

UNIVERSITI PUTRA MALAYSIA

AN INTEGRATED MODEL FOR EXPLAINING HOUSEHOLD RECYCLING BEHAVIOURAL INTENTION

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MUHAMMAD SALISU KHALIL

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Doctor of Philosophy

August 2018

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DEDICATION

This thesis is dedicated to my parents (Haj. Aishatu Ibrahim and late Alhaji Salisu Khalil) for their prayers and encouragement at all times that give me the courage, hope and the confidence that Inshaa'Allah, I would make it.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

AN INTEGRATED MODEL FOR EXPLAINING HOUSEHOLD RECYCLING BEHAVIOURAL INTENTION

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Globally, municipal solid waste generation is increasing rapidly and its management is becoming more challenging. Kano metropolis faces numerous challenges concerning solid waste management. Although more than 63% of the solid waste generated comes from households, less than 2% of the waste generated is recycled due to low public participation. Consequently, improper disposal of solid waste without proper segregation and recycling causes littering of the city and blockage of drainages, which leads to occurrence of flooding during rainy season. This explains the annual outbreak of diseases such as cholera and malaria fever during the rainy seasons and, the disgusting odour from the city areas where the waste accumulates and decays. Recycling has been proposed as a key strategy through which a sustainable solid waste management can be achieved due to its environmental and economic benefits. However, low public participation has posed a serious challenge to the recycling program. Previous studies and government's recycling policies focused on top-down approach, neglecting the bottom-up that ensures public involvement. The aim of this study is to develop an integrated model for explaining households' recycling behavioural intention, using inductive theory building approach (ITB). Data collected from Kano metropolis Nigeria were used to test the integrated model. A multi-stage stratified sampling technique was used to select 393 participants for this study. The proposed integrated model was tested using statistical analysis including descriptive, t-Test, and correlational analyses, and structural equation modeling (SEM). The findings of the descriptive analysis revealed that majority of the respondents have high attitude and intention towards recycling, which is reflected in the high mean scores for recycling intention and attitude (Mean = 4.03) and (Mean = 4.09) respectively. Similarly, the result of the independent t-test shows that there is significant difference in the attitude and intention mean scores between high and low income households. The analysis of the structural equation model indicated that the integrated model accounted for 53% of variance in

recycling intention, with attitude having the highest contribution on recycling intention ($\beta = 0.479$, p = 0.000). Only Perceived behavioural control was found to have insignificant effect on recycling intention ($\beta = .006$, p = 0.907), whereas perceived lack of facilitating conditions shows significant negative effect on recycling intention ($\beta = .170$, p=0.010). The result of the moderating analysis reveals that the relationships between attitude—recycling intention [low income ($\beta = 1.019$, p = 0.000) and high income ($\beta = -0.160$, p = 0.606)], personal norms—recycling intention [low income ($\beta = 0.127$, p = 0.028) and high income ($\beta = 0.406$, p = 0.129)], and perceived lack of facilitating conditions—recycling intention [low income ($\beta = 0.089$, p = 0.048) and high income ($\beta = -0.499$, p = 0.003)] were moderated by income level. Generally, the results in this research indicated that in Kano metropolis low income households are more likely to participate in recycling for their personal gain (financial benefits), whereas, high income households are more likely to participate in recycling when there is availability of facilitating conditions.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

