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Usage of Bioplastic Bags to Resolve Littering and Household Waste Disposal for Environment Preservation and Sustainable Community

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Abstract

In suburban and rural Malaysia, littering and household waste disposal have been perennial issues. Communities geographically distanced from the metro areas do not have proper waste disposal facilities or awareness of bioplastic bag usage. Most of the practices of household waste disposals are through open burning or throwing the trash in nearby rivers and canals. Thus, the study assessed the public's awareness of using bioplastics to resolve the littering and disposal of household waste. Interviews with community heads and a replicated, simple survey for descriptive statistics formed the methodology. The results showed that 31.8% of respondents admitted to public littering, while 90.8% deliberately littered in public places. With limited enforcement from the local and relevant authorities, the communities will continue the negative attitude without knowing the environmental and public health implications. Malaysia's communities must continuously be aware of the consequences of littering and irresponsible waste disposal. The impact of these attitudes will result in the degradation of the environment and public health. Curbing bad habits from littering will reflect the civil society leading towards sustainable communities and increasing socio-economic wellbeing and quality of life.

Keywords: Bioplastic, Waste Disposal, Environment Preservation, Sustainable Community

Introduction

Wastes of all kinds increase in tandem with the population boom. Based on the media report on Malaysia's waste collection data, there has been a significant increase in waste generation in recent years. In 2018, about 36,843 tons of waste were generated daily, and the numbers keep increasing in 2019 (37,462 tons); 2020 (38,081 tons); 2021 (38,699 tons);

and 2022 (39,936 tons) respectively (Bernama, 2022). The waste is expected to be increased by the end of this year due to recycling practices that have yet to become a norm in this country. Even though the government has done many campaigns like 3Rs -reduce, reuse, recycle- the public's awareness is still low (Song et al., 2016; Papargyropoulou et al., 2014).

Regarding the recycling rate, Malaysia is lagging at 31.52 percent in 2021, compared to other developed countries, which is over 60 percent (Bernama, 2022). The rating may be improved if Malaysian educate themselves on the impact of waste disposal. The time has come to implement bioplastic bags to reduce the increased waste mass in Malaysia.

Thus, the paper aims to share the findings from a study that assessed the public's awareness of using biodegradable or bioplastic bags to resolve littering and responsible household waste disposal. Emphasis on the awareness of bioplastic bags for waste disposal and other uses was also examined and elucidated with the inherent outcome of the residents' contributions to environmental preservation and transformation into a sustainable community.

Literature Review

The literature review consisted of the elucidations to support the research objectives on the usage and awareness of bioplastic bags, sustainable community, the public's littering literacy, and household waste management and disposal, culminating with previous research projects on similar issues.

Bioplastics Awareness and Usage

Malaysians use 300 plastic bags annually, as reported by the Malaysian Plastics Manufacturers Association (Soon, 2021). In other words, a Malaysian uses eight plastic bags per week, making plastic bags the most discarded waste in the country (Jamain, 2021). As a result, 19,000 tonnes of solid waste are produced yearly, of which a quarter is plastic [ibid]. With that concern, in 2021, the authorities introduced the No Plastic Bag Day campaign in selected supermarkets every Saturday to encourage people to reduce plastic bag usage [ibid]. However, the campaign was a minor success in metro areas as the more significant part of the country's society was not fully aware of the environmental consequences of irresponsible plastic littering (Jamain, 2021). The continuity of regular campaigns and commitment from the local authorities will create awareness of the harm created by plastic waste and will transform the mindset for changes towards environmental preservation.

Furthermore, as posited by Afroz et al (2017), people who are more informed on the awareness and consequences of littering will have a more positive attitude toward recycling. Issues with plastic pollution are experienced everywhere in the world, including in Pakistan. The exponential increase in plastic consumption has compelled the Pakistani government to ban the use of non-biodegradable plastics (Ali et al., 2021). The recommendation proposed by Ali et al (2021) is for government authorities should incorporate carbon taxes and subsidize the sustainable development sector.

