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Conceptual Modelling of Residents' Environmental Sanitation Behaviour in a Nigerian Metropolis

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Abstract: This study modelled residents' environmental sanitation behaviour in Ibadan metropolis, Nigeria. To examine the factors influencing environmental sanitation behaviour, residents were sampled across the residential areas of the metropolis. The identified factors were residents' socioeconomic background, residential characteristics, access to environmental sanitation facilities and services, and agreement with environmental sanitation exercise. Findings revealed that environmental sanitation exercise was a strong and statistically significant predictor (R2 = .971) of environmental sanitation behaviour in Ibadan metropolis while other factors were trailing behind with 2.9% contribution. These findings suggest that environmental sanitation in Ibadan metropolis was mainly an exercise rather than a practice. It was law-driven, and therefore mostly government-initiated and motivated. These findings have implications for practice and policy making by highlighting environmental sanitation reorientation and strengthening of other identified factors of environmental sanitation behaviour in the metropolis.

Keywords: environmental behaviour, environmental sanitation, Ibadan metropolis, model, Nigeria, residents

JEL codes: D19, K32

1. Introduction

In Nigeria, environmental sanitation is an often-misconstrued subject matter. It is usually understood as an exercise (an action) rather than a practice (a custom or habit) (Daramola, 2015). This is attributable to the idea that brought environmental sanitation into the limelight during the military regime of Buhari/Idiagbon in 1984. The regime instituted the mandatory monthly environmental sanitation exercise to be carried out from 7 to 10 am of every last Saturday of the

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month. With the advent of the current democratic dispensation and renunciation of the military rule in 1999, the Federal Government of Nigeria rescinded the monthly environmental sanitation exercise on the basis that it is an offspring of military junta.

Despite the cancellation of the exercise, its notion lingers in the minds of the people as what constitutes environmental sanitation.

Therefore, with no legislation coming forth from the Federal Government, some State Governments enacted laws. These laws provide for monthly or bimonthly environmental sanitation exercise in the states, and their execution is similar to that of the repealed military decree. The enactment of these laws by the states further established the credence that everything about environmental sanitation starts and ends with the exercise. Nonetheless, the average person on the street and even in government circles understands environmental sanitation as not more than the routine evacuations of municipal solid waste; he is not bothered by other environmental aspects that might be infringing on the wellbeing of the homes and neighbourhoods (Anunonwu et al, 2009). The effectiveness of this environmental sanitation exercise was based mainly on legislation.

In the real sense of it, environmental sanitation refers to efforts or activities aimed at maintaining a clean, safe and pleasant physical environment through water supply, excreta and wastewater disposal, solid waste disposal, and ensuring the safety of the environment in all human settlements towards the promotion of social, economic and physical well-being of all sections of the population (Franceys et al, 1992; WHO and UNDP, 1997; WHO and UNICEF, 2000; IRC, 2006; IRC, 2006a; Dwivedi and Sharma 2007; Acheampong, 2010). It comprises activities such as provision and maintenance of sanitary facilities and services (water supply; toilet; and management of wastewater, storm water and solid waste), public education, legislation and individual and community actions (Federal Ministry of Environment, 2005; IRC, 2006).

The foregoing establishes it that despite the fact that environmental sanitation is technical and legislative nature, its behavioural nature cannot be compromised (Hueting, 1980; Blaikie and Brookfield, 1987). It has to do with change in behaviour and availability of facilities which work together to form a hygienic environment (World Bank, 2002; Mmom and Mmom, 2003). Therefore, environmental sanitation connotes the habit of living where every second, minute, hour and day counts in order to make the residences sanitary and aesthetic. This habit is termed environmental sanitation behaviour (ESB).

In this context, therefore, environmental sanitation behaviour is the involvement of residents in the provision, utilisation and maintenance of environmental sanitation facilities and services and adherence to environmental sanitation legislation both in their homes and neighbourhoods. This implies that despite the fact that availability of infrastructure and enforcement of legislation contribute towards residents' willingness to promote a sanitary, the sustainability of these conditions should be based on behavioural tendency. This is because environmental quality strongly depends on human behavioural patterns (Steg and Vlek, 2009) and environmental sanitation is a behavioural issue (Daramola, 2015).

