

## Analyzing Urban Communities Level of Environmental Awareness for a Future Sustainable Use of Plastic Packaging



Nur Muthi'ah Rezkiyanti Ridwan<sup>1</sup>, Evi Frimawaty<sup>2\*</sup>, Herdis Herdiansyah<sup>3</sup>

School of Environmental Science Programme, Universitas Indonesia, Jakarta Pusat 10430, Indonesia

Corresponding Author Email: [evi.frimawaty11@ui.ac.id](mailto:evi.frimawaty11@ui.ac.id)

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### ABSTRACT

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For the last decades, problems have occurred due to the increased plastic used as packaging for various products. Plastic may be considered profitable for the company for their products because it is easy to use and has a low price which is economically beneficial for the company. However, problems may arise due to its nature of being hard to break, the material making it difficult to decompose, causing piles of plastic waste. Therefore, this research aims to determine the level of environmental awareness in individuals. We aim from the human perspective since humans are the subject of plastic users in daily life, as we access the level of knowledge, attitude, and behavior towards plastic use. We used a quantitative research method and distributed questionnaires to 268 respondents. Distributed frequency analysis was done using SPSS, and we categorized the total scores of each variable into two groups. Then, we composite the three variables to determine the level of environmental awareness. Results show that based on respondent's knowledge, attitude, and behavior towards plastic use, the majority of respondents, about 55.6% have good environmental awareness, whereas the other 44.4% have poor environmental awareness. This result indicates that the respondents already have formed their awareness, which may be beneficial in forming their pro-environmental behavior in future daily life, therefore aiming for future sustainable behavior of plastic use, especially plastic for packaging.

## 1. INTRODUCTION

Developments in the food industry in various countries since the 1970s have transformed people's behavior, significantly increasing consumption of processed and takeaway food, including in Asia. It is influenced by various factors, namely economic growth, urbanization, and globalization, that encourage easy access to food [1]. The increase in demand for food products supported by technological developments encourages innovation in food industries, thus creating various types of new innovation in food and beverage products. One of the main elements of a food product is its packaging. Food products are susceptible to deterioration caused by many reasons, such as heat, light, humidity, and microorganisms [2]. Therefore, packaging in food products plays a vital role in protecting products from contamination and damage.

Furthermore, according to Williams et al. [3], packaging also acts in assisting in product handling, provides product information for consumers, and attracts consumers. However, lately, the packaging of food products has received attention from the public due to its negative impact on the environment, especially food products with plastic-based packaging [4]. Plastic is known as a material widely used for food product packaging for its characteristics such as transparency, water resistance, flexibility to turn into many shapes of packaging, and it is cheaper than any other material. The problem arises when its durability turns out to be unfavorable to the environment, where plastic packaging decomposing will not

happen in the environment anytime less than years later; thus, it only accumulates [5]. Although alternatives such as reusable packaging have been widely campaigned in recent years [6], the use of single-use plastic is still commonly found in food packaging, resulting in millions of tons of its waste polluting oceans every year [7]. Therefore, based on these results, we need to find a better solution.

Data from the Indonesian Ministry of Environment and Forestry showed that out of 10 million plastic consumption in 2017, 49% were from packaging industries, wherein 70% of the packaging is used in the food industries. Kurniawan et al. [8] state that the problem of accumulated single-use plastic in the environment is fully contributed by human use as the volume would continue to increase as long as they do not minimize plastic use. They argue that people may already learn that plastic is a concern that needs attention from all stakeholders. Yet, increasing awareness and initiating people to take action may need more evidence. From the customer's perspective, using single-use plastic is more convenient because it is already provided at the store rather than bringing reusable plastic packaging [9]. Customers reason that carrying reusable bags is not as practical as using plastic already available in stores which is light, affordable, and has various shapes and sizes. Further studies showed that households are one of the contributors to single-use plastic in the environment, where the household's list of single-use plastic waste includes plastic bags, plastic wraps, beverage product cups and straws, cutlery, and takeout food containers [10]. The research found that household residents could take up to ten plastic bags

weekly [11]. Based on these findings, we can conclude that this single-use plastic waste problem may occur due to the high amount of human daily use of plastic; thus, we need to find a proper solution using an approach from the human perspective.

