PRINT ISSN 1119-8362
Electronic ISSN 2659-1502

Full-text Available Online at
https://www.ajol.info/index.php/jasem
http://www.bioline.org.br/ja

J. Appl. Sci. Environ. Manage.
Vol. 27 (7) 1557-1567 July 2023

Evaluation of the Knowledge, Attitude and Practices towards Plastic Waste as Environmental Nuisance of Students at Can Tho University, Can Tho, Vietnam

NHI, DK; *GIAO, NT

College of Environment and Natural Resources, Can Tho University, 3/2 Street, Xuan Khanh Ward, Ninh Kieu District, Can Tho city 90000, Vietnam

**Corresponding Author Email: ntgiao@ctu.edu.vn*

ABSTRACT: The study was conducted to evaluate the knowledge, attitude and practices towards plastic waste as environmental nuisance of students at Can Tho University, Can Tho, Vietnam using 240 students from four training units including Faculty of Environment and Natural Resources, College of Engineering Technology, School of Economics and College of Agriculture. The results showed that students of faculties/schools/colleges were relatively aware of the harmful effects of plastic waste on the environment and human health. However, students still use a variety of plastic products including plastic cups and bottles (accounting for 27%), styrofoam boxes and plastic bags (25%), plastic straws (accounting for 21%), and plastic food containers and food wraps (19%) and plastic tableware sets (accounting for 8%) with 1-3 products per day, mainly due to convenience and initiative supplier's offer. It is estimated that the amount of plastic waste daily generated at Can Tho University is about 748 kg. However, a relatively high percentage of students are very willing to implement regulations and community activities to control and limit plastic waste generated (ranging from 45-93%), but plastic waste sorting was limited accounting for 42%. Students are also very willing to use environmentally friendly products to replace plastic products ranging from 60-74%, showing the feasibility of implementing relevant solutions. There are four groups of factors affecting students' practices to reduce the use of plastic products, including (1) the popularity of substitute products, (2) policies and legislation, (3) groups of relatives and friends, and (4) influential groups in society. A number of solutions to improve students' awareness and practice of using plastic products have been proposed.

DOI: https://dx.doi.org/10.4314/jasem.v27i7.32

Cite this paper as: NHI, D. K; GIAO, N. T. (2023). Evaluation of the Knowledge, Attitude and Practices towards Plastic Waste as Environmental Nuisance of Students at Can Tho University, Can Tho, Vietnam. *J. Appl. Sci. Environ. Manage.* 27 (7) 1557-1567

Dates: Received: 12 June 2023; Revised: 21 June 2023; Accepted: 04 July 2023 Published: 30 July 2023

Keywords: environ mental nuisance; pollution; plastic waste pollution; plastic waste classification

Plastic is one of the most used materials in the world, in which the packaging industry accounts for the largest proportion (Kumar *et al*., 2021). Plastics represent a very large group of individual polymers with different chemical and technical properties, with some commonly used polymers such as polyethylene terephthalate (PET), high-density polyethylene (HDPE), polyvinyl chloride (PVC), low density polyethylene (LDPE), poly propylene (PP), and polystyrene (PS) (Faraca and Astrup, 2019). Due to the lightweight, cheap, and durable properties of plastics, the increasing production and use of plastics has led to large-scale plastic pollution, posing a major threat to the environment (Nxumalo *et al*., 2020). In 2019, global plastic production reached 370 million tons, only 9% of which was recycled, 12% was incinerated and the rest was discharged into the environment or landfill (Kumar *et al*., 2021). The estimated annual amount of plastic waste entering the oceans will triple, to 29 tons per year by 2040 (Latkin *et al*., 2022). In Vietnam, the amount of plastic waste is increasing rapidly, about 2 million tons in 2016 and now about 3.27 million tons per year (Hung, 2022a). Of which, from 0.28 to 0.73 million tons are dumped into the ocean (accounting for about 6% of the world's total marine plastic waste) and only about 27% of it is