MODEL BERSEPADU BAGI MENJELASKAN SIKAP ISI RUMAH TERHADAP HASRAT MENGITAR SEMULA

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Di peringkat global, penjanaan sisa pepejal perbandaran semakin pesat dan pengurusannya semakin mencabar. Kota metropolis, Kano, menghadapi banyak cabaran berkaitan dengan pengurusan sisa pepejal. Walaupun lebih daripada 63% daripada sisa pepejal dihasilkan dari isi rumah, kurang daripada 2% sampah yang dijana dikitar semula kerana penyertaan awam yang rendah. Oleh itu, pelupusan sisa pepejal tanpa pengasingan dan kitar semula yang betul menyebabkan limpahan sampah di bandar serta penyumbatan saliran yang menyebabkan terjadinya banjir semasa musim hujan. Hal ini menjadi penyebab kepada wabak penyakit seperti kolera dan demam malaria semasa musim hujan dan bau yang menjijikkan dari kawasan bandar di mana sisa itu berkumpul dan mereput. Kitar semula dilaporkan sebagai strategi utama pengurusan sisa pepejal yang mampan kerana ia dapat memberi faedah kepada alam sekitar dan ekonomi. Walau bagaimanapun, penyertaan awam yang rendah telah menimbulkan cabaran yang serius terhadap program kitar semula. Kajian terdahulu dan dasar kitar semula kerajaan hanya memberi tumpuan kepada pendekatan atas-bawah (top-down) tetapi mengabaikan pendekatan bawah-atas (bottom-up) yang memastikan penglibatan orang ramai. Tujuan kajian ini adalah untuk membangun dan menguji model bersepadu untuk menerangkan niat tingkah laku kitar semula isi rumah, dengan menggunakan pendekatan pembangunan teori induktif (ITB). Data yang dikumpul dari kota metropolis, Kano, Nigeria digunakan untuk menguji model bersepadu ini. Teknik persampelan strata bertingkat digunakan untuk memilih 422 peserta untuk kajian ini. Model bersepadu yang dicadangkan ini diuji dengan menggunakan analisis statistik termasuk analisis deskriptif, ujian t, analisis korelasi, dan pemodelan persamaan struktur (SEM). Penemuan analisis deskriptif menunjukkan bahawa majoriti responden mempunyai sikap dan hasrat yang tinggi terhadap kitar semula, yang ditunjukkan dalam skor min yang tinggi untuk niat dan sikap mengitar semula (min = 4.03) dan (min = 4.09) masing-masing. Begitu juga, keputusan ujian t-bebas



menunjukkan terdapat perbezaan yang signifikan antara isi rumah berpendapatan tinggi dan rendah dalam skor sikap dan niat. Analisis model persamaan struktur menunjukkan bahawa model bersepadu menyumbang 53% daripada varians dalam niat kitar semula, dengan sikap yang mempunyai sumbangan tertinggi dalam niat kitar semula ($\beta = 0.479$, p = 0.000). Hanya kawalan tanggapan tingkah laku (perceived behavioural control) didapati mempunyai kesan yang tidak signifikan terhadap niat mengitar semula ($\beta = .006$, p = .907), manakala tanggapan terhadap keadaan kurang kemudahan (perceived lack of facilitating conditions) menunjukkan kesan negatif yang signifikan terhadap niat mengitar semula ($\beta = -.170$, p = 0.010). Hasil daripada analisis perantara menunjukkan bahawa hubungan antara niat sikapkitar semula [pendapatan rendah ($\beta = 1.019$, p = 0.000) dan pendapatan tinggi ($\beta = -$ (0.160, p = 0.606)], ($\beta = 0.127, p = 0.028$) dan berpendapatan tinggi ($\beta = 0.406, p = 0.028$) 0.129)], dan tanggapan terhadap kurang kemudahan - niat mengitar semula [berpendapatan rendah ($\beta = 0.089$, p = 0.048) dan pendapatan tinggi ($\beta = -0.499$, p = 0.003)] diperantarai oleh tahap pendapatan. Secara amnya, keputusan dalam kajian ini menunjukkan bahawa di metropolis Kano isi rumah berpendapatan rendah lebih cenderung untuk mengambil bahagian dalam kitar semula untuk keuntungan peribadi mereka (keuntungan kewangan), sedangkan, isi rumah berpendapatan tinggi lebih cenderung untuk mengambil bahagian dalam kitar semula apabila terdapat keadaan yang memudahkan.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

PEB	Pro-Environmental Behaviour
RI	Recycling Intention
ITB	Integrated Theory Building
NEP	New Environmental Paradigm
TPB	Theory of Planned Behaviour
NAM	Norm Activation Model
TIB	Theory of Interpersonal Behaviour
VBN	Value-Belief-Norm
ATT	Attitude
SN	Social Norms
PBC	Perceived Behavioural Control
PN	Personal Norms
AC	Awareness of Consequences
AR	Ascription of Responsibility
PLFC	Perceived Lack of Facilitating Conditions
INTR	Recycling Intention

CHAPTER 1

INTRODUCTION

The introductory section presents the general background of the study, statement of problem, objectives, significance of the study, limitations of the study. The chapter also contains some operational definition of terms.

Background of the Study

Globally, municipal solid waste (MSW) generation is increasing rapidly and its management is becoming more challenging, particularly in developing nations. The difficulty to effectively and properly managed the unprecedented increase of solid waste is due to rapid growth of cities and population, and change in living standard and consumption patterns (Mahar et al., 2007). The MSW produced can be categorized based on its sources of generation which include commercial, industrial, residential and office wastes (Grazhdani, 2016). Residential/Household solid waste (HSW) has been the main source of municipal solid waste (MSW) in many countries to which most cost of the waste management is allocated (Pakpour et al., 2014). In spite of the huge allocation, improper handling and disposal of the MSW is still a challenge and has been a growing concern in many countries, particularly in developing nations. It has been reported that approximately 1.7-1.9 billion metric tons of MSW are generated annually worldwide, and this figure is expected to reach about 27 billion tons by 2050 (UNEP, 2010). Ideally, these wastes should be properly handled in an environmentally responsible manner. However, more than 50% of the waste generated is disposed-off through uncontrolled landfilling (Chalmin and Gaillochet, 2009).