The issue of environmental behaviour has been well explored by many studies. For instance, studies on environmental behaviour have focused on travel mode choice (Heath and Gifford, 2002; Bamberg, 2003; Wall et al., 2007), household recycling (Kaiser and Gutscher, 2003), waste composting (Mannetti, Pierro, and Livi, 2004), and the purchasing of energy-saving light bulbs, use of unbleached paper, meat consumption (Harland et al., 1999). Likewise, in the study environmental sanitation as an offshoot of pro-environmental behaviour, isolation of certain issues is common. These include components such as water supply, sanitation and wastewater disposal (Olawuni, 2007; Daramola, 2011), environmental sanitation management (Acheampong, 2010), community participation in environmental sanitation (Narayan, 1995; Chess 2000; UNEP, 2005; Luthi, 2012), health effects of environmental sanitation (Mmom and Mmom, 2011). The studies have focussed mainly on contextual factors such as technical facilities and services in terms of their provision and effects of their deficiencies. Studies on environmental sanitation with recourse to motivational (intra-personal) factors of environmental behaviour, such as norms and habits, have not been well documented, especially in African setting.

Earlier studies have identified some predictors of environmental behaviour such as age (Howell and Laska, 1992; Nord et al., 1998; Buttel and Taylor, 1999) and gender (Tarrant and Cordel, 1997; Stern, 1998; Arcury, 2000; Dietz et al., 2002; Caiazza and Barrett, 2003; Hunter et al., 2004). Other identified factors include income, level of education, place of residence, household size, environmental knowledge or awareness, religious participation, environmental legislation and occupation (Adeola, 1994; Arcury, 2000; McFarlanc and Boxall, 2003; Poortinga et al., 2004; Kalantari et al., 2007). In particular, it is expedient to explore the relevance of these variables as determinants of environmental sanitation behaviour in African setting.

Besides, unlike earlier studies, this study attempts not to isolate each of these factors in modelling environmental sanitation behaviour. This is based on the premise that many of the factors have been identified as highly correlated covariates in several earlier studies (Karp 1996; Kollmuss and Agyeman, 2002; Plombon, 2011; Gifford and Nilsson, 2014). This inadvertently makes the statistical analysis of these factors subject to multicollinearity, which can seriously distort the interpretation of a model (Slinker and Glantz, 1985; Miles and Shelvin, 2001; Glantz, 2001; Tu, Clerehugh and Gilthorpe, 2004) and leads to generation of spurious results. Thus, in avoiding this, there would be a comprehensive model that gives consideration to as many of the different explanatory factors as possible. The omission of important factors leading to erroneous conclusions concerning the effects of the variables included in the model will be avoided (Organisation for Economic Co-operation and Development [OECD], 2008). This will bring about the real dimensions with which environmental sanitation behaviour can be modelled. Based on the foregoing, therefore, this study attempts to model environmental sanitation behaviour in the metropolitan area of Ibadan, Nigeria.

2. Modelling Pro-Environmental Behaviour: A Review

The field of environmental psychology is loaded with models developed to explain environmental behaviour. The models were developed to understand which factors promote or inhibit environmental behaviour (Steg and Vlek, 2009). However in this study, three selected theories of environmental behaviour will be reviewed. The determination to review the theories was based on their utility in examining the antecedents of pro-environmental behaviour. The theories are reviewed to serve as theoretical basis in understanding the antecedents (both motivational and contextual factors) of environmental sanitation behaviour. The theories are Theory of Planned Behaviour/Reasoned Action, Norm Activation Model and Values-Beliefs-Norms Theory.

Theory of Planned Behaviour/ Reasoned Action

Ajzen and Fishbein formulated in 1980 the theory of reasoned action (TRA). This resulted from attitude research from the Expectancy Value Models. Ajzen and Fishbein formulated the TRA after trying to estimate the discrepancy between attitude and behaviour. This TRA was related to voluntary behaviour. Later on behaviour appeared not to be 100% voluntary and under control, this resulted in the addition of perceived behavioural control. With this addition the theory was called

the theory of planned behaviour (TpB). The theory of planned behaviour is a theory which predicts deliberate behaviour, because behaviour can be deliberative and planned.

TRA suggests that a person's behaviour is determined by his/her intention to perform the behaviour and that this intention is, in turn, a function of his/her attitude toward the behaviour and his/her subjective norm. The best predictor of behaviour is intention. Intention is the cognitive representation of a person's readiness to perform a given behaviour, and it is considered to be the immediate antecedent of behaviour. It is determined by three things: attitude toward the specific behaviour, subjective norms and perceived behavioural control.