**Corresponding Author Email: ntgiao@ctu.edu.vn*

recycled. In addition, according to a report by the World Bank (WB), plastic waste accounts for about 79.7% and 95.4% of the total solid waste collected along rivers and coasts in Vietnam, respectively (Hung, 2022b). Plastic pollution becomes a global threat, affecting almost every marine and freshwater ecosystem and ultimately human health (Mukheed and Khan, 2020). Plastics are designed to be very durable, so the decomposition of plastic waste can take about 58-1,200 years through optical degradation, which requires the interaction of light, oxygen and bacteria (Tuuri *et al*., 2023). This causes the fragmentation of larger plastic pieces into micro particles (<5 mm), microplastics (1 mm-0.1 m) and even nano (< 0.1 nm), resulting in leakage of the microplastics into the environments, posing significant risks to marine organisms, food webs and ecosystems (Kumar *et al*., 2021). Notably, microplastics have been found in drinking water (Dhaka *et al*., 2022; Li *et al*., 2023), and at different trophic levels such as zooplankton, bivalve, and crustaceans' carcasses, marine life and other larger animals, including organisms intended for human consumption (Kumar *et al*., 2022; Tuuri *et al*., 2023). While toxic chemicals in plastics can also leach into the water, contributing to water quality deterioration and serious water pollution (Mukheed and Khan, 2020). Plastic decomposition and burning are sources of greenhouse gases (Nxumalo *et al*., 2020; Mukheed and Khan, 2020; Mihai *et al*., 2021). In addition, the extraction of petroleum, which is required to produce plastics, has serious consequences for the environment and human health (Sun *et al*., 2022). Students are the future engineers and bachelors of the country, so it is extremely important to have the right awareness, attitude and practice of environments, especially the negative effects of plastic waste, to contribute to lead the country towards sustainable development. At the same time, students are also one of the subjects that are and will be affected by the negative effects of environmental pollution. Can Tho University has a multidisciplinary university providing undergraduate and postgraduate training in the Mekong Delta with the role of a national key university in the region. According to statistics, the university is training about 46,781 students (CTU, 2022). The number of students assessed is large. Since then, the research focuses on assessing the awareness, attitude and practice of students at Can Tho University towards plastic waste. The objective of the study is to evaluate the knowledge, attitude and practices towards plastic waste as environmental nuisance of students at Can Tho University, Can Tho, Vietnam.

MATERIALS AND METHODS

The study was carried out from December 2022 to May 2023. The study used online questionnaires to assess the awareness, attitude and practice of students at Can Tho University towards plastic waste. Randomly sampled questionnaires among four groups of students selected as students from faculties/schools affiliated to Can Tho University, including School of Economics, Faculty of Environment and Natural Resources, School of Polytechnic, and School of Agriculture. The number of survey samples was calculated according to the equation of Slovin (Thuan *et al*., 2021; Huong *et al*., 2021; Niyirera and Nkurunziza, 2023):

$$n = \frac{N}{1 + Ne^2}$$

Where: n is the number of students interviewed, N is the total number of students of the University. By the end of 2022, Can Tho University have more than 46,781 students (CTU, 2022). e is the acceptable error, and should not exceed 10%. In this study, e was selected at 7% (Huong *et al*., 2021). Thus, the total number of students to be interviewed in this study is 204 students. However, in order to obtain the proposed sample results and ensure that the research results are representative of the population, 240 students were interviewed for this study. 240 students were divided equally among the studied schools and colleges.

The prepared interview sheet includes contents related to students' awareness, attitudes and practice towards plastic waste as well as influencing factors and solutions to limit the use of plastic products in the environment. Interview data were collected and processed with descriptive statistics for analysis and evaluation. In addition, the Likert scale with 5 levels was used in the research to assess students' awareness, attitudes and practice towards the proposed views. The frequency scale is divided into "1 = never", "2 = "rarely", "3 = sometimes", "4 = often" and "5 = always" (Wang *et al*., 2021). For the scale of agreement is divided into "1 = completely disagree", "2 = disagree", "3 = neutral", "4 = agree" and "5 = completely agree" (Lu *et al*., 2022; Thanh *et al*., 2022). Similarly, for the scale of assessment of influence, it is divided into "1 = no effect", "2 = little influence", "3 = neutral", "4 = influence" and "5 = very influence".

RESULTS AND DISCUSSION

Figure 1 shows plastic products commonly used in students' daily activities. It can be easily seen that there were five groups of plastic products used by students, including (1) plastic cups and bottles, (2) foam boxes and plastic bags, (3) plastic straws, (4) plastic containers food and food wrap and (5) plastic tableware sets (bowls, spoons, forks). In which, plastic products such as plastic cups, plastic bottles,

styrofoam boxes and plastic bags account for a large proportion of the plastic products used by students, ranging from 25-27%. Among four schools/colleges, Faculty of Environment and Natural Resources, Polytechnic University were the two units with the highest percentage of students using plastic cups and plastic bottles (accounting for 93.3%). These were items that serve students' daily eating needs such as plastic bags for food, convenient plastic cups for drinking water, bottled drinking water and convenient foam boxes for rice, dumplings, or sticky rice. The percentage of plastic bottles used the most in the student community has also been recorded in a few studies (Huyen *et al*., 2020; Thai and Thich, 2022; Duong and Hang, 2022). According to the statistics of the United Nations, every minute that passes, around the world, about 1 million plastic bottles are consumed (The United Nations, 2023). Next, the proportion of plastic items used from 19-21% included plastic straws, plastic food containers and food wraps. For these plastic products, Polytechnic University continued to have the highest percentage of students uses, ranging from 63.3-81.7%. The group of plastic tableware products including plastic bowls, spoons and forks were used by very few students, accounting for only about 8%. The reason was that most students bring food and water from outside while some will eat directly at the campus canteen, so most students tended to use and dispose of a lot of plastic wastes in the university campus.