Undoubtedly, residents in urban areas tend to use more plastic bags than the residents in rural areas [12]. Tasseron et al. [13] argues that residents' lifestyle in urban areas is one of the primary sources of plastic pollution in the environment compared to rural areas. Studies have found that the concentration of plastic debris in river flow in urban areas has increased compared to the concentration of plastic in rivers from rural areas [14]. Water streams from urban areas can be a pathway for plastic waste movement, which eventually ends up in the vast seas [15]. The study found plastic debris, almost 92% of the total waste collected from water streams in urban areas, eventually ends in a marine ecosystem [16]. From the facts above, we could imply that residents in urban areas dominate single-use plastic usage, which would cause microplastics pollution in marine ecosystems. Therefore it is essential to conduct a study on community behavior focused on the community in urban environments.

A recent study proved that awareness about the importance of the environment could rectify human behavior towards sustainable behavior. Chen et al. [17] state that environmental awareness is a concern and understanding of an individual regarding environmental issues and their impact. Study show that individuals' environmental awareness might encourage change in their behavior [18]. However, increasing environmental awareness among consumers might come as a hindrance, as lack of knowledge might be a common factor. According to Moshood et al. [19], several customers recognize plastic-based food packaging as disadvantageous to the environment compared to paper or metal-based food packaging. They discovered that all factors, such as environmental knowledge and concern, attitudes, and hedonic aspects, are all the triggering characteristics for changing their behavior to banning plastic use in their daily life. This results are supported by a research who found that individuals with a deep understanding of the impact of plastic on the environment tend to behave environmentally friendly, for example, limiting their use of single-use plastic [20]. Hence, it is crucial to educate the individual about the environment from their early age to increase environmental awareness in the community [21].

However, the problem occurs when even though there is positive and high awareness in students about environmental issues, formal education still lacks in the practical section. The research found that even though students have good knowledge and awareness about the environment, it would be difficult for students to apply their knowledge into good-practice because the habit is not formed correctly from the beginning [22]. At the end, people might have a good knowledge of the issue but are not accustomed to practicing this knowledge in their daily activities. For that, the knowledge formed since their early age might becoming a waste if not showing through their pro-environmental behavior.

However, Jaiswal and Singh [23], in their study, state that consumers with environmental knowledge are not significantly linked to their behavior about using environmentally friendly products. According to Sun et al. [24], other factors that would have affected consumers using plastic bags are attitudes, subjective norms, individual behavior control, and accessibility. Variables such as their

attitudes towards the environment would influence them to adopt a pro-environmental behavior as it is defined as an evaluative tendency for an individual to be acquired, and it can influence their belief, feelings, and behavior openly [25]. Knowledge may be essential but not significantly affect behavior change in a person. However, it plays a crucial role in gradually shaping individual attitudes and behavior. This theory is supported by Carlos et al. [26], who found that knowledge will be the driving force for the formation of one's attitudes and judgments which can change one's behavior eventually. Environmental attitudes are one of the vital driving factors along with the knowledge that could shape one's behavior. Therefore, analyzing a person's knowledge and attitude could be done to study their behavior.

According to Ajzen and Fishbein [27], individual's belief based on their knowledge would form their attitude, which in turn could directly affect their behavior. Although there are no definite methods to assess an individual's environmental awareness, in general, the variables of knowledge, attitude, and behavior are used as reference factors to determine how well environmental awareness has been formed in a person. Charitou et al. [28] state in their study that pro-environmental behavior is developed through knowledge of the issues and attitude to the issues, thus raising their awareness to behave in more pro-environmental behavior.

To the best of our knowledge, studies about knowledge, attitude, and behavior have never been conducted at our research location. Malaka Sari urban village is one of the urban villages in DKI Jakarta province with a government program called Waste Bank. The waste bank program is a Community-Based environment action program from the Indonesian Government to reduce waste with a bank-like system, where people collect waste and can equally exchange it into cash. This program needs to be supported by community participation so it can run effectively. For this reason, we assessed the community in the area, particularly regarding plastic waste. Therefore, the research aims to analyze public awareness of plastic as food packaging and its impact on the environment, specifically in urban communities.

## 2. METHODS

### 2.1 Study area

This study use a quantitative approach in Malaka Sari Urban Village, DKI Jakarta Province. According to the Indonesian Statistical Centers in 2019, the Malaka Sari Urban Village has an area of 0.99 km<sup>2</sup> and is inhabited by 10,519 families with a 32,915 total population. By using Isaac & Michael Sampling Method, minimal sampling for this research is 268 samples.