The TpB holds that only specific attitudes toward the behaviour in question can be expected to predict that behaviour. In addition to measuring attitudes toward the behaviour, we also need to measure people's subjective norms – their beliefs about how people they care about will view the behaviour in question. To predict someone's intentions, knowing these beliefs can be as important as knowing the person's attitudes. Finally, perceived behavioural control influences intentions. Perceived behavioural control refers to people's perceptions of their ability to perform a given behaviour. These predictors lead to intention. A general rule, the more favourable the attitude and the subjective norm, and the greater the perceived control, the stronger should the person's intention to perform the behaviour in question. Kollmuss and Agyeman (2002) put it that the model has been the most influential attitude-behaviour model in social psychology. This was despite its limitation based on its underlying assumption that people act rationally (Regis, 1990). The diagrammatic presentation of the theory is as contained in Figure 1.

Norm Activation Model

Schwartz originally outlined the norm activation model in the late 1960s (1968a, 1968b) and then made some refinements to this model in a series of articles in the 1970s (1970, 1973, 1977). In an earlier article about changing attitudes toward environmental issues, Heberlein (1972) suggested that Schwartz's norm activation model would provide a good foundation for investigating pro-environmental behaviours such as recycling and conserving energy because the model was intended to investigate pro-social behaviours. Likewise, Kollmuss and Agyeman (2002) put it that norm activation theory's main constructs are awareness of need, awareness of consequences, personal norms and subjective norms

Schwartz poses three antecedents of pro-social behaviour. These three antecedents are awareness of consequences, ascription of responsibility, and personal norms. The model is labelled norm activation because it argues that an awareness of potentially harmful consequences and ascription of personal responsibility activate personal norms that determine whether a person should act to intervene to prevent harmful outcomes. The model is a theory of intervention behaviours. It only applies when processes or events are already in place that someone believes will lead to harmful consequences for others or others and oneself collectively. Schwartz originally called his model a theory of altruism because it focuses on behaviours in which the motivation is not apparent self-interest.

The logic of Schwartz's theory revolves around the intensity of the awareness of consequences and acceptance of responsibility components and the content of an individual's norms. The theory contends that as the salience or intensity of awareness of consequences and acceptance of responsibility increases, the likelihood that personal norms will be evoked increases. If the content of a person's norms prescribes action, then a person will act to prevent the expected harmful consequences. Schwartz noted that this process needs not be a deliberate calculus but might be quite spontaneous if the situation is of high enough intensity and the individual's norms are strong and prescribe behaviour. Figure 2 is the graphical representation of the theory.

Values-Beliefs-Norms Theory

Stern et al. (1999) tested a theory of support for social movements that incorporated values and beliefs together into a norm activation framework. This work was built on some of their earlier work (Stern, et al., 1995) that integrated values measures with the research on the New Environmental Paradigm Scale (Dunlap and Van Liere, 1978). The values-beliefs-norms theory contends that pro-social behaviour is stimulated by activating norms of helping. These norms stem from three factors: (a) personal values, (b) beliefs that these values are under threat, and (c) beliefs that the individual can take action to reduce the threat and restore those values (see Figure 3). The primary differences between the values-beliefs-norms theory and the norm activation theory are that the norm activation theory focuses solely on altruistic values or motives whereas the values-beliefs-norms theory includes other values as well, and the values-beliefs-norms theory directly assesses individuals' relevant beliefs.

Several studies have expressed different views in relation to these theories (Heath and Gifford (2002); Kollmuss and Agyeman, 2002; Hinds and Sparks, 2008; Chen and Tung, 2010;

Raymond, Brown and Robinson, 2011; Gifford and Nilsson, 2014). For instance, Gifford and Nilsson (2014) posited that each of the theories have been proposed as succinct model of pro-environmental concern and behaviour. This indicates that the question of what shapes pro-environmental behaviour is such a complex one that it cannot be visualized in one single framework or diagram as such a single diagram with all the factors that shape and influence behaviour would be so complicated that it would lose its practicality and probably even its meaning (Kollmuss and Agyeman, 2002). Besides, Gifford and Nilsson (2014) documented that these theories are deficient of some personal and social factors.

Kollmuss and Agyeman (2002) further put that due to the protean and complex nature of human beings, such theories may only capture important portions of the variability in environmental concern and pro-environmental behaviour without including a broad range of personal and social influences. The identified influences comprise both personal factors and social factors, and some influences contain both personal and social aspects. According to them, the personal factors are childhood experience, religion, knowledge and education, personality and self-construal, sense of control, values, political and world views, goals, felt responsibility, cognitive biases, place attachment, age, gender and chosen activities. The social factors identified are religion, urban-rural differences, norms, social class, proximity to problematic environmental sites and cultural and ethnic variations. These social factors emerged based on the fact that people are heavily influenced by the context in which they live their daily lives. The context may be long-term as in the case of religion or social class, or more volatile in nature, such as the passing influence of fads.

