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Establishing of Conceptual Model of Separation of Waste at the Source (SAS)

Syukrie Mohd Nasir[1*], Haryati Shafii[1], Azlina Md Yassin[1]

[1]Faculty of Technology Management and Business
Universiti Tun Hussein Onn Malaysia, Batu Pahat, MALAYSIA

*Corresponding Author

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Abstract: There is consensus that environmental issues are consequences of human activities and can be addressed by improvements in behavior. Separation of waste at the source (SAS) as mandated through Act 672 is a pro-environmental behavior (PEB) at the household level to reduce waste from being send to landfill and also an effective measure in reducing waste as a whole which will ultimately protect the environment from pollution. Based on the problem statement that lack of household knowledge on how to perform the separation of waste and holding environmental ethics that is not pro-environment will hinder household from performing such behavior, this article aims to establish a conceptual model of separation of waste at the source among households in Malaysia. The conceptual model proposed a modification to Value-Belief-Norm (VBN) model to predict SAS behavior with environmental ethics and specific waste separation knowledge as an adjustment and additional factors to the original model which could demonstrate the causal-effect relationship towards the behavior. The conceptual model proposed individuals with biocentric and ecocentric beliefs to be more likely to engage in SAS behavior than those with anthropocentric and technocentric beliefs. The conceptual model also proposed that individuals specific waste separation knowledge will moderate the relationship between personal norm and SAS behavior. It is expected that the conceptual model has a potential in helping researchers and stakeholders to better understand the underlying SAS behavior among households in Malaysia.

Keywords: Separation at source behavior, environmental ethics, specific knowledge, personal norm, VBN

1. Introduction

In recent years, awareness of the vulnerability of the environment is increasing and the need to protect it against the effects of human activities that have deteriorated the environment has been recognized. There is consensus that environmental problems are consequences of human behavior and can be solved through behavioral changes. Accordingly, altering waste behavior in a responsible way is vital because it can reduce environmental pollution. Malaysia as a developing economy is also facing environmental problems and unsystematic domestic waste disposal has been identified as one of the contributors to environmental pollution in the country. The recycling rate in Malaysia was only 5% which is relatively low compared to other neighboring countries (Abas & Wee, 2014). Preliminary studies have also shown that less than 5% of waste is separated and recycled, although the amount of recyclable waste is large (Omran et. al., 2009; Periathamby et. al., 2009). These results indicate practices and behaviors towards reduction of waste are still low to date. Hence, to address this problem, the Malaysian government has mandated the separation of solid waste at the source (SAS) starting from September 2015. The implementation of SAS among household is based on the Regulations under the Act 672 (Solid Waste Management and Public Cleansing Act 2007). The implementation of SAS includes the states that have adopted Act 672, namely the WP Putrajaya, Federal Territory of Kuala Lumpur, Johor, Pahang, Melaka,

*Corresponding author: syukriemohdnasir@gmail.com

Negeri Sembilan, Kedah and Perlis. Through the implementation of Act 672, it is mandatory for households to sort waste and failure to do so will result to penalties being taken against them. However, based on recent findings by Ogiri et. al. (2019), deterrence mechanism through the implementation of such regulation only explains 25% of compliance behavior. Furthermore, it is too early to evaluate the effectiveness of such regulation since it was only introduced in 2015 and it is hard to generalized the result to whole country since not all states in the country are adhere to the Act. Since the success of SAS program is highly dependent on the general public acceptance and practice of such behavior, it is very important to investigate why some people do separate their waste and some other do not. Many households in Malaysia are still unwilling to participate (Moh & Manaf, 2017). Promoting such behavior is expected to reduce overall waste generation and preventing recyclable waste from being sent to landfill.

2. Problem Statement

The behavior of a person who deliberately tries to mitigate and minimize the adverse environmental effect is referred to as pro-environmental behavior (PEB) (Kollmuss & Agyeman, 2002). Accordingly, efforts to reduce waste through SAS among households can be categorized as one of the PEB. Past studies on PEB that particularly focusing on waste have been done through various fields. However, according to Ma and Hipel (2016), through the systematic review that has been done on journal articles that have been published between 1980 and 2014, when compared to the factors of technical aspects like infrastructure and waste management facilities, social and psychological dimensions did not get enough attention from researchers. Hence, to bridge the gap on why households do not separate their waste, the article aims to identify the psychological factors that influence such behavior and further develop a conceptual model to explain the relationship.