### 2.2 Questionnaire and data collection

Survey was conducted by distributing questionnaire. The questionnaire' validity and reliability were assessed with 30 samples and the Cronbach's Alpha of the instrument is 0.817. We collected the primary data in August 2022 and ended up with total of 291 respondents. We divided the contents of the questionnaire into four different parts, which are:

1. The Sociodemographic profile of the respondents,
2. Regarding plastic use knowledge, the questions are in nominal data with the choice of true or false answers. Questions related to knowledge in the questionnaire are

presented in Table 1 as follows:

**Table 1.** Plastic use knowledge

No	Question
1	Plastic waste is one of the environment's issue
2	Plastic waste from food packaging is the dominant type of plastic in plastic waste
3	Plastic waste can decompose over time into smaller particles called microplastics
4	Styrofoam which is used as food packaging is a type of plastic packaging
5	Paper cups that are used as beverage packaging, predominantly have a plastic coating
6	Biodegradable plastic is a better choice than conventional single-use plastic
7	Plastic packaging, such as plastic bottles, plastic cups, and straws, can last in the environment for hundreds of years
8	Microplastics can enter the human body through the food chain

3. Regarding plastic use attitude, the questions are in ordinal data with the choice of Likert scale questions between strongly disagree to strongly agree. Questions related to attitude in the questionnaire are presented in Table 2 as follows:

**Table 2.** Plastic use attitude

No	Question
1	Use of reusable bags when buying food and beverage products
2	Provision of refills for drinking water in public places
3	Using reusable eating and drinking utensils
4	Implementation of a straw-free policy
5	The food and beverage industry includes an environmental label on its product packaging as proof of support for the go-green program
6	Plastic reuse and recycling
7	If there is a choice, I will buy products with packaging made from biodegradable plastic

4. Regarding plastic use Behavior, the questions are in ordinal data with the choice of Likert scale questions between never to always. Questions related to behavior in the questionnaire are presented in Table 3 as follows:

**Table 3.** Plastic use behavior

No	Question
1	I use reusable bags when buying food and beverage products
2	I bring my drinking bottle
3	I use reusable eating and drinking utensils
4	I do not use a single-use plastic straw
5	If there is any choice, I prefer using product that includes an environmental label on its packaging
6	I did reuse and recycle plastic waste
7	If there is any choice, I prefer buying products with packaging made from biodegradable plastic

### 2.3 Data scoring and analysis

Each questions in the questionnaire has a different score load, where the scoring is as follows:

1. In the knowledge section, a total of eight questions each has one score for the correct answer and zero for the false answer, with a minimum score of zero and a maximum

score of eight.

2. In the attitude section, a total of seven questions has varied score range between: one (strongly disagree), two (disagree), three (agree), and four (strongly agree) for each questions, with a minimum score of seven and a maximum score of 28.

3. In the behavior section, a total of seven questions has varied score between: one (never), two (rarely), three (sometimes), four (often), five (always) for each questions, with a minimum score of seven and a maximum score of thirty-five.

Before processing with the data analysis, we conducted a data cleaning by eliminating errors in the data so that, in the end, the number of respondents who were processed was 268 women and men between the age of 17 - 45. Each variable was analyzed with distributed frequency using SPSS. The total score of each variable was then categorized into two categories, where the cutoff between categories is each variable's total score's mean. The category were based on the previous study of the assessment of knowledge, attitude, and practice of sustainable consumption, as it was also stated in the study that the categorized of poor and good have been widely used in previous knowledge, attitude, and practice studies [29] Lastly, we composite all three variables, each weighing the same as the other, to categorize the environmental awareness level, also using the environmental awareness total score's mean to determine the cutoff between categories.

## 3. RESULTS AND DISCUSSION

### 3.1 Knowledge

Table 4 shows the level of plastic use knowledge among the respondents; about 54.4% of 268 respondents have poor knowledge, and 46.6% of 268 respondents have good knowledge. Questions asked in the questionnaire are divided based on topics such as the impact of plastic on the environment, alternatives to single-use plastics, and individual awareness of the types of plastic in daily life. These results suggest that people may not realize the correct answer due to their little knowledge and awareness of the negative impact of plastic. They may already understand that plastic waste harms the environment, as the environmental campaign said for the past few years, but that is all they know.