In the opinion of Kollmuss and Agyeman (2002), there are commonalties, contradictions, and omissions that can be found in the models. Thus, they came up with specific factors that have been established as having some influence (positive or negative) on the models of pro-environmental behaviour. They further put it that distinctions and the hierarchy between the different factors are to some extent arbitrary. The factors were categorized into three: demographic, external (institutional, economic, social, and cultural factors) and internal factors (motivation, environmental knowledge, awareness, values, attitudes, emotion, locus of control, responsibilities, and priorities).

In relation to these views of Kollmuss and Agyeman (2002) and Gifford and Nilsson (2014), many factors that are consistently related to environmental behaviour have been established

by various studies (Howell and Laska, 1992; Adeola, 1994; Tarrant and Cordel, 1997; Stern, 1998; Nord et al., 1998; Buttel and Taylor, 1999; Arcury, 2000; Dietz et al., 2002; European Opinion Research Group [EORG], 2002; McFarlanc and Boxall, 2003; Caiazza and Barrett, 2003; Hunter et al., 2004; Poortinga et al., 2004; African Water Development Report [AWDR], 2006; Kalantari et al., 2007; Faniran, 2012; Daramola, 2012; 2015). Notable among these factors are the socioeconomic background of people such as gender, age, income, religious participation and level of education. These were called demographic factors by Kollmuss and Agyeman (2002) and personal factors by Gifford and Nilsson (2014).

It is observable, however, that these personal factors, in many cases, serve both as direct determinants of environmental behaviour or indirectly by influencing individual's environmental awareness, environmental concern, provision of environmental amenities and adherence to environmental legislation. This reveals the complexity in variation that exists in people. The variation is responsible for impact on environmental concern and people's reactions to the environmental problems they experience. Thus, the difficulty in defining and delimiting the different factors is due to the fact that most are broadly and vaguely defined, interrelated, and often do not have clear boundaries (Kollmuss and Agyeman, 2002).

For instance, the study of Kalantari et al (2007) residents' environmental behaviour in Tehran revealed a significant relationship between gender and environmental behaviour. Several earlier studies have also theorized in this respect (Tarrant and Cordel, 1997; Stern, 1998; Arcury, 2000; Dietz et al., 2002; Caiazza and Barrett, 2003; Hunter et al., 2004). Their conclusion established the fact that gender determines the environmental behaviour of urban residents, although with contradiction in some cases. While Tarrant and Cordel (1997) and Stern (1998) reported that females were environmentally concerned than males, Arcury (2000) later found that females were less environmentally concerned than males.

In the same vein, among the identified most consistent socioeconomic factors of environmental behaviour in literature are age (Howell and Laska, 1992; Nord et al., 1998; Buttel and Taylor, 1999; Kalantari et al., 2007) and education (EORG, 2002; Kalantari et al., 2007; Daramola, 2012; 2015). Studies concluded that education plays an important role in enhancing environmental behaviour by providing individuals with the ability to better present arguments to support their believes and behaviours. Thus, there is a significant and positive correlation between environmental awareness, environmental concern and consequently environmental behaviour.

On the provision of environmental sanitation facilities and services, AWDR (2006) opined there must be an income level that allows all this to be paid for, or provisions to ensure supplies for those unable to meet their bills. Studies have also identified other factors of environmental behaviour such as place of residence, household size, environmental knowledge, environmental legislation, social class and occupation, liberal political orientation, values and worldviews, (Adeola, 1994; Arcury, 2000; McFarlanc and Boxall, 2003; Poortinga et al., 2004; Kalantari et al., 2007; Faniran, 2012; Daramola, 2015).

