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Exploring Undergraduates' Perspectives on Environmental Awareness and Sustainability Challenges

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Abstract
Plastic pollution is a critical global issue, and this study examines undergraduates' awareness and willingness to act against it using the Theory of Planned Behaviour (TPB). The research, focusing on a Malaysian university, found that students were aware of plastic pollution's environmental impact and supported the university's sustainability efforts. However, stronger institutional measures are needed to reduce single-use plastics and promote eco-friendly alternatives, aligning with SDGs 13, 14, and 15. Universities play a key role in fostering sustainable practices among students.

Keywords: environmental awareness; plastic pollution; SDG; single-use plastics

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1.0 Introduction

Pollution remains one of the most neglected issues in the modern world, with various forms ranging from air to water and land pollution causing irreversible harm to the planet and its inhabitants. The consequences are evident in the rise of diseases, the extinction of wildlife, and the intensification of climate change, which negatively impact economic growth and exacerbate poverty and inequality, especially among marginalised communities. According to Gancar et al. (2023), harmful environmental impacts are caused not only by overconsumption of natural resources, increased waste generation, and the exploitation of wildlife and ecosystems, but also by environmentally irresponsible behaviour such as littering. Among pollutants, plastic waste stands out due to its persistence in the environment. Plastics do not biodegrade; instead, they break down into microplastics that infiltrate food chains and pose significant risks to both marine and terrestrial life.

Statistics highlight the severity of plastic pollution on marine life: a young whale in the Philippines died after ingesting 40 kilograms of plastic bags (Borunda, 2019). Studies have found marine plastic pollution in 100% of marine turtles, 59% of whales, 36% of seals, and 40% of seabird species. Each year, plastic pollution kills an estimated 100,000 marine mammals and turtles and 1 million seabirds.

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Microplastics have even been detected in remote regions and inside human organs, such as the lungs, liver, spleen, and kidneys (Blakely, 2020). These findings underscore the urgent need for collective action to address plastic pollution.

Every piece of plastic waste we discard into the environment eventually finds its way back to us. Microplastics have penetrated every stage of the food chain, and we humans, sitting right at the top, will not be spared. It is time we get our acts together to stop this from worsening, for if we, as a world community, fail to fight microplastics successfully, there will be consequences for both humans and other forms of life on land and in the ocean. Despite widespread discussion of environmental issues, questions remain about the effectiveness of current interventions, particularly within academic institutions, which are ideal settings for fostering sustainable practices among young intellectuals. Malaysia, in particular, has been slow to adopt proactive environmental measures (Md Yusop et al., 2023). This study seeks to assess Malaysian university undergraduates' awareness and willingness to address the dangers of single-use plastics and determine whether they are prepared to make the necessary lifestyle changes.

This two-stage micro-level study focuses on, first, identifying the most pressing environmental issues that undergraduates believe humans can tackle. Secondly, it determines how undergraduates are willing to support university-led efforts to reduce plastic pollution on campus. Finally, it explores the steps undergraduates are prepared to initiate themselves to address plastic pollution.

2.0 Literature Review

Microplastics, resulting from the mishandling of plastic waste and increased plastic production, pose significant health and environmental risks. Primary microplastics, intentionally manufactured for products like toothpaste and facial cleansers, are prevalent in consumer goods. Over 93% of liquid skin-cleansing products in the EU, Switzerland, and Norway contain microplastics, with 6% of these products using them. While plastics offer durability, lightweight characteristics, and cost-effective manufacturing (Mikula et al., 2021), additives in plastics can leach toxic chemicals, causing respiratory and other health issues (Ramasamy & Palanisamy, 2021).

Despite the evident dangers posed by plastic waste, Malaysia faces challenges in separating and recycling waste, with a low ratio of plastic manufacturing to recycling. This is largely due to the higher costs associated with recycling compared to purchasing newly manufactured plastics (Chen, Nath, & Chong, 2021). Moreover, inconsistent policy implementation by state governments, coupled with low public awareness and a lack of interest in household recycling, exacerbates the issue. Consequently, a large amount of solid waste ends up in landfills.

2.1 University Initiatives and Student Engagement

Universities are pivotal in promoting sustainable practices. Various studies highlight the importance of engaging undergraduates in campus plastic waste management initiatives. For instance, research at Lakehead University in Canada explored students' awareness and behaviours regarding plastic use. The findings indicated that while many students recognised the harmful effects of plastic pollution, they lacked adequate knowledge of effective disposal methods. However, the majority expressed a willingness to reduce plastic consumption if the university implemented better initiatives, such as enhanced recycling facilities and awareness campaigns (Auld & Wang, 2020).