**Table 4.** Level of plastic use knowledge

	Category	Frequency	Percent
Knowledge	Poor	143	53.4 %
	Good	125	46.6 %
	<b>Total</b>	<b>268</b>	<b>100.0 %</b>

Topics of knowledge on environmental matters have already been widely researched over the years, which is vital due to its role as one of the drivers in influencing individuals to have pro-environmental behavior in their everyday life [30]. Knowledge is essential in shaping an individual's attitude and later developing their behavior. According to Charitou et al. [28], poor knowledge among respondents is due to the lack of information received by the community regarding plastic issues. In line with that research, this research shows the majority of respondents have a poor knowledge regarding plastic issues. Therefore, the right way to solve this problem is to develop strategies about how to spread the information to

increase their awareness of the issues. Study found that spreading knowledge about environmental matters should be done either by formal or non-formal education. Formal education matters because it shapes individuals from their younger level of education, which later influences their behavior. It is crucial to provide information for individuals at an early stage of education to increase their awareness about the environment [31]. Another way is through campaigns and counseling by government programs about the environment could also be done to educate the public about environmental issues [32]. These strategies are based on a study conducted by Bahri et al. [33] where they found that lack of knowledge is based on the absence of a government-provided campaign program in their neighborhood. However, we found that most respondents have poor knowledge even though there is a community-based government program called the waste bank in our research location. Further study might need to be done about how is the participation of people in the area in the waste bank program.

There are some examples in the previous study about how knowledge in an individual directly affects the consumer that uses the product in plastic packaging. One of the previous studies in a survey on consumers about their preference for products based on their packaging [34], shows that consumers with knowledge of the plastic issue to the environment tend to choose a product that uses any other than plastic packaging. In line with previous research, the study found that packaging is one of the first things consumers consider when they purchase a product [35]. Therefore, in increasing pro-environmental behavior, knowledge is an essential factor that needs to be considered.

### 3.2 Attitude

Attitude means a person’s evaluative tendencies that would influence people’s beliefs and feelings and would later be shown in their behavior [36]. Variables such as their attitudes towards the environment would influence them to adopt a pro-environmental behavior as it is defined as an evaluative tendency for an individual to be acquired, and it can influence their belief, feelings, and behavior openly [25]. Thus, it is necessary to study attitude as a factor in forming pro-environmental behavior in individuals [37].

**Table 5.** Level of plastic use attitude

	Category	Frequency	Percent
Attitude	Poor	112	41.8 %
	Good	156	58.2 %
	<b>Total</b>	<b>268</b>	<b>100.0 %</b>

Based on Table 5, we found that among 268 respondents, the majority of respondents, about 58.2% have a good attitude towards the environment regarding plastic use, and the rest, 41.8% of respondents, have a poor attitude towards the environment. Unlike the previous result on the level of plastic use knowledge in Table 4, this result found a different majority in the category, where the category of good attitude of respondents exceeds the number of poor attitudes. The section in the questionnaire about attitude use a Likert scale questions regarding their judgment about good practices in reducing plastic use in everyday life on a scale from strongly disagree to strongly agree. This result shows that the majority of respondents have an excellent evaluation in which the majority agree to the good practice presented in the forms for the

purpose of reducing the amount of single-use plastic in everyday life.

The previous study found that even though good knowledge is essential in individuals, there is no significant relationship between of good knowledge to their pro-environmental behavior [38]. It may happen due to the lack of practice of pro-environmental behavior from an early age. This theory was also proved by a study that found no significant relationship between knowledge of individuals' behavior, neither in individuals with excellent nor poor environmental knowledge [39]. However, it does not mean that there is no role of knowledge in developing awareness of the environment in individuals, as Bezerra et al. [26] found in their study that knowledge develops an attitude and later shows in their behavior [26].

Let us compare the result in knowledge of plastic use and attitude toward plastic use. We could see that the results are contradictory, wherein in the knowledge section, the majority have a poor knowledge level. In contrast, in the attitude section, the majority have a good attitude level. This difference may be explained that the lack of knowledge in the community is due to to the majority of respondents not having basic education in the environmental field; thus, the specific questions provided about plastics and their impact cannot be answered with certainty. For example, one of the questions is that, over time could break down into smaller particles called microplastics. Most respondents might not know the correct answers to the questions. However, a good attitude formed by their surroundings, as in social media and the internet, may provide the information throughout their lives, which formed their understanding of good practices to implement the reducing of plastic use. This statement is proved by a study that found out that in a group discussion, the majority of the participants have no awareness of what microplastic is. Nevertheless, even with no knowledge of microplastic, they are aware that plastic harms the environment through news reports of plastic-banning policy by the government on social media [40]. In conclusion, even though the majority of respondents have good attitude but not directly proportional to a good knowledge, it could be fixed by giving out more basic information than just banning plastic without giving out the reason of why. More information and knowledge of plastic and its negative impact on our environment might raise awareness, thus forming environmental awareness for sustainable plastic consumption in the future.