Traditionally, land-filling has been the major way of solid waste disposal in many countries across the world. In Africa and many east European nations, the rate of landfilling is very high as compared to waste minimization and recycling practices (Pérez-López et al., 2016). However, landfilling method is detrimental to the public health and environment, which leads to high rates of morbidity and mortality (Antanasijević et al., 2013). In order to reduce the adverse effect of improper waste handling and limit the increasing demand of land for waste disposal, the idea of converting solid waste to resource should be adopted and practiced as part of the waste management hierarchy must be set according to the priority targets, starting from waste prevention, reduction, reuse, recycle, and energy recovery; with waste disposal as least required practice (Gharfalkar, et al., 2015). Depending on the country, the priority list may differ from the conventional framework. Nevertheless, the ultimate goal is to achieve a sustainable and efficient solid waste management that is good for the environment and public health.



Recycling has been reported as a key strategy through which a sustainable solid waste management can be achieved due to its environmental and economic benefits. It helps to conserve natural resources, reduce pollution and landfilling, save energy as well as improves quality of the environment and public health (Song et al., 2015). From the social and economic perspective, recycling creates job opportunities, through promoting recycling industry, and green technologies, which ultimately lead to economic development (UNEP, 2010). Overall, solid waste recycling is a sustainable practice that reduces the negative impacts of human activities on the environment, and plays an important role in a waste management hierarchy (Wang et al., 2016). However, in most developing countries, the rate of public participation in recycling is low. A sustainable and responsible recycling program strategy should begin with motivating and instilling recycling behavior in the citizens (Echegaray and Hansstein, 2017). This can be achieved by investigating and understanding the key factors that influence people's intention to participate in recycling.

Solid waste recycling as a strategy to reduce landfilling has been widely and successfully applied in various countries, particularly developed nations including U.S.A., Japan, U.K., etc. For example, U.S.A. has implemented recycling laws in 1993, which mandated citizens to recycle some portion of the solid waste generated. Success has been recorded in the recycling program with about 34% of the solid waste generated been recycled as reported by the US Environmental Protection Agency, (2011). Similarly, recycling program was successfully implemented in the UK. It was reported that as at 2014, approximately 44.9% of the solid waste produced has been recycled. This figure was targeted to increase to a minimum recycling rate of 50% of the solid waste generated by the year 2020 (Priestley, 2016). Moreover, in Japan, recycling laws were imposed in which citizens were mandated to minimize waste generation as well as recycle solid waste generated. The law recommended the use of recyclable packaging materials in shops and food producing companies so as to minimize waste generation and achieve sustainability (Hoornweg and Bhada-Tata, 2012).

Contrarily, in Nigeria, proper implementation of formal recycling program has been a major challenge to the authority concerned. Some citizens participate in the informal recycling activities to support themselves financially through selling recyclable materials to the informal recycling sector (Abd'Razack et al., 2017). However, informal recycling is not a sustainable and reliable recycling method. Several efforts were made by the government to implement formal recycling programs in various Nigerian cities, however, little success has been recorded, and landfilling continue to be the most practiced technique for solid waste disposal (Khalil et al., 2017). This may not be unconnected to the fact that the country's recycling policies were leaned toward top-down approach and less attention was given to the bottom-up approach that ensures public involvement. Additionally, there is lack of studies that utilized an empirically validated theory to investigate the key determinants of households' participation in recycling activities. Graham-Rowe et al., (2014) reported that for recycling policies to be effective, there is need to understand the major socio-psychological variables that influence households'

intention to participate in recycling. Some of these strategies as suggested by (Stoeva and Alriksson, 2016) include imposing taxes and levy, and provision of incentives to recyclers. However, these measures gave an unsustainable result as they only have a short-term effect on households recycling participation. A sustainable and long-term recycling strategy as posited by (Chen and Tung, 2010) should include investigating and understanding the socio-psychological factors from empirically validated theories that influence people's behavior.