Instilling environmental responsibility in younger generations is crucial, and universities are recognised as pivotal environments for fostering sustainable practices. Often described as "quasi-cities" due to their size and diversity, universities can significantly influence environmental outcomes and serve as catalysts for broader societal change (Adeniran, Nubi, & Adelopo, 2017). Globally, many universities have adopted various waste management strategies. For instance, Shenyang University in China improved its solid waste management by introducing clearly marked recycling bins and integrating environmental education into campus life (Geng et al., 2013). In Nigeria, institutions like the University of Lagos are advancing toward zero-waste goals through policies that minimise waste generation and by providing affordable recycling bags to the campus community (Adeniran et al., 2017).

In Malaysia, universities play an active role in reducing solid waste, particularly single-use plastics, in support of national environmental initiatives. For instance, a study at Universiti Utara Malaysia (UUM) found that although students were generally aware of the hazards of plastic pollution, their understanding of recycling practices remained limited, even though most plastics used by students are recyclable (Nasir & Lamsali, 2017). Another significant initiative took place at Universiti Teknologi MARA, where the "Towards Single-Use Plastic Free Cafeteria on Campus" campaign was launched in 2019 to raise awareness and reduce single-use plastic consumption. This project also aimed to develop adaptable Standard Operating Procedures (SOPs) for cafeteria operators to help curb plastic use on campus (Dass et al., 2022).

Such proactive efforts underscore the importance of raising awareness and implementing effective strategies to address single-use plastics in university settings. By promoting recycling and sustainable practices, universities can make substantial contributions to reducing plastic waste and fostering environmentally friendly campus environments. The influential role of academic institutions in shaping sustainable waste management behaviours and promoting environmental stewardship among students is undeniable.

2.2 Willingness of Students to Address Plastic Pollution

Recent research highlights that university students can act as catalysts for environmental change, particularly in addressing plastic pollution. Studies indicate that students are increasingly willing to reduce single-use plastics, a shift largely attributed to greater awareness of the environmental consequences associated with plastic waste (Wahid, Purnamasari, & Fauzi, 2020; Abramson, 2008). Many express concern over the adverse impacts of plastic pollution on ecosystems, marine life, and human health, with this heightened awareness often motivating personal action to minimise plastic use (Omar, Quoquab, & Mohammad, 2019).

Several factors influence students' willingness to address plastic pollution. Environmental education and awareness campaigns are particularly effective in shaping attitudes and behaviours, equipping students with crucial information about the impacts of single-use

plastics and encouraging the adoption of sustainable alternatives (Nasir & Lamsali, 2017; Soberi et al., 2021). Waste education and targeted awareness strategies are also vital for promoting effective solid waste management

Social norms and peer influence further play a significant role; students are more likely to adopt eco-friendly behaviours, such as using reusable bottles or bags, when these practices are observed among their peers (Hasan, Harun, & Hock, 2015). Moreover, the convenience and accessibility of sustainable alternatives are important determinants of student engagement. The availability of water refill stations, accessible recycling facilities, and affordable reusable products can greatly facilitate the transition away from single-use plastics (Cutts, Anderson, & Watson, 2018).

2.3 Conceptual model: Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is a widely used framework for understanding and predicting individual behaviours, especially in environmental contexts (Yuriev et al., 2020). TPB identifies three key factors influencing behaviour: attitudes (personal beliefs about the outcomes and value of a behaviour), subjective norms (perceived social pressures or expectations), and perceived behavioural control (an individual's belief in their capability to perform the behaviour given available resources and obstacles) (Fan, Yang, & Shen, 2019). In the context of reducing single-use plastics, attitudes involve beliefs about environmental impact and personal responsibility, subjective norms reflect the influence of peers and social expectations, and perceived behavioural control relates to the ease or difficulty of adopting sustainable practices.

Empirical studies support the relevance of TPB in explaining plastic consumption behaviours. For instance, attitudes were found to be the primary driver of intentions to reduce plastic use (Van et al., 2021), while TPB has also been applied to understand intentions regarding plastic waste sorting (Kaffashi & Shamsudin, 2019). Within university settings, subjective norms and perceived behavioural control help explain students' engagement in plastic waste management (Khan et al., 2020; Fan et al., 2019). Research at Universiti Putra Malaysia confirmed significant positive relationships among environmental knowledge, attitudes, subjective norms, and perceived behavioural control in reducing plastic use (Hasan, Harun, & Hock, 2015). Additionally, TPB-based interventions, such as online pledges and reminders, have been shown to effectively reduce plastic consumption among university students in the USA (Truelove et al., 2023).