### 3.3 Behavior

**Table 6.** Level of plastic use behavior

	Category	Frequency	Percent
Behavior	Poor	140	52.2 %
	Good	128	47.8 %
	<b>Total</b>	<b>268</b>	<b>100.0 %</b>

The result in Table 6 shows that the majority of 268 respondents, about 52.2% have a level of poor behavior in plastic use, whereas the rest, 47.8%, show good behavior. The questions presented in the section about behavior in the questionnaire are in line with the questions in the attitude section. The respondents are asked to choose on a scale from never to constantly in the questions presented regarding their preference behavior in everyday life. The results, which show that majority of respondents have poor behavior shows that people’s behavior in using the single-use plastic product may

not be sustainable.

The relationship between knowledge, attitude, and behavior is explained in many previous studies. Amin et al. [41] in their study found that an individual's tendencies to developing pro-environmental attitude and behave in a pro-environmental behavior depend on their cognitive level. Therefore, environmental education is vital to be provided from an early stage of education, both in formal and non-formal education, with the purpose of shaping an individual's behavior in daily life. Let us compare the results level of behavior in Table 6 to the prior result level of knowledge in Table 4. We could conclude that majority of the respondents are still on the poor side of their understanding of the issue regarding plastic and its adverse harm to the environment, meaning the lack of knowledge resulting in their poor behavior in daily life. However, unlike the results in a level of knowledge and behavior, the result in Table 5 shows an opposite result, where the majority have a good level of attitude. A prior study found that attitude is an evaluative tendency in individuals thereafter manifested by their behavior [42]. However, the different results in this study may occur because of many different factors, such as gender, age, level of education, knowledge, and attitude [35]. It is likely to happen, where although based on the theory, attitudes and behavior are interconnected, sometimes there are gaps between them, resulting in the attitude formed inside individuals not being in line with the behavior they showed.

### 3.4 Environmental awareness

**Table 7.** Level of environmental awareness

	Category	Frequency	Percent
Environmental Awareness	Poor	119	44.4 %
	Good	149	55.6 %
	<b>Total</b>	<b>268</b>	<b>100.0 %</b>

This study tried to determine environmental awareness based on the relationship between knowledge, attitude, and behavior, specifically on environmental issues about plastic use and its adverse environmental harm. The result shown in Table 7 is that most of the respondents have good environmental awareness, about 55.6% of 268 respondents. In contrast, the rest of 44.4% of the respondents have poor environmental awareness. These results indicated that the level of environmental awareness based on the survey of knowledge, attitude, and behavior is at good level, which means that awareness regarding environmental issues is already formed in the respondents. Study explains the importance of determining environmental awareness is that forming an awareness of the environment could encourage pro-environmental behavior in person [43]. Awareness may be formed by providing education to the young from an early age, thus in the future it might influence individual to live a sustainable life with a pro-environmental behavior.

However, the problem occurs when, even though there is positive and high awareness among students about environmental issues, formal education still lacks in the practical section so that even though students have good knowledge and awareness about the environment, it would be difficult for students to apply their knowledge because the habit is not formed correctly since the beginning [22]. Thus, in addition to providing knowledge, the young need to be encouraged to good practice from an early age since people need some familiarity other than knowledge. Although Wang

et al. [37] argue that in addition to knowledge an individual has, attitude is also an important variable that could influence someone to behave positively towards the environment. For example, apart from knowledge about the environmental effect of product packaging, customer's attitudes play a role in controlling their behavior toward buying environmentally friendly packaging products [35].

Studies may have found that government programs could be the best way to achieve sustainable goals. However, self-awareness could be the driver in achieving the goals since a person was not driven by a fear of an applicable sanction by the government but by an urge to protect the environment. This is ascertained by the study that the community's plastic use in daily life is due to the habits in their surroundings [44]. Thus, the regulation and policy may be effective in the meantime, but the results are unknown for the extended future. However, it does not mean that the regulation is not essential, as one might suggest that combing efforts to raise environmental awareness and applying environmental policy might work to change people's behavior, as people would behave in a pro-environmental way, not only for fear of the rules but also to their urge to protect the environment. Thus, it might create a long-term habit.

## 4. CONCLUSIONS

Study concludes that environmental awareness in respondents is at a good level, where the majority of respondents, about 55.6%, belong to the good environmental awareness category, whereas the other 44.4% fall into the poor environmental awareness category. The result shows that most respondents have a poor knowledge of plastic use issues and a poor level of behavior in their daily life. However, the results in attitude contradict to both results in knowledge and behavior, wherein the attitude section shows that majority of respondents have a good level of attitudes. This result indicates that the respondents still have little information regarding environmental issues. However, living in our digital society might provide one's knowledge about a good practice towards the environment, thus influencing their answer in attitude section. Regardless, a good attitude does not mean it shows good behavior, which may be explained by the lack of practice and factors such as norms and habits [22].

