

## **DOES ENVIRONMENTAL KNOWLEDGE MODERATE THE RELATIONSHIP BETWEEN HOUSEHOLD DETERMINANTS' INTENTION TO PRACTICE SOLID WASTE SEGREGATION-AT-SOURCE? A CONCEPTUAL PAPER**

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### **ABSTRACT**

Previous research has reported that environmental knowledge plays an important role in enhancing general pro-environmental behaviour, as environmental knowledge appears to be the key indicator for increasing awareness of several pollution promulgations and other natural environmental issues. However, the significant role of environmental knowledge in the intention of households to practise solid waste segregation-at-source is not well understood. This research will, therefore, investigate the influence of environmental knowledge on the intention of households to engage in solid waste segregation-at-source. Further analysis will also be carried out to explore the moderating effect of environmental knowledge in the relationship between the households' attitude and subjective norm (i.e. descriptive norm and injunctive norm) with the intention to practise solid waste segregation-at-source. The findings of this current research are expected to provide an essential opportunity to investigate knowledge gaps, to contribute to the enrichment of existing literature, as well as to provide important insights for local households and Malaysian government agencies to strengthen the sense of responsibility for environmental cleanliness.

**Keywords:** Attitude; descriptive norm; injunctive norm; environmental knowledge; intention; solid waste segregation-at-source.

### **INTRODUCTION**

The amount of solid waste generated has always been seen as a global challenge [1]. Waste materials can be categorised according to their different properties, quality, and components. In Malaysia, paper, aluminium, e-waste, plastic, metal, glass, and other recyclables will be first sorted at the point of generation of waste. They are then collected in separate containers, which in turn improve the recycling rate and ensure the efficiency of disposal at household level [2]. Besides that, unscientific and inadequate municipal solid waste practices have led to low environmental quality problems in Malaysia [3-4]. The use of open ground storage or unsightly makeshift containers may impair the city's beautiful image and cause visual pollution [5]. Visual pollution is an aesthetic concern. People who have a high esthetic value in contact with the environment can significantly increase the overall well-being of individuals [6] and vice versa,

since preferences and perceptions of the visual environment are segments of what makes the environment psychologically comfortable.

Generally, as of 30<sup>th</sup> September 2019, there were 142 waste disposal sites under the responsibility of Malaysian local authorities, of which 19 out of 142 solid waste landfill sites were classified as sanitary landfill sites, 119 of which were classified as non-sanitary landfill sites, while the remaining 4 were classified as inert landfill sites. Surprisingly, Sarawak (43) has been recorded as the state with the most non-sanitary landfill sites. It was followed by Sabah (21) and Perak (15) but there are no municipal landfill sites in the Federal Territory of Kuala Lumpur and the Federal Territory of Putrajaya [7]. This current scenario thus drew the attention of local authorities to take serious action to solve the problems of solid waste in this country.

This research aims to explore and fill the gap in existing literature by treating environmental knowledge as a moderating variable between attitude, descriptive norm, injunctive norm, and the intention to practise solid waste segregation-at-source. General research has reported that environmental knowledge plays an important role in improving environmentally friendly behaviour [8] among a group of people. Consumers should therefore be given the opportunity to gain sufficient environmental knowledge through either formal or informal education [9], as environmental knowledge appears to be the key indicator [10] for increasing their awareness of a number of pollution issues and other environmental issues [8]. However, the important role of environmental knowledge in the environmental impact of human industrial production is not well understood [11]. This specific phenomenon tends to cause most people to fail to act in an environmentally responsible manner [12]. This is because they are sensitive enough about the environmental issues that have occurred around them. As a result, many households appeared to underestimate the extent of critical environmental problems [13].

Drawing from the above, the subsequent section outlines the link between the variables studied and the dependent variable, i.e. the intention to practise solid waste segregation-at-source based on the aim of this paper.

## **LITERATURE REVIEW**

### **Intention to Practice Solid Waste Segregation-at-Source**

Current research has used the intention to practise solid waste segregation-at-source as a dependent variable. According to Charuvichaipong and Sajor [14], the intention to practise solid waste segregation-at-source is defined as a tendency to perform a repeat and typical action of separating unwanted material or matter efficiently into different elements according to their recycling potential systematically. More specifically, this is the term used to indicate the extent to which targeted respondents who are likely to carry out waste sorting activities in the required fractions in place of waste products before the disposal process takes place.