Plastic bags contain a harmful chemical, Styrene, carcinogenic, Phthalates, and Bisphenol A [9]; that is, when used for packing hot food, the migration of Styrene will cause

diabetes and heart and liver diseases (ibid). Thus, the use of non-plastic or bioplastic bags must be championed by the relevant stakeholders and community leaders.

Nonetheless, bioplastics have been introduced to replace the damaging environmental effects. Bioplastic is defined as bio-based plastic that is biodegradable (Filho et al., 2022). Filho's (ibid) research project encompassed 42 countries where the respondents' perceptions of the use of bioplastics were collected. The consumer behavior and attitude toward bioplastic use were mixed with feedback indicating a shortage of bioplastics and reluctance to purchase expensive biodegradable bags. To reiterate, Malaysia's bioplastic awareness and usage should be encouraged. Using eco-friendly packaging products will result in zero-waste plastic.

The Sustainable Community

The sustainability community can be described as a blend of people, environmental, social, lifestyle, and economic (Atkinson, 1996). It is completed with the meaning of one's that meets the needs of everyone in the community while protecting and limiting environmental damage (Flint, 2012). These integrate regions, cities, towns, and rural areas without abandoning the land, water, air, and natural and cultural resources. Residential areas, transportation, plantations, factories, and commercial buildings should be adequately managed to sustain a good environment and economy (Papargyropoulou et al., 2014; Ojedokun et al., 2022).

Moreover, to develop a sustainable community, environmental awareness in minimizing the consumption of fossil fuels, greenhouse gas emissions, water resources, and pollution is crucial. In addition, concerns should be given on how to dispose of waste, regardless of the type. With numerous annual reports from reliable sources, the time has come for the population to be more diligent with all aspects of waste disposal to ensure that the next generation can enjoy the natural wonders of mother earth. The continuity and cooperative efforts in managing household garbage will evoke for a sustainable community.

Littering Literacy

Littering happens in many public areas like sidewalks, parking lots, streets, waterways, and beaches (Tjell, 2010; Ahmad, 2021) It can have many adverse effects like contaminating soil and water quality, harming animal health, killing wildlife, and flooding disasters, and it has an inestimably adverse effect on every part of the world's ecosystem (Ojedokun et al., 2022; Ojedokun, 2011). According to Ahmad (2021), litter has the potential to cause harm to human health, safety, welfare, as well as the environment. Also, garbage disposal impacts the environment and lives on earth (Asmui et al., 2021). Human behaviors appeared to be the main contributor to this littering attitude. Al-Khatib et al (2019) argue that people tend to litter due to the absence of nearby litter bins and discover that men litter more than women. Harris (1995); Asmui et al (2021), also supported that people tend to throw garbage because there is no garbage bin nearby. Kopaei et al (2021) explored the factors that influence home composting intention and identified the moderating role of composting knowledge in the model, using the combined model of the theory of planned behavior (TPB) and norm activation model (N.A.M.). The findings showed that attitude, subjective norm, and perceived behavior control could predict the intention to compost. Therefore, waste littering prevention is likely to be the most effective method of tackling the litter problem (Al-Khatib et al., 2019);

for instance, providing facilities such as litter bins, better placement, and design of litter bins, and employing more staff for frequent street sweeping (Ojedokun, 2011; Asmui et al., 2021).

Awareness and campaign activities on littering are also seen as effective ways to reduce littering attitudes among the public (Asmui et al., 2021). Chan et al (2022), effectively suggest waste management's concept and practical implementation, particularly in plastic containers. Among the suggestions are sustainability practices courses and micro-credential courses at higher education institutions. In addition, Puji (2019), suggested innovation in the form of plastic waste product management as an alternative to solving the environmental pollution issue. Another alternative for successful waste disposal is waste separation at source and utilization. A circular economy is applied in terms of recycled materials and organic waste, increasing direct and indirect labor hiring in recycling businesses and related businesses (Janprasert et al., 2021).