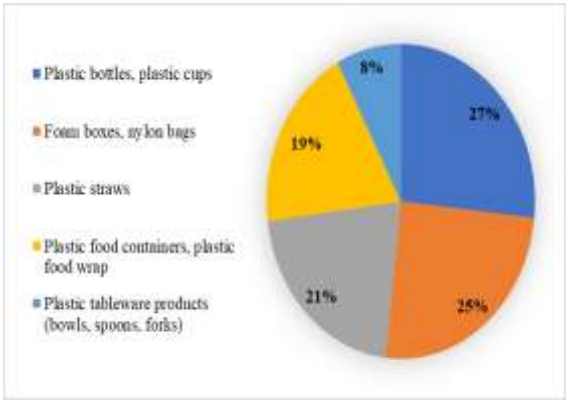

Fig 1. Percentage of commonly used plastic products

According to the interview results, the study found five main reasons that students of Can Tho University often used plastic products (Figure 2). Have 27.5% of students participating in the study chose plastic products by the initiative of vendors, because most of the campus canteens only sell plastic cups and bottles. At business units on campus of Can Tho University, the number of plastic cups used ranges from 10-200 pieces/day and the number of plastic straws ranges from 30-100 pieces/day (Thuan *et al*., 2021). Besides, 23.1% of students chose because of the convenience that plastic products bring. These are considered the biggest reasons why students use plastic products. According to the research results of Thai and Thich (2022), the majority of university students in Ho Chi Minh City choosing plastic products is mainly due to convenience (accounting for 55%). This supports the result of the current study.

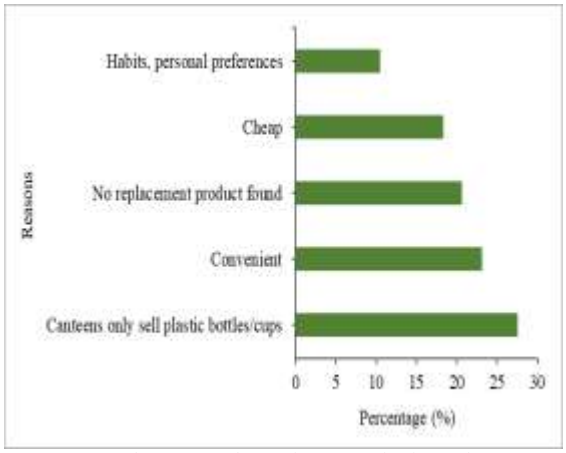

Fig 2. The reason why students use plastic products

Knowledge of students regarding types of plastics: Currently, most plastic products are printed with plastic code symbols on the shell or the bottom of plastic products, to provide information about the composition, toxicity and recyclability. Plastics are divided into seven categories including polyethylene terephthalate (PET), high-density polyethylene (HDPE), polyvinyl chloride (PVC), low density polyethylene (LDPE), poly propylene (PP), polystyrene (PS), and other plastic types (Nxumalo *et al*., 2020). In particular, HDPE, LDPE and PP are in the safest group to use and can be reused many times, while PVC and PS should be avoided. The pyrolysis of PVC produces harmful emissions, such as hydrogen chloride (HCl) and chlorinated hydrocarbons including polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) (Altarawneh *et al*., 2022; Kuang *et al*. al., 2023). Besides, HCl gas emitted from PVC pyrolysis is corrosive and causes acid rain (Kuang *et al*., 2023). PS at high temperature can release toxic substances such as chlorofluorocarbons, carbon monoxide and sulphur oxide (Nxumalo *et al*., 2020). The results of the survey on students' understanding of the meanings of the symbols printed on plastic products are shown in Figure 3. From Figure 3, it is found that most students understood the meanings of these symbols, but the rate of complete understanding of all symbols was not high. Each symbol on plastic products was only understood by about 8-23% of the total students. In which, the PET symbol had the highest rate of

recognition by students. PET is widely used as a packaging material in the food and beverage industries, typically soft drink and mineral water bottles. This is classified as "caution to use", as antimony, acetaldehyde, bisphenol A, and phthalates are harmful chemicals that can be released from this plastic, therefore, they negatively affect human health, antimony in particular is considered a human carcinogen (Dhaka *et al*., 2022; Ajaj *et al*., 2022). While PVC should be avoided because of its ability to release many harmful substances, is little known to students. This may affect the safety when using plastic as well as the ability to recycle is not high.