The complexity of pro-environmental behaviour is also reflected in the dimension of 'honeybees' introduced in Gifford (2011) and Gifford and Nilsson (2014). They observed that some people engage in pro-environmental behaviour without necessarily having any of its presumed pre-requisites, such as knowledge, childhood experiences, activity choices, personality, values, perceived behavioural control or even behavioural intention to do so. This was explained in the choice of individuals to engage in pro-environmental behaviour and thereby reduce harm to the environment without recourse to the mentioned pre-requisites of pro-environmental behaviour. For instance, such individuals cycle for their health (Whitmarsh, 2009), walk to save reduce transport cost or as a result shorter distance (Simma and Axhausen, 2004; Dargay and Hanly, 2004), insulate their homes to save money (Gifford, 2011), they prevent waste generation or reuse and recycle because they are poor (Hong et al., 1993; Miranda and Aldy, 1998; Gifford, 2011). The individuals have been called "honeybees," because, like that insect, in pursuing some completely different goals, they provide an important side-benefit to the environment (Gifford, 2011).

From these discussions, certain issues can be raised. Developing a model that incorporates all the factors influencing pro-environmental behaviour might be a tall ambition that will be neither feasible nor useful. Pro-environmental behaviour is a diverse concept which cannot be explained by one, universal explanation. It can be considered a complex social phenomenon, a mixture of social perceptions, local histories and environmental realities, international relationships and influences, and unique cultural and structural features of particular countries and regions (Brechin, 1999). However, in designing a model of environmental behaviour, these studies serve as a good basis and an effective influence on subsequent contribution to knowledge. Therefore, the validity of the provisions of these theories and the assertions of the earlier studies formed the basis for modelling environmental sanitation behaviour in Ibadan metropolis. This was an attempt to

domicile the study of pro-environmental behaviour in relation to environmental sanitation in the study area.

3. The Study Area

The study area, Ibadan metropolis, is one of the largest indigenous urban centres in sub-Saharan Africa. It is located in the south-western part of Nigeria but characterised with cosmopolitan nature. Ibadan, as a metropolis, is composed of the municipality (main city) and its suburbs (less city) with eleven local government areas. Politically and administratively, the main city was under one local government, Ibadan Municipal Government, before it was split into five distinct local government areas (LGA) in 1991. These are Ibadan North, Ibadan North East, Ibadan North West, Ibadan South East and Ibadan South West. The remaining six LGAs constitute the suburbs. These are Akinyele, Egbeda, Ido, Lagelu, Oluyole and Ona-Ara LGAs (Figures 4-6).

Ibadan metropolis has an estimated population of more than 2 million inhabitants made up of people from different parts of Nigeria and other parts of the world. The inhabitants reside in different residential zones of the city, both traditional and modern. As common to most Nigerian traditional cities, the combination of these two parts revealed three contrasting residential zones linked to three historical periods (Onibokun, 1985) with their nature and characteristics determined by social, economic and physical patterns. These are: the pre-colonial residential development which is the core or traditional zone; the colonial/pre-independence residential development referred to as the intermediate or transition zone; and the post-independence residential development, also called the suburban. Among the typical African cities where these zones have been identified are: Ilorin (Akorede, 1975); Benin City (Onakerhoraye, 1977); and Ogbomoso (Okewole, 1977; Afon, 2005).

4. Methodology

This study was based on a field survey through administration of questionnaire. The research population of the study was all the residents of Ibadan aging over 18 years old. This is because, in Nigeria, 18 years is the minimum age of franchise and responsibility (when somebody is no more a minor). To derive a representative sample for the study, one out every two local government areas

was sampled both in the municipality and the less city. Thus, three LGAs (Ibadan North East, Ibadan North West and Ibadan South West) were sampled out of the five in the main city and three LGAs (Akinyele, Egbeda and Oluyole) were also sampled in the less city. For questionnaire administration, the selected LGAs were stratified into four residential zones. This started with the adoption of the stratification of Onibokun (1985) for the main city. All residential areas in the selected three LGAs of the main city were stratified into the first three residential zones (core, transition and older suburb) while the residential areas in the selected LGAs in the less city were stratified as the newer suburb.

Following the stratification, each selected LGA was divided into the existing different political wards, as recognised by Independence National Electoral Commission [INEC] (2015) in the conduct of electoral polls. However, in the newer suburb, focus was only on the wards that are parts of the metropolitan areas while those in the rural areas were left out. For questionnaire administration, one ward in each residential zone of all the selected LGAs was sampled randomly. Through this method, residents from twelve (12) wards cutting across the four different residential zones were surveyed. Using systematic sampling technique, every 20th residential building was selected in the residential zones. Questionnaire was successfully administered in 1,283 residential buildings comprising 436 in the core, 351 in the transition and 295 in older suburb and 201 in newer suburb.