With regards to psychological factors influencing PEB, Valliere and Manning (1980) have found that an empirical treatment of environmental ethics has been lacking. In this regard, researches (e.g., Light, 2002; Rolston, 2012) besides focusing their discussion on the theory itself, began to focus on how theories of environmental ethics can be accepted and can provide a positive influence within societies. In addition, past studies have shown that individual may behave differently depending on the environmental ethics that individual beliefs. According to Kopnina (2017), individuals who adhere to ecocentric environmental ethics are more likely to preserve the environment. The result is also consistent with a preliminary study conducted by Thompson and Barton (1994) who found that individuals with ecocentric environmental ethics are more likely to commit PEB than individuals with anthropocentric environmental ethics beliefs. Recent study by García and Sanz (2018) suggested that individuals within societies must adhere to correct ethical orientation to ensure sustainability of the environment. Therefore, in establishing a conceptual model, it is crucial to investigate the possibility of linking environmental ethic approach to PEB particularly on SAS among households.

Besides environmental ethics as the predictor for PEB, the role of knowledge has also been studied in recent years. Liao and Li (2019); Desa et. al. (2011) found that knowledge is a good predictor in determining waste segregation behavior in line with the findings by Johannson (2016) and de Vega et. al., (2008) that specific knowledge of recycling behavior has a significant influence on recycling behavior because without adequate knowledge of how to recycle, one will not know how to do it. Specific knowledge of the types of recyclable waste, how waste segregation should be done, proper use of recycling bins is essential. The same view is also shared by Kaplowitz (2009) that in the delivery of information about recycling, clear instructions on what, how and where should be given the main focus. Accordingly, specific knowledge on waste separation is included into the conceptual model of SAS behavior.

3. Literature Review and Hypothesis Development

3.1 VBN Model

The theoretical framework in the field of human sociology and human psychology continues to be used in research to construct a relationship between different psychological factors and environmentally sound behaviors. Schwartz (1977) proposed Norm Activation Model (NAM) to explain pro environmental behaviors. NAM explains altruistic behavior with the idea that moral or personal norms influences pro social behavior. NAM explains that social norms are transform into personal norms via education and communication. Individuals that have internalized personal norms will act in environmentally friendly way. Recently, one of the most likely theoretical models in describing this relationship is the theory of Value-Belief-Norm (VBN) proposed by Stern et. al., (1999) based on the norm activation model (NAM), the basic theory of values and the new environmental paradigm (NEP) (Schwartz et. al., 1981; Stern and Dietz, 1994; Dunlap et. al., 1978). The theory proposed individual internal value influences beliefs and further activated norms that will eventually influences environmentally sound behavior. Past empirical research has repeatedly proven the strength of the VBN variables as indicators of pro-environmental behavior. As such, VBN has been considered valid and reliable to investigate the causal link between environmentally sound behaviors, beliefs, attitudes and values. VBN proposed individual egoistic values and environmental beliefs are negatively related. On the other hand, individual altruistic and biospheric values are positively related to environmental beliefs (NEP). Ecological worldview is a predictor for the factors of awareness of the problem that influences the ascription of responsibility. The ascription of responsibility will influence individual personal norms that will ultimately shape individual's behavior towards the environment.

3.1.1 Personal Norm in VBN Model

Schwartz (1977) defined personal norm as "a subtype of attitudinal variable, i.e., evaluations of act in terms of their moral worth to the self". According to this definition, personal norms are complied with for internal reasons, consistent with internalized values and norms. Turaga, Howarth, & Borsuk (2010) explained that, individual differ in their relative importance to particular values and general norms, hence, the activation of individual's personal norms would give rise to different moral consideration in different individual with regards to the same situation. With regards to PEB, a study by Zhang et. al. (2019) has identified personal norm as the key factor influencing intentions of Chinese residents towards waste separation behavior. A similar finding was found by Geiger et. al. (2019) where behavior-specific factors like personal norms towards recycling is better to predict recycling than general factors. Similarly, Zhang et. al. (2020) has found that personal norm was a major predictor of residents' waste classification intention. In another PEB like purchasing, Song et. al. (2019) found that the relationship between environmental concern, perceived consumer effectiveness and buying energy efficient appliances behavior was mediated by personal norm. With regards to PEB intention, Kim and Kim (2018) discovered that personal norms played a critical role in shaping the pro-environmental intentions of respondents. Therefore, a proposed hypothesis for households' personal norm towards SAS behavior can be made:

H1: Households personal norm positively related to SAS behavior.