Household waste management and disposal

Proper waste disposal management (WSM) has been implemented in most developed and developing countries despite the unsatisfactory outcome due to rapid urbanization, poor resource allocation, lack of awareness, poor coordination, and inappropriate technologies (Dangi, 2009). Consequently, environmental pollution and human health status worsen and indirectly result in the country's poor economy (Aweng et al., 2014; Bharadwaj et al., 2021).

In most urban areas, littering appears to be one of the main factors contributing to pollution (Tjell, 2010; Chaudhary et al., 2021). More recently, Zhou et al (2022), studied household waste management in two megacities, Singapore and Shanghai, regarding management strategies, environmental effects, economic costs, and social outcomes. The research reveals that the waste management system in Singapore had a relatively lower environmental impact than in Shanghai before Shanghai's new waste segregation and recycling policy in 2019.

In contrast, a study conducted in China's rural areas revealed no waste classification program in most rural areas (Hu et al., 2022). There is a significant positive correlation between residents' willingness to classify and their willingness to put waste in a designated place. The level of education, income, and environmental awareness of rural residents have a significant positive impact on waste disposal willingness, whereas age has a negative impact. In Rizal, the Philippines, the household's knowledge, attitude, and practice, and the family's income showed significance concerning effective solid waste management (Arnold et al., 2022). The other significant demographics were the household size and educational attainment. While in Butuan City, Philippines, very high SWM knowledge (3.80) and attitude (4.52) were attributed to high educational attainment and income. Most respondents practice waste segregation, reusing, recycling, and composting. However, insufficient knowledge of the location, functionality, and utilization of the materials recovery facilities are among the challenges (Cando III, 2022).

On the other hand, a study conducted in Panji, located in Kota Bahru, Malaysia, discovered that food debris (74.3 %) and plastic materials (18.3%) were disposed of as waste. The study also showed that 50.3% of the households segregate their waste while 49.7% did

not. Ironically, about 95.9% of the respondents knew that improper waste management leads to diseases such as diarrhea and malaria (Fadhullah et al., 2022).

Research on household waste management and disposal.

Many research projects have been conducted to study household waste management regardless of locations, rural, suburban, and metro areas. Previous studies have shown that the common practice of waste disposal in rural and remote areas is by burying and burning waste due to the inaccessibility of collecting the waste in narrow lanes and alleys (Saat et al., 2018)]. On the other hand, for urban or semi-urban areas, stationary waste storage containers are mainly provided on the main road's sides (Fadhullah et al., 2022). Sometimes, wastes are illegally dumped into rivers and canals or used to fill land depressions without proper consultation. These practices cause many problems in the long run. These can range from the degradation of the soil quality to leaching toxic chemicals into underground water sources. Therefore, to prevent such scenarios, proper waste disposal methods should be adopted.

Methodology

The research project was conducted from UiTM Cawangan Selangor, Puncak Alam, Selangor, Malaysia. An online survey link was sent to the researchers' multiple WhatsApp groups of residential areas to which they belonged. The Google Form is the instrument used. The language used in the online survey was simple statements in Bahasa Melayu. The findings were then translated into English. The sample size was 400 respondents through convenience sampling within one week. 195 (48.75%) responses were tabulated and analyzed for descriptive statistics. The feedback was imported to the NVivo software for coding and thematic analysis. The survey consisted of three parts: littering literacy, attitude towards household waste disposal, and awareness of environmental preservation. The last part of the form elicited other opinions and feedback on waste management from the respondents. The NVivo software analyzed the qualitative responses. The conceptual framework for the research project is shown in Figure 1.