Even though the results found that the majority of people have good environmental awareness, the behavior of people who are at a poor level needs to be converted; where in addition to increasing environmental awareness in the community, intervention by the government with the implementation of environmental regulations can be carried out. Thus, changes in behavior will be based not only on the desire to protect the environment but also on feelings of fear of sanctions if they do not comply with the rules.

Our findings could enable a grasp of the environmental awareness level formed in urban communities. Understanding the level of environmental awareness might be a future reference to the government in building strategic programs for reaching sustainable use of plastic, especially in urban communities. This research has limitations as this research was only conducted in the Malaka Sari urban village area; therefore, the results cannot be used in generalizing all urban communities. Communities in different locations may have different levels of environmental awareness; thus, future research at other locations can be carried out to obtain an in-depth understanding of the level of environmental awareness.

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## REFERENCES

- [1] Oddo, V.M., Maehara, M., Rah, J.H. (2019). Overweight in Indonesia: An observational study of trends and risk factors among adults and children. *BMJ Open*, 9(9). <http://dx.doi.org/10.1136/bmjopen-2019-031198>
- [2] Debeaufort, F. (2021). Active biopackaging produced from by-products and waste from food and marine industries. *FEBS Open Bio*, 11(4): 984-998. <http://dx.doi.org/10.1002/2211-5463.13121>
- [3] Williams, H., Lindström, A., Trischler, J., Wikström, F., Rowe, Z. (2020). Avoiding food becoming waste in households - The role of packaging in consumers' practices across different food categories. *Journal of Cleaner Production*, 265: 121775. <http://dx.doi.org/10.1016/j.jclepro.2020.121775>
- [4] Sundqvist-Andberg, H., Åkerman, M. (2021). Sustainability governance and contested plastic food packaging - An integrative review. *Journal of Cleaner Production*, 306: 127111. <http://dx.doi.org/10.1016/j.jclepro.2021.127111>
- [5] Jiang, J., Shi, K., Zhang, X.N., Yu, K., Zhang, H., He, J., Ju, Y., Liu, J.L. (2022). From plastic waste to wealth using chemical recycling: A review. *Journal of Environmental Chemical Engineering*, 10(1): 106867. <http://dx.doi.org/10.1016/j.jece.2021.106867>
- [6] Gardas, B.B., Raut, R.D., Narkhede, B. (2018). Identifying critical success factors to facilitate reusable plastic packaging towards sustainable supply chain management. *Journal of Environmental Management*, 236(15): 81-92. <http://dx.doi.org/10.1016/j.jenvman.2019.01.113>
- [7] Plastics - General Assembly of the United Nations. <https://www.un.org/pga/73/plastics/>, accessed on Oct. 23, 2022.
- [8] Kurniawan, S.B., Abdullah, S.R.S., Imron, M.F., Ismail, N.R. (2021). Current state of marine plastic pollution and its technology for more eminent evidence: A review. *Journal of Cleaner Production*, 278: 123537. <http://dx.doi.org/10.1016/j.jclepro.2020.123537>
- [9] Bharadwaj, B., Subedi, M.N., Chalise, B.K. (2021). Where is my reusable bag? Retailers' bag use before and after the plastic bag ban in Dharan Municipality of Nepal. *Waste Management*, 120: 494-502. <http://dx.doi.org/10.1016/j.wasman.2020.10.019>