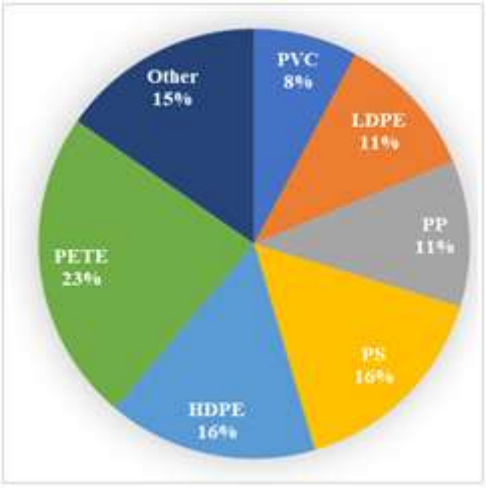

Fig 3. Percentage of students' understanding of symbols printed on plastic products

Students' knowledge of the impact of plastic waste on the environment and human health: The problem of plastic waste generation on the campus of Can Tho University mainly comes from the majority of students who had the habit of using plastic products once, not recycled (accounting for 30.7%). The second reason was that students did not do waste separation at source (24.8%). In third place, the act of improperly dumping plastic wastes accounted for 19%. The reason is related to the inconvenient arrangement of trash cans (accounting for 8.3%). This could mean that the location of the trash cans is inconvenient or obscured, and many places lack of trash cans, leading to indiscriminate littering behaviour of students. Another cause is the inefficient plastic waste collection system (16.2%). Through the field survey, it was found that the waste collection system is not really effective and has many shortcomings such as leachate generated during the collection process, causing bad odours and unsanitary. In general, the majority of students participating in the study were aware of the causes of plastic waste pollution. Individual behaviour and lack of adequate facilities are among the main factors responsible for the large volume of plastic waste in the environment (Marazzi *et al*., 2020).

Table 1. Causes of plastic waste pollution

No.	Causes	Percentage (%)
1	Single use plastic, not recycled	30.7
2	No garbage sorting	24.8
3	Disposal of garbage in the wrong place	19.0
4	Inefficient plastic waste collection system	16.2
5	The location of the trash cans is inconvenient	8.3
6	Don't know	1.1

The students' awareness level was assessed based on their understanding of the harm caused by single-use plastics (Figure 4). The results showed that, for human health, about 34% of students thought that human health would be affected and nearly 53% of students thought that plastic pollution would greatly affect human health. However, it still appeared that more than 13% of students thought that human health is not affected and have a neutral attitude towards this issue. Plastic materials do not decompose completely, they only decrease in size (particles). These microplastics can enter the food chain after being consumed by various freshwater and marine organisms, posing a public health risk (Ajaj *et al*., 2022). According to the study of Li *et al*. (2022), microplastics have been found in some beverages. Microplastics can penetrate deeper into human blood cells, causing cytotoxicity, metabolic dysfunction, and DNA damage (Kumar *et al*., 2022). Furthermore, incineration of plastic waste could release harmful gases and airborne particles that can be inhaled by humans (Hossain *et al*., 2021). Approximately 360-102,000 microplastics are generated from incineration per ton of waste (Bhat *et al*., 2023) and it is estimated that adults and children absorb an average of 1063 and 3223 microplastics per year, equivalent to response (Dehghani *et al*., 2017). Open-air burning of plastic waste is associated with an increased risk of heart disease, respiratory diseases, neurological disorders, skin rashes, headaches, and dementia (Pathak *et al*., 2023). Besides, Bisphenol A molecules leaking from plastic products such as food containers, plastic water bottles are hormone disruptors, obesity, infertility, decreased activity of thyroid hormone receptors and associated with neurological problems (Ajaj *et al*., 2022). Antimony derived from PET resins can cause skin inflammation, respiratory tract irritation, electrocardiographic changes and gastric pelleting in humans, especially cancer (Dhaka *et al*., 2022). There are three pathways including ingestion, skin contact and inhalation which are the major routes of human exposure to pollutants (Alabi *et al*., 2019). In general, students' awareness

about the negative effects of plastic waste on human health was relatively high (accounting for 86.7% of the total), and the average score was 4.30 on the Likert scale.