In terms of pro-environmental research, taking into account trends in solid waste management in Malaysia, the concept of recycling and solid waste segregation-at-source has only recently been introduced [15]. There is therefore still a lack of useful and relevant information in this specific field of research, particularly in the local context. This situation can be seen from most of the previous research which focusses solely on recycling [16], sustainable development [1, 17-19], and sustainable food products buying intention [20]. In addition to that, despite the implementation and planning of transformative recycling and solid waste segregation-at-source strategies, there are still many challenges to achieving the recycling and solid waste segregation-

at-source objective in order to meet the national recycling target of 22 per cent by 2020 [15]. By realising scarce knowledge and research in this field, this current research provides an essential opportunity to explore the gaps in knowledge and its literature.

### **The Influence of Attitude on Intention to Practice Solid Waste Segregation-at-Source**

Generally, based on Kotler and Armstrong [21] as well as Madden, Ellen, and Ajzen [22], an attitude refers to the degree of unfavourable or favourable appraisal, tendency, evaluation, and feeling of a person with respect to an idea or object. This is due to the Rosenberg [23]'s model of attitude which shows that a person has a negative or positive judgement of an object or idea because of the perceived values that she or he attaches to certain items which, in turn, give rise to her or his cognitive expectations as to the ability of objects or ideas. As a result, the present research predicts that the perceived negative value with respect to the perception of the low value of a product can lead to an unfavourable attitude towards that particular product [24-26] or vice versa. Ideally, if a consumer feels that the value of a product is lower, he or she is likely to have a more unfavourable attitude towards, or generate a lower level of comfort from, that particular product.

Human behavioural intention is closely linked to the level of a person's unfavourable and favourable perception [27]. There is a social dilemma in Australia where there is an environmental attitude problem between green consumers and non-green consumers [28] with regard to their green purchasing intentions. According to Jauhari and Manaktola [29], most people in the National Capital Region of India are likely to return to housing that implements environmental practices due to their positive environmentally friendly experiences, including energy conservation, solid waste reduction-at-source, product-life extension, and pollution prevention. Accordingly, the present research predicts that a more favourable attitude of the household will lead to a higher intention to practise solid waste segregation-at-source.

### **The Relationship between Descriptive Norm and Intention to Practice Solid Waste Segregation-at-Source**

The descriptive norm can be seen as a decision-making shortcut [30] or a social heuristic cue that functions through motivation [31] in a given context. Shealy et al. [31] further explained that heuristics have cognitive elements to attract the attention of decision-makers to their intended behaviour through the norm. Accordingly, the descriptive norm indicates which action is most effective and adaptive in a particular situation [32]. Usually, most people will do whatever the majority of the social group does, because they believe that they can be accepted and approval by a typical, common, and "normal" action. Accordingly, this current research predicts that the intention of households to perform solid waste segregation-at-source is influenced by their common observation of what most others practice in their homes every day. If a household thinks that most of its neighbours are segregating their domestic solid waste, the household is more likely to segregate their domestic solid waste.

In previous environmental and social psychological research, the descriptive norm was applied to the examination of the intention to recycle [33-35], recycling behaviour [36], water conservation [37], littering [32, 38-39], saving energy [40-41], and towel reuse in a hotel setting [41-42]. This section therefore extends the research to provide some useful insights into the relationship between the descriptive norm and other similar areas of research that help academicians to establish a new reference point.

### **The Relationship between Injunctive Norm and Intention to Practice Solid Waste Segregation-at-Source**

The notion of an injunctive norm is based on extrinsic social pressure [43]. This situation is due to the injunctive norm, which always presents the social expectations within one's referent groups or of an important individual, including "people they trust" or "other people who are important to them" [44]. Taken together, in the context of the present research, the researcher can conceptualise the injunctive norm as one of the extrinsic normative factors commonly disapproval or approval for the intention to practise solid waste segregation-at-source among the local households.