- [10] Liu, C., Nguyen, T.T., Ishimura, Y. (2021). Current situation and key challenges on the use of single-use plastic in Hanoi. *Waste Management*, 121(15): 422-431. <http://dx.doi.org/10.1016/j.wasman.2020.12.033>
- [11] Aghdam, F.B., Alamdari, Z.D., Nadrian, H., Jafarabadi, M.A., Dehghanzadeh, R. (2019). Personal, social, and environmental factors associated with the behavior of plastic bag use among urban residents: A study with socioecological approach. *International Journal of Preventive Medicine*, 10(1): 160. [http://dx.doi.org/10.4103/ijpvm.IJPVM\\_341\\_17](http://dx.doi.org/10.4103/ijpvm.IJPVM_341_17)
- [12] Zambrano-Monserrate, M.A., Ruano, M.A. (2020). Do you need a bag? Analyzing the consumption behavior of plastic bags of households in Ecuador. *Resources, Conservation and Recycling*, 152: 104489. <http://dx.doi.org/10.1016/j.resconrec.2019.104489>
- [13] Tasseron, P., Zinsmeister, H., Rambonnet, L., Hiemstra, A.F., Siepmann, D., van Emmerik, T. (2020). Plastic hotspot mapping in urban water systems. *Geosciences*, 10(9): 1-11. <http://dx.doi.org/10.3390/geosciences10090342>
- [14] Wagner, S., Klöckner, P., Stier, B., Römer, M., Seiwert, B., Reemtsma, T., Schmidt, C. (2019). Relationship between discharge and river plastic concentrations in a rural and an urban catchment. *Environmental Science & Technology*, 53(17): 10082-10091. <http://dx.doi.org/10.1021/acs.est.9b03048>
- [15] Lebreton, L., Andrady, A. (2019). Future scenarios of global plastic waste generation and disposal. *Palgrave Communications*, 5(1): 1-11. <http://dx.doi.org/10.1057/s41599-018-0212-7>
- [16] Bauer-Civiello, A., Critchell, K., Hoogenboom, M., Hamann, M. (2019). Input of plastic debris in an urban tropical river system. *Marine Pollution Bulletin*, 144: 235-242. <http://dx.doi.org/10.1016/j.marpolbul.2019.04.070>
- [17] Chen, X., Huang, B., Lin, C.T. (2019). Environmental awareness and environmental Kuznets curve. *Economic Modelling*, 77: 2-11. <http://dx.doi.org/10.1016/j.econmod.2019.02.003>
- [18] Jacobsen, L.F., Pedersen, S., Thøgersen, J. (2022). Drivers of and barriers to consumers' plastic packaging waste avoidance and recycling - A systematic literature review. *Waste Management*, 141: 63-78. <http://dx.doi.org/10.1016/j.wasman.2022.01.021>
- [19] Moshood, T.D., Nawanir, G., Mahmud, F., Mohamad, F., Ahmad, M.H., AbdulGhani, A. (2022). Why do consumers purchase biodegradable plastic? The impact of hedonics and environmental motivations on switching intention from synthetic to biodegradable plastic among the young consumers. *Journal of Retailing and Consumer Services*, 64: 102807. <http://dx.doi.org/10.1016/j.jretconser.2021.102807>
- [20] Soares, J., Miguel, I., Venâncio, C., Lopes, I., Oliveira, M. (2021). Public views on plastic pollution: Knowledge, perceived impacts, and pro-environmental behaviours. *Journal of Hazardous Materials*, 412: 125227. <http://dx.doi.org/10.1016/j.jhazmat.2021.125227>
- [21] Chankrajang, T., Muttarak, R. (2017). Green returns to education: Does schooling contribute to pro-environmental behaviours? Evidence from Thailand. *Ecological Economics*, 131: 434-448. <http://dx.doi.org/10.1016/j.ecolecon.2016.09.015>
- [22] Debrah, J.K., Vidal, D.G., Dinis, M.A.P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, 6(1): 1-21. <http://dx.doi.org/10.3390/recycling6010006>
- [23] Jaiswal, D., Singh, B. (2018). Toward sustainable consumption: Investigating the determinants of green