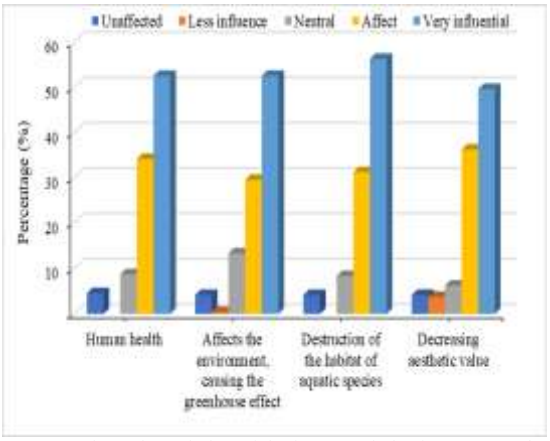

Fig 4. Students' knowledge of the impact of plastic waste on the environment and human health

The majority of students said that single-use plastics pollute the environment (accounting for 82.1% of the total) from affect to very harmful, with an average of 4.26 on the Likert scale (accounting for 82.1% of the total, Figure 4). When plastic is disposed of or buried in soil, it interacts with water, resulting in the biotic or abiotic degradation of the plastic, in which plastic additives such as stabilizers, harmful colorants, plasticizers and heavy metals could leach into soil, groundwater and surrounding aquatic systems, contaminating ecosystems (Alabi *et al*., 2019). CH_4, a hazardous greenhouse gas, that contributes significantly to global warming is released during the microbial biodegradation of plastics (Mukheed and Khan, 2020). In addition, the plastic film present in the soil could reduce the hydraulic conductivity or permeability of the soil, ultimately affecting the soil microbial activity as well as the soil fertility (Dan *et al*., 2017). With 79% of global plastic waste ending up in landfills, there is a very high risk of soil degradation and pollution (Hossain *et al*., 2020). Furthermore, plastics are a particularly problematic waste stream when incinerated outdoors, with about 90% of black carbon released from waste incineration, typically polyethylene terephthalate and polystyrene (Reyna-Bensusan *et al*., 2019; Mihai *et al*., 2021). In addition, the burning of waste also leads to the release of heavy metals into the atmosphere, typically Cd, Zn, Pb, As and other harmful gases such as furans, dioxins, and polychlorinated biphenyls that pollute air environment (Alabi *et al*., 2019; Kováts *et al*., 2022). Normally, the process of decomposing plastic in the aquatic environment would generate harmful substances such as bisphenol A, which pollute the water (Alabi *et al*., 2019; Mukheed and Khan, 2020). Accumulation of microplastics could promote mineralization, nitrification and denitrification in aquatic ecosystems, thereby releasing CO_2, CH_4 and N_2O, and eutrophication becomes more serious (Kumar *et al*., 2021). These microplastics could act as an intermediary carrying various hydrophobic organic substances into the aquatic ecosystem, typically persistent organic pollutants (POPs) such as PCBs, PBDEs, PAHs and phenanthrenes (Hossain *et al*., 2020). In addition, when plastic waste leaks into the environment, it causes other serious problems such as clogging up the drainage system, leading to standing water that is a breeding ground for many disease vectors, and disturbing the environment. Natural cycles (biogeochemical cycles in ecosystems) (Kumar *et al*., 2021). In addition, more than 87% of students said that aquatic life is seriously affected when a large amount of plastic waste is generated into their habitat (Figure 4). This assessment had a fairly high average of 4.35 points on the Likert scale. Plastics pose major challenges to aquatic ecosystems, where small plastic particles are easily ingested by organisms and enter their organ systems (Kumar *et al*., 2021). The accumulation of nano plastics in fish body was reported by Crossman *et al*. (2020). When the concentration of nano plastics increased, the fish's metabolism was disrupted by increasing the concentration of ethanol, lysine and adenosine in the fish liver. In addition, the continuous contact between oysters and nano plastics leads to changes in signalling molecules, which interfere with lipid metabolism (Bhargava *et al*., 2018). In addition, the ingestion of plastic by aquatic organisms would interfere with the respiratory process, block the digestive tract, cause false satiety, abnormal swimming, oxidative stress, compromised immune response, reproductive complications and liver metastases, which are serious and fatal (Alabi *et al*., 2019; Hossain *et al*., 2020; Tuuri *et al*., 2023). Many marine species, from zooplankton to marine mammals, seabirds and marine reptiles suffocate and die from entanglement in plastic debris (Mukheed and Khan, 2020). Entanglement is observed to pose a risk to approximately 243 marine species (Alabi *et al*., 2019). In the future, marine litter could harm nearly 600 species by 2050, 90% of seabird species will be threatened and about 15% of marine species will be endangered (Jambeck *et al*., 2015). In terms of aesthetics, plastic pollution causes serious loss of beauty, nearly 86% of students are aware of this problem, with an average of 4.23 points on the Likert scale (Figure 4). From the above analysis, it can be seen that the majority of students participating in the study are relatively aware of the problem of plastic pollution that negatively affects the environment and human health. This study has found that students get

this information from a variety of sources. There are 4 main sources including through forums, mass media (accounting for 37.5%), through movements, activities of schools and clubs (25%), through friends, teachers, relatives (accounting for 19.5%) and through articles, leaflets, banners (accounting for 18%).