3.2 Environmental Ethics

Since 1970, due to the increase in knowledge and awareness that human beings ought to have moral responsibility for nature, the area of environmental ethics has begun to grow. This new development in environmental ethics was based on the general notion that ethical values at that time regarding environmental resource exploitation (mostly anthropocentric) were no longer reasonable (McShane, 2009). It is important to consider how moral intuitions can be made to resonate with values related to the preservation of the natural world in order to encourage environmentalism (Markowitz & Shariff, 2012). In the meantime, environmental ethicists have addressed the basic principles, concepts and implications of human moral responsibilities to non-human nature extensively, proposing numerous concepts of 'environmental ethic' with the premise that if we follow such an environmental ethic, we would then indulge in less environmentally destructive behaviors (Leopold, 1949; Rolston, 1988). Yang (2006) states that environmental ethics provides ethical justification by systematically identifying the values given to the environment (including living and non-living beings). Environmental ethics also provides a guideline on how we should act (or what our responsibilities are) towards the environment according to the values we have given to the environment. According to Holden (2019), environmental ethics extends the principles of ethics by not only limiting it within the scope of human relations but extending it to the world other than human beings. This statement is in line with Randall (2013) opinion on the ethical tendency of the environmental ethics to take into consideration aspects of wilderness, species, natural processes and the status of human and non-human moral life as a whole. Therefore, this paper highlighted four dimension of environmental ethics that have been extensively highlighted and discussed in the field.

3.2.1 Anthropocentric

According to Thompson and Barton (1994), anthropocentric views only humans have intrinsic value and there are no direct moral obligations to the environment to protect the environment. From the angle of ethical theory, anthropocentric are utilitarian in the sense that nature is valued because of what it can contribute to the fulfilment of human requirements and interest; therefore because of its value in sustaining the quality of life for humans, it should be preserved and protected. According to Neumeyer (2003), the focus of anthropocentric is on sustaining human well-being and maximizing social welfare throughout time while Taylor (1981) stated that anthropocentric also gives greater value to human beings than to non-human beings; it is almost always justified to defend human interests at the expense of non-human interests. Anthropocentric people are responsible for ecosystems however, they depend on the fact that the treatment of ecosystems provides certain human benefits.

3.2.2 Technocentric

Technocentric can be view as similar to anthropocentric (Warren, 1994). Technocentric view humankind are separated from the natural world, the decision-making process is anthropocentric and based on economic implications, and economic development and technological progress can resolve problems resulting from environmental degradation (Gladwin et. al., 1995). Some scholar described technocentric view human being as master of nature and nature must be protected through modern technology (O'Riordan, 1981; Bailey & Wilson, 2009). Intergenerational responsibility is met by continued growth and technological advancement (Whyte & Lamberton, 2020). More seriously, renewable resources depletion, increased pollution, and inequality are linked as the inevitable consequences of technocentric (Gladwin et. at.,1995; Martin & Schouten, 2011).

3.2.3 Biocentric

Biocentric construes human beings are not naturally superior than other living creatures. Non-human creatures and human life have equal and inherent worth, that is, they are intrinsically valuable. Biocentric ethics can be described as theory that ascribes moral norms and intrinsic value to life, including plants and animals (Rolston, 1988). Humans and non-human beings need to be respected and have the right to their own wellbeing in their own way (Palmer, 1997; Taylor, 2011). Taylor (2011) further states, for humans to form behaviors that show they respect the environment, they must acknowledge that plants and animals (individually) in nature have intrinsic value. While anthropocentric can sometimes lead to pro-environmental attitudes and actions, biocentric is more reliably and robustly related to environmentalism, both for abstract values and for concrete behaviors (e.g., Thompson & Barton, 1994; Schultz et al., 2005; Steg et al., 2005; de Groot & Steg, 2008). Anthropocentric belief advocates the protection of natural environment as a means to an end, rather than an end in itself. Biocentric, on the other hand, treats the environment regardless of its effect on human prosperity as a moral duty.