1.1 Problem Statement

Attempts were made by previous studies to determine which theory best explain recycling behavioral intention. These studies revealed inconsistent and inconclusive results as they mostly used variables from existing or modified theoretical source that focuses on one aspect of behavior (Echegaray and Hansstein, 2017). For example the theory of planned behavior (TPB) has been identified as the most widely applied model in recycling studies. Nevertheless, the theory has been challenged for explaining only the self-gain aspect of the intended behavior, and has failed to consider the moral aspect of behavior (Chen and Tung, 2014). Additionally, other models such as Norm activation model and value-belief-norm theory focused more on normative aspect of the behavior, whereas, theory of interpersonal behavior and Comprehensive Action Determination Model focused only on non-rational behavior. It is becoming apparent that an integrated approach would have a better explanatory ability, through combining variables from discrete but complimentary theories of pro-environmental behavior using a particular approach. This is because a comprehensive understanding of households' recycling behavioral intention requires a multifaceted approach as posited by Wall, (2008). This approach is lacking in the existing literature. Inclusion of different socio-psychological variables such as belief, altruisms, and facilitating factors means that various factors are at play when explaining recycling behavioral intention, and will help to create a comprehensive model (Bamberg et al., 2007; Park and Ha, 2014). Similarly, including income level as a moderating variable will help in formulating a promising recycling program that considers different income groups based on the factors influencing their intention to participate in recycling programs, thus, resulting to a sustainable recycling program. In order to further enhance our understanding of what influence households' recycling intention, this study employs an inductive theory building method to develop an integrated theoretical framework that provides valuable insights to the policy makers for proper policy formulation and implementation towards effective and sustainable recycling program. The variables in the proposed integrated model were not been overtly used in the previous recycling literature as one integrated model. The researcher considers this as a gap in the gap.

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Data collected from Kano metropolis Nigeria were used to test the integrated model. Kano metropolis faces numerous challenges with regards to public participation in recycling programs. Although more than 63% of the solid waste produced comes from the households, less than 2% of the waste generated is recycled due to low public participation (Khalil et al., 2017). Consequently, improper disposal of solid

waste without proper segregation and recycling causes littering of the city and blockage of drainages, which lead to occurrence of flooding during rainy season. This explains the annual outbreak of diseases such as cholera and malaria fever during the rainy seasons and, the disgusting odor from the city areas where the waste accumulates and decays. In an effort to reduce this menace, government attempted to develop recycling program, however, these efforts were proved abortive due to poor policies and improper approach and implementation. For example, recently formal recycling program was introduced in cities such as Kano and Kaduna, however, the effect of the program was limited due to low public participation. A possible explanation is that the existing recycling policies were top-down in nature, neglecting the bottom-up approach that ensures public involvement. Additionally, previous literature on recycling failed to investigate the key factors that influence households' intention to participate in recycling. Some of these studies include institutional problems (Nabegu and Mustapha, 2014), provision of infrastructure (Ogu, 2000), assessment of MSWM strategies (Batagarawa, 2011), MSWM policies and regulations (Nzeadibe and Ajaero, 2011), and state of the environment (Anake et al., 2009). Therefore, there is lack of literature that utilized an empirically validated theory to examine the key factors influencing households' intention to recycle, indicating the presence of research gap. Thus, more insights on what influence households' recycling intention would provide in-depth explanation of how to achieve a sustainable recycling program and consequently address the municipal solid waste management problems in the country.

1.2 Objectives: General and Specific

1.2.1 General objective

The main objective of this research is to develop and test an integrated theoretical model for explaining households' recycling intention in Kano metropolis, Nigeria.

1.2.2 The specific objectives of the study are:

- 1. To assess the households' levels of predictor variables and recycling intention in the integrated model.
- 2. To evaluate the levels of the predictor variables and recycling intention among low and high incomes households in Kano metropolis, Nigeria
- 3. To examine the relationships between the predictor variables and recycling intention among households in Kano metropolis Nigeria.
- 4. To determine the prediction effect of independent variables on the recycling intention among households in Kano metropolis, Nigeria
- 5. To investigate the moderating effect of income level on the relationships between the predictor variables and recycling intention among households in Kano metropolis

In order to achieve these objectives, an inductive theory building (ITB) approach, which is a qualitative method, was used to develop an integrated model based on general pro-environmental behaviour theories. The ITB approach was adopted from the work of (Jabareen, 2009) and (McDonald, 2014). This method enables the review and comparison of the range of pro-environmental behavioural theories and variables used in the previous recycling literature and, combining the insights into one integrated conceptual framework. ITB allows for selection for appropriate variables that were used in developing the proposed integrated model, thus fulfilling the major objective of this thesis. In the subsequent stages of the thesis, the integrated model was empirically validated through established statistical methods including structural equation modelling using statistical tools (SPSS and AMOS), fulfilling the remaining objectives of the thesis.