Students' habit of using plastic products: The results of the survey on students' habits of using plastic products are shown in Table 2. Frequency of using plastic products was divided into five levels including no use, 1-3 products/day, 4-6 products/day, 7-10 products/day and greater than 10 products/day. For plastic bottles and cups, only 21.67% of students did not use, but up to 74.17% of students used plastic bottles and cups from 1-3 products/day, 2.92% students used 4-6 products/day, 0.83% of students used 7-10 products/day and 0.42% of students used more than 10 products/day. The percentage of students using foam boxes and plastic bags was very high, a total of 87.91% of students used foam boxes and plastic bags every day and mainly 1-3 products/day (accounting for 78.33%). Similarly, the percentage of students using plastic straws, plastic food containers and food wraps daily was high, with about 64.17-77.91% of students. While the group of plastic food products (bowls, spoons, forks) had a lower rate of use than the rate of no daily use, the amount used was only about 34.16%. Particularly for the group of students who did not use plastic products on campus, it is because these students often eat directly at the canteen in the morning, noon, and afternoon. In general, students had the habit of using 1-3 plastic products every day. This trend was relatively higher than that was found in the research at Vietnam Maritime University, the number of plastic products consumed by students was only 1-2 products/day (Duong and Hang, 2022). Although students are aware of the harm that plastic waste brings to the environment and human health, the percentage of students using single-use plastic is still very high.

Table 2. Frequency of using plastic products (%)

Plastic products	Don't use	1-3 products/day	4-6 products/day	7-10 products/day	>10 products/day
Plastic bottles, plastic cups	21.67	74.17	2.92	0.83	0.42
Foam boxes, nylon bags	12.08	78.33	7.08	1.25	1.25
Plastic straws	22.08	68.33	7.08	2.08	0.42
Plastic food containers, plastic food wrap	35.83	56.67	7.08	0	0.42
Plastic tableware products (bowls, spoons, forks)	65.83	32.08	1.25	0.83	0

According to the research results, the frequency of using plastic products by students was mainly 1-3 products/day. The average weight of a plastic product is about 8 g. At the research units of the School of Economics, the Faculty of Environment and Natural Resources, the School of Agriculture and the Polytechnic School with the number of students is 5,313 students, 1,366 students, 2,685 students and 7,066 students, respectively, plastic waste is daily generated about 85 kg, 21.86 kg, 42.96 kg and 113.06 kg, respectively. Thus, the entire Can Tho University with about 46,781 students would generate about 748 kg of plastic waste per day. The daily amount of plastic waste generated at Can Tho University is rated higher than the University Campus in Ghana (Asare *et al*., 2022), but lower than that at Henna Agricultural University (Zhang *et al*., 2020).

Student compliance with plastic waste regulations: The research results showed that the level of student compliance with regulations related to plastic waste is divided into 5 levels: not done, rarely done, sometimes, often and always done (Figure 5). Up to 92.5% of students were willing to put their plastic waste in the right place, with an average of 4.4 on the Likert scale, with the level of always doing it accounting for more than 50%. However, only about 42% of students did waste separation at source, from often to very often, with an average of 3.22 on the Likert scale, and more than 50% of students only occasionally or rarely waste segregation at source. The reason is that the facilities are not fully equipped trash bins. Some schools/college only equip a single type of trash bin, which affects the waste classification. Along with that, waste collection vehicles in the study area are limited. In addition to complying with regulations related to plastic waste in schools, students also actively participate in community activities to reduce plastic waste generation. The study found that more than 45% of students are willing to participate in community activities, with an average of 3.29 on the Likert scale. Moreover, students are also very willing to encourage relatives and friends to keep the environment clean. About 73.3% of students perform the above activity often to very often, with an average of 3.89 on the Likert scale. From that, students are very willing to implement regulations and community activities to control and limit plastic waste generated, but the behaviour of waste separation at source is still limited.