3.2.4 Ecocentric

Some of the leading forms of environmental ethics claim that our moral emphasis should be on ecological collectives rather than individual organisms, e.g., land or the ecosystems. Leopold's idea, especially his essay "The Land Ethic" (Leopold, 1949), has been highly influential towards this belief. Leopold expands the moral domain beyond the human community to also include the biotic community: "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants and animals, or collectively, the land". Leopold famously defends a land ethic in which "thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise". Ecocentrism which is rooted in ecology advocates the protection of the ecological health of the ecosystems as a whole. In other words, moral consideration is extended to the entire ecosystem rather than to an individual entity. Instead of being in charge or superior of it, people with ecocentric beliefs see themselves as part of nature and assume moral obligation for it, concentrating on how to preserve and protect its ecological stability and integrity. In addition, individuals who adhere to ecocentric (non-anthropocentric) beliefs are more likely to preserve the environment (Kopnina, 2017). This finding is also in accordance with a preliminary study by Thompson and Barton (1994) who found that individuals with these beliefs are more likely to commit pro-environmental behaviors than individuals with anthropocentric beliefs. Therefore, based on the four dimensions of environmental ethics, and based on how individuals with specific environmental ethics behave towards environment or PEB, four hypotheses for households' environmental ethics towards SAS behavior can be made:

H2: Biocentric positively related to SAS behavior.
H3: Ecocentric positively related to SAS behavior.
H4: Anthropocentric negatively related to SAS behavior.
H5: Technocentric negatively related to SAS behavior.

Although the direct relation between value and behavior can be established (Steg et. al.,2005), Stern (2000) in earlier study has suggested that those relations can become stronger in the presence of other mediating variables, such as personal norm (Nordlund & Garvil, 2003). Past studies have shown that biospheric values as a significant predictor of personal norms (De Groot & Steg, 2007; Fornara et. al., 2016). Nordlund and Garvill (2003) found that there were positive and direct effects of self-transcendence values and ecocentrism on the personal norm to reduce personal car usage. However, Lauper et. al. (2016) found that egoistic values negatively influence personal norm. In relation to the field of environmental ethics, according to Goldman et. al., (2020), egoistic and human altruism values reflect anthropocentric ethics, while in biospheric, the moral concern of environment is independent of services it provides for humans, reflecting ecocentric and biocentric orientation. Therefore, the mediation effect of personal norm linking environmental ethics to SAS can be hypothesized as:

H6: Biocentric positively related to personal norm; personal norm mediates the relation between biocentric and SAS behavior.
H7: Ecocentric positively related to personal norm; personal norm mediates the relation between ecocentric and SAS behaviour.
H8: Anthropocentric negatively related to personal norm; personal norm mediates the relation between anthropocentric and SAS behavior.
H9: Technocentric negatively related to personal norm; personal norm mediates the relation between technocentric and SAS behavior.

3.3 Specific Knowledge on SAS

Waste separation activity is a systematic separation into defined categories of solid waste. Waste separation should be carried out at the site by the waste producer. In a case study done at private hospital in Kenya (Maina, 2018), clear instructions and guidelines influenced the practice of waste separation among staff at the hospital. This is in line with (Fishbein & Ajzen, 2010; Ajzen, 2015) that people will not perform the behavior correctly if they do not have enough knowledge or skills. Árnadóttir et. al. (2019) has conducted a study on student waste separation behavior in cafeteria. They have tried to improve knowledge on waste separation by placing information triangle on every table in the cafeteria as an intervention to encourage the separation behavior. However, since the information triangles were not read by those students, the intervention did not improve the behavior. Another study by Zakianis and Djaja (2017) done in Indonesia have found that 90% of the respondents stated that they have good waste management knowledge but still the waste separation rate is low (9%). Therefore, in order to explain the contradiction findings of previous studies, the conceptual model suggests specific waste separation knowledge as having moderating effects rather than direct effects on SAS. Hence, the moderating effect of specific waste knowledge into the relationship between personal norm and SAS can be investigated. The following hypothesis can be made:

H10: The positive relationship between personal norm and SAS will be stronger when the specific knowledge on waste separation is high.

4. Conceptual Model of SAS Behavior

The original VBN theory suggests that individual values drive beliefs and, in turn, form norms that directly motivate pro-environmental behavior. **Fig.1** illustrated the conceptual model of SAS behavior. Independent variables consist of four dimensions of environmental ethics: anthropocentric, technocentric, biocentric and ecocentric which are hypothesized to have direct relationship to personal norm. Personal norm is proposed as a mediating variable, mediating the relationship of all four environmental ethics to SAS behavior. Specific waste separation knowledge is proposed as a moderator variable which moderates the relationship between personal norm and SAS behavior.