Unfortunately, in Czajkowski, Zagorska, and Hanley [45]'s field experiment, they argued that the injunctive norm does not have an impact on the recycling behavioural intention in the Netherlands. Interestingly, Neighbors, O'Connor, Lewis, Chawla, Lee, and Fossos [46] are in the same vein as Czajkowski et al. [45]. In their research on alcohol consumption among 811 American college students, it was shown that the injunctive norm with alcohol drinking behaviour was insignificant. The current researcher therefore predicts that the injunctive norm is a complex concept and that these complexities therefore warrant important and significant consideration in the development of intervention strategies for other socially prohibited behaviours, including, loitering around the city at night, cheating on examinations, stealing from shops, ignoring parental prohibitions, getting drunk, and smoking marijuana.

### **The Relationship between Environmental Knowledge and Intention to Practice Solid Waste Segregation-at-Source**

The current researcher obtains several definitions of environmental knowledge from previous literature published in recent years. For example, Berkes, Folke, and Colding [47] have defined the general environmental knowledge as the cumulative body of a person's knowledge of the independence between the natural environment and human society. This conceptualisation is similar to that of Fryxell and Lo [48], which interpreted the phrase "environmental knowledge" as a type of general knowledge that focusses on the relationship, fact, and concept of the natural environment and the ecosystem. Mostafa [49] further argued that environmental knowledge also includes people's understanding of key relationships that could have consequences for the natural environment. Accordingly, Zsoka, Szerenyi, Szechy, and Kocsis [50] urged people to achieve a certain level of awareness and knowledge on various environmental issues so that possible solutions can be taken immediately to address these current environmental issues and avoid potential future ones [51-53].

Environmental knowledge is one of the psychological factors that has been widely used in existing literature to determine pro-environmental behaviour [54]. However, the explanatory link between environmental knowledge and pro-environmental behaviour has been questioned in the previous literature [13, 55]. More specifically, the link between environmental knowledge and ecological behaviour has been shown to be significant but relatively weak [56]. Due to the circumstances, Paco and Lavrador [57] explained that the increase in knowledge, which merely emphasises the pro-environmental domain, has not always been successfully translated into actual pro-environmental behaviour [58-59], although a large amount of environmental knowledge has increased dramatically over the last decades. As a result, the present researcher suggests that while improving the knowledge of the individual is crucial to increasing the concern for environmental destruction and, in turn, to get to know what actions can be taken to minimise

these consequences, it is much better to let them realise the importance of the natural environment and, subsequently, to engage actively in the conservation and preservation of the environment.

### **The Moderating Effect of Environmental Knowledge on the Relationship between Attitude and Intention to Practice Solid Waste Segregation-at-Source**

To date, there is no existing research that can be verified between attitude, environmental knowledge, and the intention to practise solid waste segregation-at-source. However, positive relationships between these key variables have been successfully recognised in various fields of research [60-63].

In terms of transport mode choices, Flamm [60] looked at the relationship between attitude and environmental knowledge on vehicle ownership and use among 4000 households in Sacramento, which is located in the California metropolitan area. This research has shown that environmental knowledge plays a significant role in shaping the positive environmental attitude of households, which in turn tends to influence their ownership of fuel-efficient vehicles. For example, people with high environmental knowledge of climate change may change their attitudes which, in turn, change their vehicle buying behaviour by purchasing a low emission private car or reducing their car usage in daily routine [64] and therefore consuming less petrol as a non-renewable energy. Meanwhile, another group of researchers [65-66] stressed that households need to understand the causes and consequences of greenhouse gas emissions in order to make them more enjoyable and positive about changing their consumption behaviour towards sustainability, particularly in high-income countries, including Australia, North America, and Europe [67]. Furthermore, with regard to the education and delivery of relevant pro-environmental messages to citizens, Liao [68] carried out a cabin safety education programme for primary school students in Taiwan, which aimed to reveal the 616 students' attitude, knowledge as well as behavioural intention with regards to the cabin safety were positively and significantly enhanced after receiving the relevant safety education. As a result, the current researcher assumes that increasing environmental knowledge will help shape the favourable attitude and enhance the intention of households to practise solid waste segregation-at-source.

### **The Moderating Effect of Environmental Knowledge on the Relationship between Descriptive Norm and Intention to Practice Solid Waste Segregation-at-Source**

Here is the same concern as in the previous section. To the best of the researcher's knowledge, there is no existing literature that focusses primarily on how environmental knowledge influences the descriptive norm towards the intention to practise solid waste segregation-at-source. It remains unclear, therefore, whether the descriptive norm towards environmental knowledge is related to Selangor households' intention to practise solid waste segregation-at-source. This current research was thus intended to explore this unknown idea by discovering the interrelationships between the variables studied.