The questionnaire addressed issues on their socioeconomic background, access to environmental sanitation facilities and services, environmental sanitation awareness and compliance with environmental sanitation legislation. To measure the concepts, five Likert-type scales for evaluating access to environmental sanitation awareness and compliance with environmental sanitation legislation with each containing some items which were used to measure the concepts. Thus, by transforming the categorical responses into interval data, it was possible to use several parametric tests to examine hypotheses and elaborate the conceptual model. Analysis of data was done using cross tabulation, Chi-square tests and Analysis of Variance (ANOVA), correlation analysis and regression analysis.

5. Results and Discussion

Profile of the Respondents

Out of 1,283 respondents interviewed for this study, 51.2% were male while 48.8% were female. This proportional representation of the two genders was also across the residential zones. The age structure was grouped into four: teenagers (those with less than 20 years); young adults (20 to 39 years); elderly adults (40 to 59 years) and old people 60 years and above). Majority of the residents (90%) were adults (20 to 59 years), 1.9% were teenagers and 8.1% were old people (60 years and above). The mean age of the total number of respondents was 39 years. Across the residential zones, the mean age was 49 years in the core, 39 in the transition and 34 both in older and newer suburbs. The ANOVA results ($F= 88.352$; $\rho< 0.001$) indicated that age distribution of the residents varied significantly with residential zones.

The marital status of the residents was categorised into three: single, married and those that have been married (widowed or divorced). Findings revealed that 73.1% of the respondents were married; 23.9% were single and others comprised 3% of the respondents. Thus, the respondents were in position of marital responsibility that may affect their household environmental sanitation behaviour. Almost all the respondents acquired formal education with the majority (83.1%) having either secondary or tertiary education. In the core area, 40.8% of the residents had primary education while 9.2% and 50% had secondary and tertiary education respectively. The level of residents with tertiary education increased to 83.2% in the transition zone while it was 70.2% and 71.6% for older and newer suburbs respectively. This residents' level of educational attainment across the residential zones could serve as the basis for assessment of their environmental sanitation behaviour. The two major religions in Nigeria, Christianity and Islam, are well represented among the respondents. 49.5% of the respondents were Christians while 50.5% were Muslims.

Monthly income of the respondents was grouped into three: low, medium and high. Based on these categories, 59.5% of the respondents were low income earners (less than N50,000); 25.7% were of medium income (N50,000 – N99,999); and 14.8% were of high income (N100,000 and above). Also, variation existed in residents' income across the residential zones with average income of N38,045.87; N60,977.21; N76,813.56 and N87,908.46 in the core, transition, older suburb and newer suburb respectively while overall mean income was N61,044.89. These findings revealed that averagely, the respondents in the core residential zone were of low income while those in other zones were in medium income with varying degrees. The ANOVA results ($F=$

54.332; $\rho<0.001$) indicated that income distribution varied significantly with residential zones. Further analysis using Bonferroni Post-Hoc Test revealed that significant variation existed between the core and the transition ($\rho<0.001$), older suburb ($\rho = 0.001$) and newer suburb ($\rho < 0.001$) but between older suburb and newer suburb ($\rho = 0.126$).

Findings on the household size of the respondents revealed that 40.4% had maximum of five members, 46.1% had 6 to 10 members while 13.5% had above 10 members. These findings varied with residential zones as revealed with average household size of 10 in the core, seven in the transition, and six in both the older suburb and newer suburb. The results revealed that household size reduces with increase in distance from the core of the metropolis to newer suburb. The ANOVA results ($F= 148.125$; $\rho< 0.001$) also indicated that household size varied significantly with residential zones.

Modelling the Data

In developing the model for this study, environmental sanitation behaviour was the dependent variable while the independent variables or predictors were the identified determinants of environmental sanitation behaviour in literature. The dependent variable was determined by making the residents indicate, via a 5-point Likert scale, the effectiveness of some notable environmental actions of the respondents. These include provision of potable water, provision of adequate toilets, washing of hand after going to toilet, disposal of waste, provision and maintenance of drains, observance of environmental sanitation exercise. Possible responses ranged from 'not at all effective' (coded as 1) to 'very effective' (coded as 5). The scores for each item were summed to create a composite measure of environmental sanitation behaviour. Thus, by transforming the categorical responses into interval data, it was possible to have variables that are suitable for parametric tests.