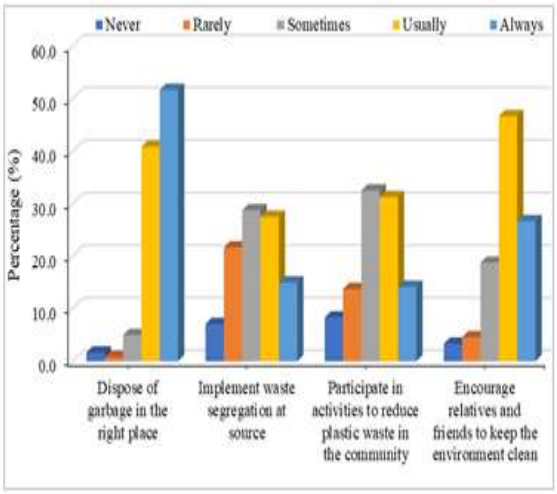

Fig 5. The level of compliance with regulations related to plastic waste by students

Level of willingness to use environmentally friendly products to replace plastic products: The research results in Figure 6 showed that the level of students' willingness to change their behaviour in using plastic products was quite high. Regarding the use of low-packaging and biodegradable products, about 73.8% of students are willing to do it from often to always, 20.8% of students only do it occasionally, 2.5% of students rarely when done and about 2.9% of students did not do, averaged 3.97 on the Likert scale. The use of biodegradable plastic products made from agricultural materials (called polylactic acid -PLA) such as corn flour, rice flour, potatoes and cassava were given priority. The energy consumption required to manufacture these products is estimated to be 20-55% lower than that of conventional plastics (Boccalon and Gorrasi, 2022). At the same time, when PLA decomposes, water, CO_2 and plant humus are released, and no toxic intermediates or by-products are released into the environment (Ahsan *et al*., 2023). Currently, about 58.1% of bioplastics are biodegradable, a large part of which consists of polylactic acid (PLA) and starch blends (18.7%), and polybutylene succinate (PBS) (accounting for 4.1). %) (Boccalon and Gorrasi, 2022). Besides, the use of biodegradable plastics derived from renewable sources would create a more sustainable environment by saving non-renewable sources (Kothakota *et al*., 2022). Second, bring recyclable products when buying food outside, 60% of students are willing to do it from very often to very often, and about 40% of students do not do it occasionally. Currently, the average was 3.67 according to the Likert scale. Third, recycle, reuse plastic waste instead of using it once, about 33.3-40.8% of students are willing to do it very often to often, with an average of 3.95 on the Likert scale. Plastic waste can be reused many times as it can maintain its functional claim before being disposed of or recycled. This action will help reduce the demand and consumption of raw materials for the production of plastic products, reducing the negative impact on the environment as more than 90% of raw plastics are produced from fossil fuels (petroleum or natural gas), especially reducing the amount of plastic waste generated into the environment (d'Ambrières, 2019; Ncube *et al*., 2021). Notably, about 72.1% of students are willing to use environmentally friendly alternatives, with an average of 3.97 on the Likert scale. Some alternative products are preferred by students such as stainless-steel water bottles, cloth bags, paper bags, rice straws, and paper cups as well as biodegradable plastic products.

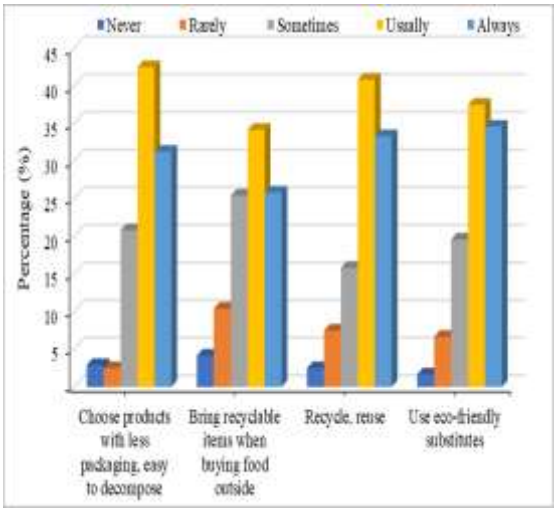

Fig 6. Willingness to change the behaviour of using plastic products

Factors affecting the reduction of students' use of plastic products: The research results showed that four factors tended to affect students' behaviour to reduce plastic product use (Figure 7). Firstly, environmentally friendly alternatives must be widely used and popularized in the community, with about 86.3% of students agreeing with this view, the average score was 4.22 on the Likert scale. To date, less than 1% of the total global plastics industry (about 370 million tons) consists of biomaterials (Boccalon and Gorrasi, 2022). Secondly, there should be specific policies and regulations on reducing the use of plastic products, with about 85% of students agreeing with this view, the average score was 4.19 on the Likert scale. According to Clause 1, Article 73 of the Law on Environmental Protection (2020), organizations and individuals have the responsibility to limit the use, reduction, classification and disposal of waste that are single-use plastic products and difficult-to-separate plastic packaging biodegradable according to regulations; and many other related regulations such