It is interesting to note that there is a common assumption that the majority of people are not willing to be consciously frustrated about the natural environment and therefore to take intentional pro-environmentally action [69-70]. As such, Frick et al. [56] argued that environmental knowledge was commonly emphasised as a prerequisite for volitional action. This situation shows that, although environmental knowledge has somehow been perceived as a necessary factor, it is simply not enough to influence a group of people to act in a pro-environmental manner [13].

Meanwhile, past empirical research has shown that the descriptive norm has a significant influence on people's important referents to conduct "appropriate" behaviour within a specific environmental [43]. It also perceived the importance of nature-based environmental education, which involves the learning process of environmental knowledge with the introduction of an intrinsic factor, namely descriptive norm, to act as a holistic method to enhance the ecological behaviour of the nation [59]. Accordingly, the present researcher takes this idea further, suggesting that the moderating effect of environmental knowledge has a significant and positive impact on the relationship between the descriptive norm and the intention to practise solid waste segregation-at-source.

### **The Moderating Effect of Environmental Knowledge on the Relationship between Injunctive Norm and Intention to Practice Solid Waste Segregation-at-Source**

Environmental knowledge is theorised to have both an indirect and a direct effect on the general pro-environmental behaviour of the respondents [71-73]. Previous researchers in the field of environmental psychology have urged future research to focus on specific pro-environmental activities instead of aggregated variables to predict individuals' general eco-friendly behaviours [74-75]. Unfortunately, the role of environmental knowledge as a moderator on the link between the injunctive norm and the intention to practise solid waste segregation-at-source has not yet been discussed in any previous research. As a result, this current research projected to broaden the researchers' understanding of the specific interrelationships between these studied variables.

The essence of environmental knowledge relies heavily on nature-based environmental education provided by institutions that emphasise the introduction of environmental knowledge in respect of the ecosystem, fauna, and flora through a physical link with the environmental [59]. Furthermore, the present researcher assumes that the generalisation of environmental knowledge within the local community is a prerequisite for ensuring that certain pro-environmental policies are accepted and effectively implemented. The participation rate among the local community is vital to be considered in the context of national environmental management and policy [76]. This situation highlights the importance of sharing relevant environmental knowledge among members of the local community in order to provide broad support for public decisions [77]. Following this line of reasoning, in order to gain a sense of belonging and avoid sanctions, the local community will see the commonly practised behaviour as a socially approved decision, as it produces a certain amount of social pressure recognised by the other members of the community. Accordingly, in the context of this current research, the present research suggests that effective and appropriate communication tools should be developed to convey relevant messages to encourage residents to perform the solid waste segregation-at-source and to catalyse their concerns about the importance of protecting the finite natural environment.

## **CONCLUSIONS**

This current research was designed to further exploring the interrelationships between attitude, descriptive norm, injunctive norm, environmental knowledge, and the intention to practise solid waste segregation-at-source. The availability of existing literature of the studied variables in the context of current research scope are limited and rare. Hence, the present research

provides a significant platform to investigate knowledge gaps which in turn to contribute to the enrichment of existing literature. As a result, the present research is expected to provide important insights for general interests, including local households and Malaysian government agencies to strengthen the sense of responsibility for environmental cleanliness.

This current research could develop a medium for households to learn more about the policy of solid waste segregation by receiving relative information through this research. It is very important that the citizen is empowered be a knowledgeable citizen, especially with regard to the correct and systematic handling and management of their daily domestic solid waste [78]. The researcher expects that they will therefore be able to further improve their capabilities, which, in turn, will enable them to protect the natural environment for the sake of current and future generations.

Last but not least, current research could be valuable for Malaysian governmental agencies to develop a favourable policy implementation framework to address recent solid waste issues in the country. The current researcher expects respondents to feel motivated to cultivate their intention to practise solid waste segregation-at-source if they are given some gifts and rewards. As a result, current research could provide guidance to the relevant Malaysian governmental bodies, in particular the National Solid Waste Management Department, Solid Waste Management and Public Cleansing Corporation, Malaysian Ministry of Energy, Science, Technology, Environment and Climate Change, and Malaysian Ministry of Housing and Local Government, to consider this circumstance in their future policy implementation.

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