However, willingness to reduce single-use plastics may vary across cultural and individual contexts, suggesting the need for further research to identify specific influencing factors and develop effective strategies to promote sustainable behaviours among diverse student populations.

3.0 Methodology

The methodology employed in this study is the use of two sets of survey questionnaires. The first set of questionnaires was designed to address Research Objective 1: determine the most pressing environmental issue participants could help tackle from their own perspective. It consisted of 2 sections: 5 demographic questions in Section A and 25 in Section B. It was distributed via an online survey to undergraduate students at a public university in Malaysia. Within two months, 214 usable questionnaires were received. The second set of questionnaires consisted of 13 questions. The purpose of this questionnaire was to determine how university undergraduates are willing to support the university's efforts to reduce plastic pollution on campus, as well as how they are willing to initiate efforts to overcome the issue of plastic pollution on campus. It was distributed among 500 undergraduate students of the Faculty of Computer Science and Mathematics (FSKM) and the Faculty of Architecture, Planning and Surveying (FSPU). Finally, 412 questionnaires were usable. This second set of questionnaires was distributed after a one-week campaign held at the university to create awareness of the dangers of single-use plastics. The data gathered from the 2 sets of questionnaires were then analysed using SPSS 26 to answer the research objectives using descriptive data analysis. As the study was aimed at undergraduate students of one public university in Malaysia, the findings cannot be generalised beyond that university.

4.0 Findings and Discussion

This section presents the study's findings based on the three objectives. This section addresses Research Objective 1, which is to identify the most pressing environmental issues that individuals can tackle from the perspective of university undergraduates. Based on environmental reports and past literature, a list of major environmental issues was identified and presented to the undergraduates, as shown in Table 1. Descriptive analysis was conducted using the mean. This objective addresses two parts: first, the pressing environmental issue; and second, the ability to tackle it.

Table 1: Descriptive statistics of environmental issues

Item	Environmental Issues	Mean	Standard Deviation
1	Lack of 3R	7.88	2.448
2	Food	7.38	2.502
3	Plastic	7.64	2.342
4	Energy	7.52	2.420
5	Non-plastic	7.48	2.353
6	Water	7.40	2.184
7	Land	7.19	2.396
8	Noise	7.09	2.152
9	Air	6.90	2.455
10	Warming	6.72	2.265
11	Deforestation	6.71	2.549

Data gathered from the first set of questionnaires was analysed, and the findings were tabulated in Table 1. Based on the mean, undergraduates' most pressing issue was the environmental threat posed by plastic waste. Global warming and food issues, including food waste and disposal, followed. The findings indicate that participants were both aware of the dangers to the environment posed by plastic waste and recognised that it is a major pressing environmental issue facing the earth, compared to other major issues such as global warming or climate change.

A very important point to note here is their awareness that plastic pollution is a concern, which further indicates their realisation that individuals, including themselves, have major roles to play in addressing this most pressing environmental issue. These findings align with studies by Wahid, Purnamasari, and Fauzi (2020) and Abramson (2008), which found that university students were increasingly motivated to reduce single-use plastics due to heightened awareness of their environmental impact.

The second part of research objective 1 is the ability to tackle this pressing issue. Based on the same list of environmental issues identified, the respondents were quizzed on their ability to handle them. Descriptive statistics in Table 2 reveal that undergraduates believed the lack of 3R (reduce, reuse & recycle) practices for plastic was the easiest environmental issue to address. This could be due to 3R Campaigns, which have been active in Malaysia for more than 10 years. This was followed by food waste and disposal, which are closely related to this environmental issue.

Table 2**:** Descriptive statistics of the ability to handle environmental issues

Item	Environmental Issues	Mean	Standard Deviation
1	Lack of 3R	6.81	2.396
2	Food	6.64	2.411
3	Plastic	6.56	2.543
4	Energy	6.47	2.385
5	Non-plastic	6.43	2.181
6	Water	6.15	2.141
7	Land	6.06	2.228
8	Noise	5.97	2.325
9	Air	5.86	2.269
10	Warming	5.81	2.295
11	Deforestation	5.75	2.361

In summary, these findings address research objective 2, which is to determine undergraduates' willingness to support the university's efforts to reduce plastic pollution on campus.

