   Providing of recycling facilities/resources in your community
o   Education on waste sorting and reusing of recyclables
o   Education on the environmental effects of non -recycling
o   Public education on consequences of not recycling on health & energy
o   Legalizing recycling in the community
o   Households and community-based recycling programmes

Section C: **The socio-demographic of the respondents. Circle the answer that best describes you.**

Gender:	Male	Female

Age:	12- 24yrs	25-34yrs	35-44yrs	45-54yrs	55+

Education:	Junior high & below	Senior high	College & University	Masters & above

If you have higher education or professional diplomas, what is your area?	o Science
	o Health
	o Administration
	o Business
	o Law
	o Education & humanities

Are you working?	Yes	No
	o Formal sector	o unemployed
	o Informal sector	o Student
		o Retired

		o other

Income (GHC):	1200 & below	1200-2500	Above 2500

Marital status	Single	married	Divorced	widowed

Number of children in household	0	1	2	3	4 & more

Location/city	Urban	Rural

Online link: https://www.surveymonkey.com/r/KTHY7C7