1.3 Research Question

What are the key predictors of households recycling intention and what degree of influence do these predictors have on the intention of individual households with regard to participation in recycling activities?

1.4 Significance of the study

This study makes significance contributions to the existing literature and it also has policy implications as follows:

In terms of theoretical contributions, the present study develops an integrated model that involves constructs from discrete but complimentary PEB theories based on previous recycling literature. The proposed integrated model therefore, provides a comprehensive explanation of, and enhances the understanding of factors influencing households' recycling behavioral intention. Combining variables from different theories of pro-environmental behavior bridges the existing gap between the theories and several academic fields including environmental management. This study is significance for researchers and practitioners as early information or reference point for future studies by providing a model that would help for the improvement of current policies of solid waste recycling among households in Kano metropolis.

From the policy implications, the research contributes with useful information for the development and implementation of household recycling program by providing evidence on the factors that significantly contribute to households recycling behavioral intention. More precisely, the thesis offers relevant authorities with useful information on what influence households' participation in recycling program, which ultimately helps to reduce the overall MSWM problems. From the findings of this research, variables found to have a significant effect can be enhanced, while variables found to have low or insignificant effect on recycling intention can be ignored. Therefore, by identifying the main variables that determines households' recycling intention, this thesis contributes in developing an overarching strategy for effective and sustainable recycling program. If properly implemented, the proposed integrated model would contribute towards influencing households' behavioral intention.

1.5 Scope and limitation of the study

This study is on households' solid waste recycling in Kano metropolis, Nigeria. It is the intention of this study to investigate the predictors of household recycling behavioral intention. The study also examines the relationship between the household waste recycling behavioral intention and some psychological variables. The study is confined to the solid waste that only comes from household source. The research, therefore, excludes solid wastes generated by other sources such as industrial, commercial and offices. The reason being that more than 63 percent of the MSW been generated in the study area originates from residential source. However, the proposed model can later be tested in other solid waste sources.

1.6 **Operational Definitions of terms**

In this segment concept used in this study are operationally defined as they apply to this study. These concepts include: attitude (ATT), social norms (SN), perceived behavioral control (PBC), intention (INT), personal norms (PN), awareness of consequences (AC), ascription of responsibility (AR), income level , and perceived lack of facilitating conditions (PLFC).

1.6.1 Ascription of Responsibility

In this study the variable AR refers to people's attribution of responsibility to themselves, which may likely influence their intention to participate in recycling.

1.6.2 Attitude

In this study, the variable attitude refers to the psychological emotion and the overall evaluation of the advantages and disadvantages of participating in an environmentally friendly behavior.

1.6.3 Awareness of Consequences

For this study, awareness of consequences is defined as individuals' disposition to become aware of the potential consequences of their actions or inactions for the benefit of others.

1.6.4 Intention

In this study, intention is described as the feeling of being ready and willing to participate in recycling. Intention plays a role of dependent variable in this study.

1.6.5 Perceived Behavioral Control

In this study, the variable PBC is operationalized as individuals' perception about the possible difficulty or ease of engaging in recycling behavior.

1.6.6 Perceived Lack of Facilitating Conditions

In this study, the variable PLFC refers to the extent to which the perception of unavailability or lack access to recycling facilities and local collections affect households' participation in recycling.

1.6.7 Personal Norms

In this study, personal norm refers to individuals' personal feelings about moral obligation related to the correctness or incorrectness of participating in recycling.

1.6.8 Social Norms

The variable social norm refers to individuals' perception of the social pressure or expectation from significant people around him to engage in recycling. In a survey research like this, respondents are asked about their believe that their family, their neighbors or community in which they live have any expectations on them to participate in recycling.

1.6.9 Income Level

For this research, households' income refers to a measure of incomes of the head of the household, which includes every form of income such as monthly salary, retirement income, average monthly income for investments and other businesses. The variable was divided into two groups (high income and low income) in the analysis.

1.7 Chapter Summary

In this chapter the research background was presented, the presence of research gaps in the recycling literature as well as the research problems that require further academic attention were highlighted. The chapter also specified the main and specific objectives of the study, and presented the significance and limitations of the research. Additionally, the chapter provided the operational definitions of the variables used in this study. The next chapter reviews the PEB theories, and the relevant literature on recycling behavioural intention.



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