Table 3**:** Descriptive statistics showing undergraduates' willingness to support the environmental campaign

Item	Ways to support efforts undertaken by the university	Mean	Sum	Percentage (%)
1	Had my meals at the café when I did not bring my own containers	.61	251	61
2	Encouraged my friends to have meals at the café when they did not bring their own containers	.35	145	35
3	Brought my own food/beverage containers	.33	138	33
4	Encouraged my friends to bring their own food/beverage	.19	80	19
5	containers	.05	22	5
	Other ways			

Based on the study, four options for supporting the environmental campaign were given to the undergraduates. Interestingly, the majority (61%) of them had their meals at the café when they did not bring their containers. Participants' awareness of the dangers of plastic pollution has prompted them to support the university's efforts to tackle it, mainly by having meals at the café when they did not bring their own containers, and then encouraging others to do the same. This highlights the important role played by environmental education and awareness initiatives in shaping undergraduates' attitudes and behaviours (Nasir & Lamsali, 2017; Soberi, Yusuf & Mohd Shazali, 2021).

A smaller percentage of participants also made efforts to bring their own food and beverage containers,s followed by those who encouraged friends to bring their own as well. This finding is supported by studies conducted at other universities, which indicate undergraduates' growing awareness of the environmental consequences of plastic pollution and their desire to take steps to combat it (Wahid, Purnamasari & Fauzi, 2020; Abramson, 2008).

This section addresses research objective 3, which is to determine the ways in which undergraduates are willing to contribute to overcoming plastic pollution on campus. Table 4 shows their willingness to use less plastic when packing food, and, as a result, they compromised by eating at the cafeteria.

Table 4: Descriptive statistics showing undergraduates' willingness to contribute towards overcoming the environmental issues

Item	Ways to contribute towards overcoming plastic pollution on campus	Mean	Sum	Percentage (%)
1	Eat at the cafeteria	.75	302	75
2	Bring your own container	.38	153	38
3	Pay extra for paper containers	.25	100	25
4	Other ways	.02	8	2

Once the undergraduates who supported the environmental campaign were identified, we went on to determine how they would initiate their efforts to address plastic pollution on campus. A majority (75%) of them felt that reducing plastic waste could be achieved by eating at the cafeteria. Hence, they felt this was the best way to support the campaign. This finding is consistent with the literature, which shows that increased awareness often leads to a desire to take action by reducing personal plastic use (Omar, Quoquab & Mohammad, 2019).

In terms of bringing their containers, it is quite disheartening to note that only a small percentage (38%) saw the importance of this method of eating to reduce plastic pollution. This could be because most undergraduates were away from home and did not have containers to bring to campus. These findings align with studies showing that students were willing to switch to more sustainable alternatives when they were more readily available (Cutts, Anderson & Watson, 2018). This is followed by an even smaller percentage (25%) of undergraduates who were willing to pay extra for paper containers.

Overall, although many studies clearly show that students have a heightened awareness and sense of responsibility towards the environment, as well as a willingness to reduce their own consumption (Omar, Quoquab & Mohammad, 2019), the university also plays an important role. The findings of the study underscore the importance of universities in initiating environmental stewardship among their students, as research indicates they are drivers of change (Adeniran, Nubi, & Adelopo, 2017). The findings also indicate that undergraduates possess a high level of awareness regarding the dangers of plastic pollution and are generally willing to support and initiate actions to reduce it. This aligns with previous research highlighting the role of environmental education and social influence in shaping sustainable behaviours (Wahid, Purnamasari, & Fauzi, 2020; Nasir & Lamsali, 2017).

5.0 Conclusion and Recommendations

This case study of undergraduates at a Malaysian public university yields three major conclusions. First, the primary environmental concern was excessive plastic consumption and insufficient adoption of the 3R (Reduce, Reuse, Recycle) principle. Second, students preferred dining in cafeterias to takeaway meals when reusable containers were unavailable, indicating a willingness to reduce plastic use. Third, individual behavioural shifts, such as choosing cafeteria dining over packed food, underscored proactive engagement in sustainability efforts.

The findings reveal that participants were well-informed about plastic pollution's environmental impact and were ready to support both institutional and personal mitigation measures. This aligns with global trends in students' environmental awareness. Universities worldwide should capitalise on this receptiveness by implementing supportive policies and partnerships with local authorities to facilitate a transition away from single-use plastics.

Universities must provide accessible, affordable, eco-friendly alternatives alongside awareness campaigns to enable sustainable practices. While this study employed descriptive analysis, its relevance to SDGs 13 (Climate Action), 14 (Life Below Water), and 15 (Life on Land) underscores its significance.

As a single-institution case study, these findings are context-specific. Future research should expand to multiple universities with larger samples to enhance generalisability. Advanced analytical methods, such as Partial Least Squares (PLS) modelling, could further explore determinants of environmental attitudes and behaviours among Malaysians.

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Paper Contribution to the Related Field of Study

This study contributes to the discourse on plastic pollution by examining its alignment with the Sustainable Development Goals (SDGs) and exploring university students' perceptions of the issue. Additionally, it helps students mitigate plastic waste through sustainable practices.

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