- buying behaviour of Indian consumers. *Business Strategy & Development*, 1(1): 64-73. <http://dx.doi.org/10.1002/bsd2.12>
- [24] Sun, Y., Wang, S., Li, J., Zhao, D., Fan, J. (2017). Understanding consumers' intention to use plastic bags: using an extended theory of planned behaviour model. *Natural Hazards*, 89(3): 1327-1342. <http://dx.doi.org/10.1007/s11069-017-3022-0>
- [25] Albarracín, D., Johnson, B.T., Zanna, M.P. (2005). *Handbook About Attitudes*.
- [26] Bezerra, J.C., Walker, T.R., Clayton, C.R., Adam, I. (2021). Single-use plastic bag policies in the Southern African development community. *Environmental Challenges*, 3: 100029. <http://dx.doi.org/10.1016/j.envc.2021.100029>
- [27] Ajzen, I., Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European Review of Social Psychology*, 11(1): 1-33. <http://dx.doi.org/10.1080/14792779943000116>
- [28] Charitou, A., Aga-Spyridopoulou, R.N., Mylona, Z., Beck, R., McLellan, F., Addamo, A.M. (2021). Investigating the knowledge and attitude of the Greek public towards marine plastic pollution and the EU Single-Use Plastics Directive. *Marine Pollution Bulletin*, 166: 112182. <http://dx.doi.org/10.1016/j.marpolbul.2021.112182>
- [29] Ahamad, N.R., Ariffin, M. (2018). Assessment of knowledge, attitude and practice towards sustainable consumption among university students in Selangor, Malaysia. *Sustainable Production and Consumption*, 16: 88-98. <http://dx.doi.org/10.1016/j.spc.2018.06.006>
- [30] Fuhrmann-Riebel, H., D'Exelle, B., Verschoor, A. (2021). The role of preferences for pro-environmental behaviour among urban middle class households in Peru. *Ecological Economics*, 180: 106850. <http://dx.doi.org/10.1016/j.ecolecon.2020.106850>
- [31] Raab, P., Bogner, F.X. (2021). Knowledge acquisition and environmental values in a microplastic learning module: Does the learning environment matter? *Studies in Educational Evaluation*, 71: 101091. <http://dx.doi.org/10.1016/j.stueduc.2021.101091>
- [32] Willis, K., Maureaud, C., Wilcox, C., Hardesty, B.D. (2018). How successful are waste abatement campaigns and government policies at reducing plastic waste into the marine environment? *Marine Policy*, 96: 243-249. <http://dx.doi.org/10.1016/j.marpol.2017.11.037>
- [33] Bahri, M.S., Meitiyani, M., Astuti, Y. (2017). Hubungan antara pengetahuan lingkungan hidup dengan tingkat kepedulian warga dalam pengolahan sampah di bank sampah nusa indah raya. *Bioeduscience*, 1(1): 01. <http://dx.doi.org/10.29405/bioeduscience/01-05111082>
- [34] Lindh, H., Olsson, A., Williams, H. (2015). Consumer perceptions of food packaging: Contributing to or counteracting Environmentally sustainable development? *Packaging Technology and Science*, 29: 3-23. <http://dx.doi.org/10.1002/pts.2184>
- [35] Popovic, I., Bossink, B.A.G., van der Sijde, P.C. (2019). Factors influencing consumers' decision to purchase food in environmentally friendly packaging: What do we know and where do we go from here? *Sustainability*, 11(24): 1-22, 2019. <http://dx.doi.org/10.3390/SU11247197>
- [36] Eagly, A.H., Chaiken, S. (1993). *Psychology of Attitudes*. Psychology of Attitudes.
- [37] Wang, H., Li, J., Mangmeechai, A., Su, J. (2021). Linking perceived policy effectiveness and proenvironmental behavior: The influence of attitude, implementation intention, and knowledge. *International Journal of Environmental Research and Public Health*, 18(6): 1-17. <http://dx.doi.org/10.3390/ijerph18062910>
- [38] Ari, E., Yılmaz, V. (2017). Effects of environmental illiteracy and environmental awareness among middle school students on environmental behavior. *Environment, Development and Sustainability*, 19(5): 1779-1793. <http://dx.doi.org/10.1007/s10668-016-9826-3>
- [39] Adriyanto, Y., Martono, D.N. (2020). Environmental perspective towards sustainability (environmental knowledge of university students in Greater Jakarta). In the 1st JESSD Symposium: International Symposium of Earth, Energy, Environmental Science and Sustainable Development 2020, vol. 211, pp. 1-11. <http://dx.doi.org/10.1051/e3sconf/202021101024>
- [40] Henderson, L., Green, C. (2020). Making sense of microplastics? Public understandings of plastic pollution. *Marine Pollution Bulletin*, 152: 110908. <http://dx.doi.org/10.1016/j.marpolbul.2020.110908>
- [41] Al Amin, M.A., Adrianto, L., Kusumastanto, T., Imran, Z. (2021). Community knowledge, attitudes and practices towards environmental conservation: Assessing influencing factors in Jor Bay Lombok Indonesia. *Marine Policy*, 129: 104521. <http://dx.doi.org/10.1016/j.marpol.2021.104521>
- [42] Crano, W.D., Prislin, R. (2010). *Attitudes and Attitude Change*. Taylor & Francis.
- [43] Liobikiene, G., Poškus, M.S. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behavior: Modifying the Value-belief-norm theory. *Sustainability*, 11(12): 2019. <https://doi.org/10.3390/su11123324>
- [44] Vassanadumrongdee, S., Hoontrakool, D., Marks, D. (2020). Perception and behavioral changes of thai youths towards the plastic bag charging program. *Applied Environmental Research*, 42(2): 27-45. <http://dx.doi.org/10.35762/AER.2020.42.2.3>