The predictors of environmental sanitation behaviour comprised the residents' basic characteristics such as gender, residential zone, number of years spent in school, household size, tribe, religion, income, length of stay in the residential area and variables on access to environmental sanitation facilities and services, environmental sanitation awareness and environmental sanitation exercise. Data collected on these variables were of various classes. The categorical ones among the variables were transformed into interval data to make them suitable for parametric tests The binary categorical variables among these were coded as '0' and '1' while those

with more than two categories were dummied with consideration for reference category. Others include data collected via a 5-point Likert scale with scored responses ranging from the least (coded as 1) to highest (coded as 5).

Initial correlation analysis of these predictors revealed that they are mostly covariates. Thus, the variables were loaded into factor analysis in order to resolve the issue of collinearity between the predictors by means of a principal component analysis. This was with a view to generating uncorrelated variables or factors to predict the dependent variable. To facilitate the interpretability of the factors, a varimax rotation was conducted. This type of rotation rearranges the variables in a way that the original variables load high on only one of the factors and low on other factors. For the variables with factor loadings not lower than 0.50, a five-factor solution yielded clearly interpretable results while the variables with factor loadings of less than 0.50 were omitted.

The five factors were named access to environmental sanitation facilities, agreement with environmental sanitation exercise, environmental sanitation awareness, residential attributes, and socioeconomic background. These factors were used for further analysis using multiple regression analysis. Based on the analysis, and the attributes of the three models of pro-environmental behaviour earlier discussed, a model of environmental sanitation behaviour was developed.

The behavioural model was developed as a causal representation based on the multi-component paradigm for environmental behaviour. It expresses a view of environmental sanitation behaviour as a framework of cause and effect that is dependent of the variables derived from the socioeconomic background and residential attributes of residents including other factors such as environmental sanitation awareness, compliance with environmental sanitation legislation and access to environmental sanitation facilities and services. These factors were organised and transformed into a conceptual model which formed the basis of the study in assessing environmental sanitation behaviour.

The aim was to formulate a conceptual framework for examining the determinants of environmental sanitation behaviour in the study area. This is in order to inform intervention development and structure scholarly discussion on environmental sanitation behaviour. Therefore, the model gave due consideration to socioeconomic and residential characteristics of residents in relation to subjective norms and beliefs that affect environmental attitudes and behaviour including altruistic values. The application of environmental legislation and education was perceived in relation to altruistic values and behavioural control. Thus, using these theoretical frameworks as

guide, investigation was made on the antecedents had influence on environmental sanitation behaviour of the residents.

In the model, initial assumptions were made regarding certain significant exogenous variables such as gender, age and income that were grouped into residents' socioeconomic background. These were hypothesized as entry level variables with direct effect on residential attributes as the first order endogenous variable. They were considered the antecedents that determine other endogenous factors that precede environmental sanitation behaviour. Besides, socioeconomic background was presumed to have direct effects on access to environmental sanitation awareness, agreement with environmental sanitation exercise and accessibility to environmental sanitation facilities and services. The residential attributes also had direct effects on environmental sanitation awareness and access to facilities and services. These direct effects of residential attributes served as indirect effects of socioeconomic background on the endogenous variables.

Also, there were non-recursive direct relationships between access to environmental sanitation facilities and services, environmental sanitation awareness and agreement with environmental sanitation exercise. Thus, there is a combination of direct and indirect effects between socioeconomic background, residential attributes, access to environmental sanitation facilities and services, environmental sanitation awareness and agreement with environmental sanitation exercise. In the model, environmental sanitation behaviour was the variable at the end of the cause/effect chain, the one to be explained.

Guided by the conceptual framework, hierarchical or sequential multiple regression analysis was used to examine the relationships between the dependent and independent variables. The interest was to determine whether the identified independent variables can predict a significant amount of the variance in environmental sanitation behaviour of the residents. The regression model summaries these factors in relation to environmental sanitation behaviour.

As contained in Table 3, Regression Model 1 contains the effect of participation in environmental sanitation exercise on environmental sanitation behaviour. As the entry level variable, environmental sanitation exercise is a strong (R^2 = .971) and statistically significant predictor (r= .986, $\rho < .001$) of environmental sanitation behaviour in Ibadan metropolis. This indicates that 97.1% of environmental sanitation behaviour in Ibadan metropolis is determined by environmental sanitation exercise.

In Models 2 and 3, there is addition of two variables: access to environmental sanitation facilities and services and residents' environmental sanitation awareness. These variables have no significant relationship with environmental sanitation behaviour. Besides, each of them is with R^2 change of 0.000 ($\Delta R^2 = .000$). As such, in the study area, access to environmental sanitation facilities and services and residents' environmental sanitation awareness do not determine of environmental sanitation behaviour.