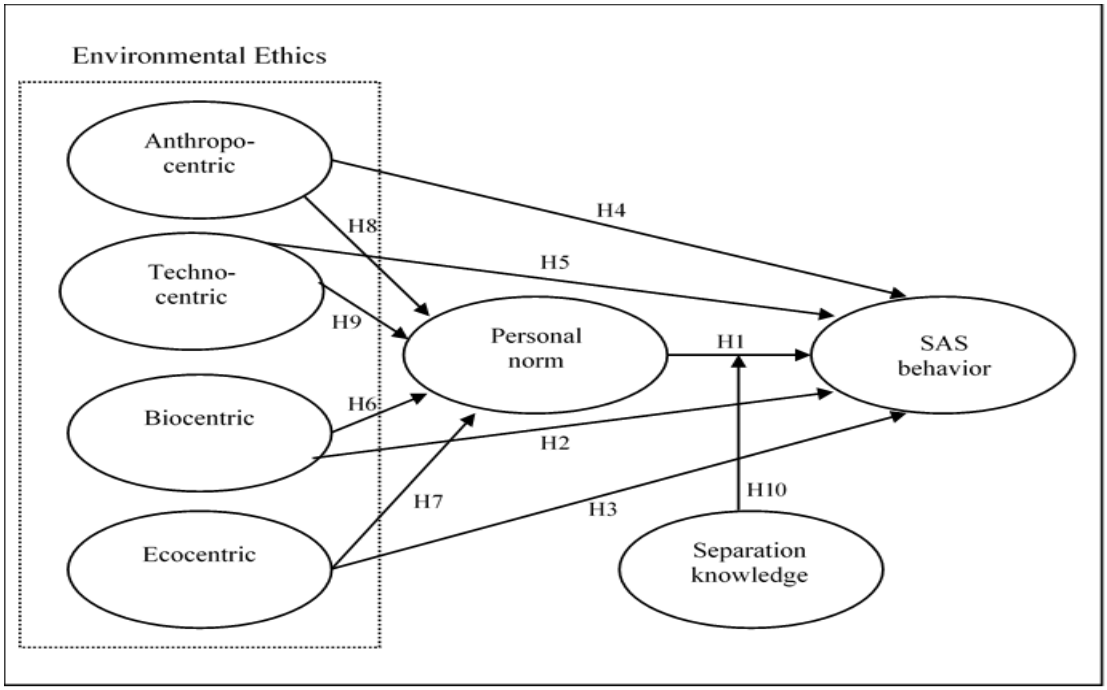

Fig. 1 - Conceptual model of SAS behavior

5. Discussion and Conclusion

Firstly, the conceptual model was developed based on the Value Belief Norm (VBN) Theory by Stern et. al., (1999) as the main underpinning theory. VBN theory proposed individual internal value influences beliefs and further activated norms that will eventually influences environmentally sound behavior. Besides values and beliefs, past studies have shown that individual may behave differently depending on the environmental ethics that they beliefs. Hence, the conceptual model suggests that individuals with biocentric and ecocentric beliefs to be more likely to perform SAS behaviors as opposed to anthropocentric and technocentric beliefs. The conceptual model also suggests that the four

dimensions of environmental ethics (anthropocentric, technocentric, biocentric and ecocentric) are predictors towards individual personal norm, which upon activation, will lead to pro-environmental behavior specifically SAS behavior. In other words, the conceptual model suggests the mediating role of individual personal norm in order to get households to engage in SAS behavior. Secondly, the conceptual model highlights the importance of specific waste separation knowledge as a moderator towards the relationship between personal norm and SAS behavior, with an assumption that, the relationship between personal norm and SAS behavior will be stronger if individual is more knowledgeable on how to separate waste correctly. It is also important to acknowledge that the specific waste separation knowledge and SAS behavior must be in accordance with the SAS guideline provided by National Solid Waste Management Department under the Ministry of Housing and Local Government of Malaysia. As a conclusion, the conceptual model served as a basis to better understand the roles of psychological and knowledge towards SAS behaviors among households. It also open new opportunities for future research in understanding the underlying SAS behavior in the country.

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