as Official Letter No. 161/LDCP, Directive No. 33/CT-TTg and Plan 30/KH-UBND of Can Tho City. It can be seen that the issue of reducing plastic waste generation has been concerned by the state government, so citizens, typically in this study, the student community must raise awareness and reduce plastic use products. Third, relatives and friends will be the group of people who contribute to changing students' behaviour in using plastic products (accounting for 75.8%), the average score was 4.02 on the Likert scale. Finally, the group of influential people in society will contribute to encouraging students to reduce the use of plastic products (accounting for 60.8%, reaching an average of 3.65 on the Likert scale). Therefore, it is necessary for a large proportion of the community to change the behaviour of using plastic products to make significant changes in practice. For example, reduce or eliminate the widespread use of single-use water bottles, as these are typically made from polyethylene terephthalate (PET) that take more than 400 years to degrade naturally.

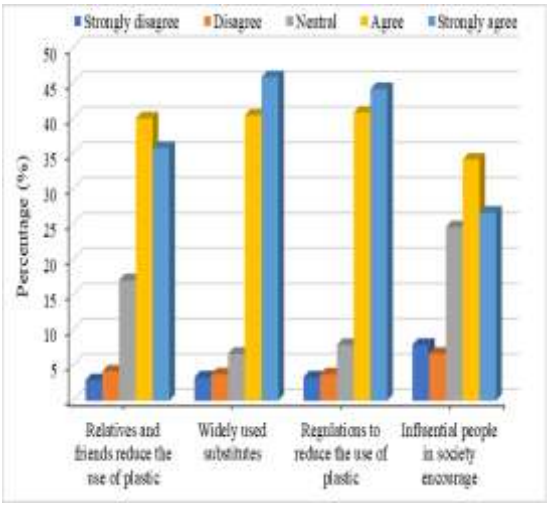

Fig 7. Factors affecting students' behaviour of using plastic products

Solutions to reduce the use of plastic products in the student community: The results show that students have a high awareness of the harmful effects of plastic waste on the environment and human health, but students still have a habit of using plastic products, especially bottles and plastic glass. Students have a high sense of readiness to use environmentally friendly alternatives. This will be an important basis to propagate and mobilize students to reduce and give up the habit of using plastic products. From the actual status of students' knowledge, attitudes and practice towards plastic products, the study offers a number of. Firstly, propagandize, raise awareness, and encourage students to use more friendly alternatives. Schools, Unions, Associations and Clubs need to promote activities such as instructing on garbage classification, reuse and recycling of used products, exchange of garbage to accumulate points and receive back more environmentally friendly products such as cloth bags, rice straws. In addition, it is necessary to train and disseminate information on plastic waste to the campus canteens in order to limit the use of plastic cups and foam boxes. Encourage students and sellers to use AnEco products (a biodegradable product in accordance with international degradable standards). Secondly, integrate the content "say no to plastic waste" in training sessions, student activities and extracurricular activities. Education is extremely important because education can change people's knowledge, attitudes and behaviours towards plastic waste management. The work of "saying no to plastic waste" should be done step by step, and applied to all subjects, from staff, lecturers to students. The first step is to encourage reduction, then to ban the use of products that cannot be recycled or reused. The university needs to closely direct mass organizations such as Trade Unions, Youth Unions and training units to develop specific plans, and at the same time strengthen supervision in the implementation. Thirdly, encourage scientific research topics, inventions and researches of lecturers and students related to the development of green products to replace plastic products. The application of scientific and technological solutions to the environment not only contributes to the reduction of pollution and protection of natural resources, but also facilitates the application of scientific research and development achievements into production, promoting technology transfer and innovation in practice. Finally, promulgate regulations, improve solid waste collection and management. Invest in replacing traditional trash cans into a form that can be classified and rearranged in a reasonable manner. The university should issue regulations to help students raise awareness. For example, if students do not comply with the regulations, typically throwing garbage in the wrong place will be warned, minus points for practice.

Conclusion: The results of this study showed that students at Can Tho University have generated and will generate a large amount of plastic waste. However, they have a relatively high awareness of the impacts of plastic waste on the environment and human health. Therefore, they are very willing to implement regulations and solutions to limit the amount of plastic waste generated in the future. More importantly, the study identified facilities that could reduce students' use of plastic products, including a preference for environmentally friendly products, specific regulations on reducing the use of plastic

products, and encouragement from relatives, friends and influential people in society.

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