The Regression Model 4 revealed that residential characteristics is almost significantly related to environmental sanitation behaviour ($r = .042$, $\rho=.066$). This level of relationship is responsible for the weak nature of residential characteristics such as place of residence and type of buildings as a determinant of environmental sanitation behaviour ($\Delta R^2 = .002$). However, to a reasonable extent, residential characteristics determine environmental sanitation behaviour in the study area. In addition, Regression Mode 5 revealed that Socioeconomic background are not significantly related with environmental sanitation behaviour ($r = .007$, $\rho=.396$). Thus, the results ($\Delta R^2 = .002$) of the regression model showed that Socioeconomic background of residents do not determine their environmental sanitation behaviour in Ibadan metropolis.

Based on this regression analysis, the regression equation is:

$$y = 36.090 + 10.773x_1 – 0.210x_2 – 0.214x_3 + 0.460\ x_4 - 0.81x_5 + \varepsilon$$

Where:

y = Environmental sanitation behaviour

x_1 = Agreement with environmental sanitation exercise

x_2 = Access to environmental sanitation facilities

x_3 = Environmental Sanitation awareness

x_4 = Residential characteristics

x_5 = Socioeconomic background

ε = Error term

Based on these regression models, it is revealed that the major determinant of environmental sanitation behaviour in residential areas of Ibadan metropolis is the mandated monthly environmental sanitation exercise. Thus, in the study area, the environmental sanitation behaviour of the residents is mainly determined by the mandatory environmental sanitation exercise while other factors proposed in the model (access to environmental sanitation facilities, environmental sanitation awareness, residential attributes, and socioeconomic background) contribute

insignificantly towards environmental sanitation behaviour in the residential areas of Ibadan metropolis, Nigeria.

6. Conclusion

Findings from the study revealed that residents' socioeconomic background, residential characteristics and access to environmental sanitation facilities and services are not strong predictors of environmental sanitation behaviour in Ibadan metropolis. However, the major determinant of residents' environmental sanitation behaviour in Ibadan metropolis was the mandated environmental sanitation exercise. Thus, environmental sanitation in Ibadan metropolis was mainly an exercise rather than a practice. It was law-driven, and government-initiated and motivated.

These findings have implications for practice and policy making. They also highlight the importance of environmental sanitation reorientation until it becomes a way of life. This is because despite the positive contributions of the monthly environmental sanitation exercise, the residents need to know the importance of daily environmental sanitation exercise (which is the practice), especially at the household and neighbourhood levels. The reorientation could be from the government, non-governmental organisations and community-based organisations. These efforts should also strengthen other identified factors of environmental sanitation behaviour in the metropolis, especially residents' access to environmental sanitation facilities and services.

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Ostateczne rozwiązania w ramach Wspólnej Polityki Rolnej w latach 2014-2020 – krok w kierunku zrównoważonego rozwoju czy biznes jak zazwyczaj?

Streszczenie

W niniejszym artykule zaprezentowano model środowiskowych zachowań sanitarnych w metropolii Ibadan w Nigerii. Aby przeanalizować czynniki wpływające na badane zachowania, dokonano doboru próby mieszkańców w dzielnicach mieszkalnych miasta. Zidentyfikowano następujące czynniki: warunki społeczno-ekonomiczne, cechy mieszkańców, dostęp do usług i urządzeń higieny środowiskowej oraz porozumienie co do ćwiczeń na rzecz higieny środowiskowej. Wyniki badań ukazały, że ćwiczenia związane z higieną środowiskową były istotnym i statystycznie znaczącym czynnikiem ((R2 = 0,971) oddziałującym na środowiskowe zachowania sanitarne w Ibadanie, natomiast pozostałe czynniki odgrywały znacznie mniejszą rolę z oddziaływaniem na poziomie 2,9%. Wyniki te sugerują, że higiena środowiskowa w Ibadanie to raczej rezultat ćwiczeń aniżeli systematycznej praktyki. Działania były wykonywane wskutek regulacji prawnych, a zatem inicjowane przez rząd. Implikacją badań dla sfery praktycznej i politycznej może być konieczność reorientacji higieny środowiskowej i wzmocnienia pozostałych czynników na nią oddziałujących.

***Słowa kluczowe**:* zachowanie prośrodowiskowe, higiena środowiskowa, warunki sanitarne, Ibadan, Nigeria, mieszkańcy.