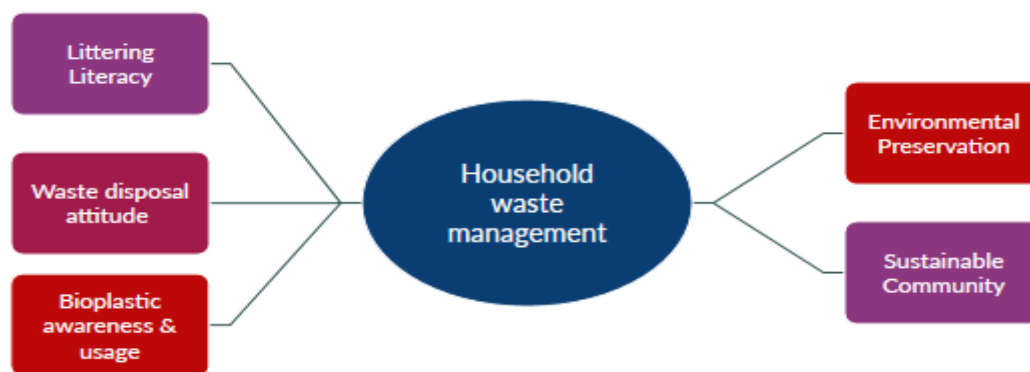


Figure 1. Conceptual framework

Findings

The online survey elicited 195 responses, 48.8%. The demographic results are shown in Table 1, where 80.7% of the respondents were female compared to 19.3% male. For the age range, the highest number of respondents was between 19-30 years at 94.8%. Meanwhile,

71.3% of the respondents have undergraduate degrees, 16.5% with diplomas, and 10.8% with master's degrees.

Table 1
Respondents' demographics.

	Frequency	Percentage
Gender: Male	37	19.3
Female	155	80.7
Age: 19-30 years	184	94.8
31-40 years	7	3.6
41-50 years	1	0.5
51 years and above	1	0.5
Qualification:		
High school (Form 5/SPM)	2	1
Diploma	32	16.5
Undergraduate	139	71.3
Master	21	10.8
Others	1	0.5

Moving on, the first objective was to assess the littering literacy of the respondents. From the three questions, 97.5% know that littering is not beneficial. Thus 31.8% admitted to littering, and 9.2% deliberately threw litter in public places.

Table 2
Littering Literacy Results.

	Frequency	Percentage
Have you littered in public places?		
Yes	37	19.3
No	155	80.7
If yes, did you deliberate throw litter in public places?		
Yes	18	9.2
No	177	90.8
Do you think that littering is beneficial?		
Yes	5	2.6
No	190	97.4

The second objective assessed the attitude towards waste disposal. In this context, wastes include household rubbish or garbage. The responses elicited 94.3% of respondents witnessing trash being thrown indiscriminately (Table 3).

Table 3

Attitude Results

Question	Yes	No
Have you witnessed people throwing household garbage indiscriminately?	94.3%	5.7%

There were seven comments to the attitude question, as shown in Table 4.

Table 4

Some comments on attitude towards household garbage disposal

Comments	Frequency	Percentage
I will pick up the litter and throw it in the trash bin	141	72.3
I will tell off the offender	62	31.8
Let it be (do not do anything)	45	23.1

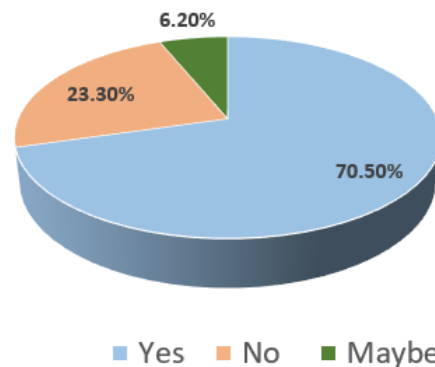


Figure 2. Awareness of availability of bioplastic bags

From Figure 2, 70.5% of the respondents are aware of bioplastic bags, while 23.3% did not. Only 6.2% were unaware of the presence of bioplastic bags. The following section concludes the findings capped with the implications of the research project.

Conclusion

The findings revealed evidence that littering is a serious issue that needs to be tackled by the relevant stakeholders and policymakers. Although the respondents were educated, as seen from their qualifications, the attitude toward littering and disposing of household wastes occurs in public places and their respective homes. There is a need for urgent action by the local authorities to continuously educate residents and instill awareness of having a clean environment. Keeping the areas free from rubbish and trash reflects a civil society and a hygienic personality. Neighborhoods should work together to ensure the residential areas are kept clean, as this will thwart prevailing diseases such as dengue and the ongoing fight against COVID-19. The sustainable community is still far off the goal, but the target is likely to be achieved with inputs like this.

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