International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 10, Issue 12, 2020

Level of Student Awareness in Using Tumbler Water Bottles in an Effort to Reduce the Use of Plastic Bottles

Niswatun Indana Jariyah[a], Ariena Diwa Andarisa[b], Rachely Annisa Dwi Putriadji[c], dan Aufan Asidqi[d], Gigih Prihantono[e*], Ika Atma Kurniawanti[f], [a,b,c,d]Department of Environmental Engeneering, Faculty of Science and Technology, [e]Department of Economics, Faculty of Economy and Bussiness, Universitas Airlangga, [f]Department of Accountancy, Faculty of Economics and Business, Universitas Airlangga, Email: [e*]gigih.pri@feb.unair.ac.id

One of the unsolved problems in Indonesia to date is that of waste . Indonesia produces 187.2 million tons of plastic waste. The community is still lacking in awareness about this problem. This research aims to discover how aware college students are regarding the use of tumbler water bottles as an effort to reduce the use of plastic bottles. The method used in this research is quantitative approach, with the data collection method using questionnaires, which includes eight questions. The sample used in this research is 50 students from the Faculty of Science and Technology, which offers eight different majors and four different year classes. 70% of the respondents are students from the Environmental Engineering major, with also 70% of student respondents having graduated from the class of 2017. From the survey data, 58% students bring tumbler water bottles to the campus, but they are still buying drinks in plastic packaging for the bottle refills. Only 18% students chose not to buy drinks in plastic bottles. The average number of students buy approximately 1-2 drinks in plastic packaging per day, even though they already bring tumbler water bottles. 96% students already know the effects of plastic waste and 90% students already show willingness to reduce plastic bottle waste.

Key words: *Plastic waste, student awareness, tumbler water bottle.*

Introduction

The problem of waste material in Indonesia is one of the problems that has not been resolved to date . Environmental problems arise from the interaction between economic activity and the environment (Basuki & Irwanda, 2018). Industrial growth develops proportionally with the increasing pollution resulting from the industrial production process as a production waste that can increase air and water pollution at dangerous levels (Agustia, Sawarjuwono, & Dianawati, 2019; Eriandani, Narsa, & Irwanto, 2019). The increasing number of people causes the volume of waste to increase indirectly. The use of plastic base material on various products causes the volume of waste material produced in a large part to be plastic waste. Plastic waste is a type of waste that is difficult to decompose, requiring around 20 years or even 100 years for decomposition to take place . Plastic waste is known to reduce soil quality and cause water pollution.

Indonesia is the second largest producer of plastic waste in the world. Jambeck (2015), stated that Indonesia produced plastic waste reaching 187.2 million tons. This relates to data submitted by the Ministry of Environment and Forestry that plastic products from 100 stores or members of the Indonesian Retail Entrepreneurs Association (APRINDO) within a year have reached 10.95 million pieces of plastic bag waste. This amount is equivalent to an area of 65.7 hectares of plastic bags.

Indonesian public awareness of the dangers of plastic waste is still lacking. This is evidenced by the fact that there are still many people who prefer to use or buy plastic-based packaging, for example by purchasing bottled plastic water for school supplies. Public awareness is an important factor in reducing the amount of plastic waste in Indonesia. Public awareness of the dangers of plastic waste can be influenced by the level of knowledge of the community. The realisation of prevention of the dangers of plastic waste that can be carried out by the community is simple, for example, the replacement of plastic packaging with materials that are more environmentally friendly, for example the use of tumbler bottles for drinking water in order to reduce plastic bottle waste.

Students are part of the community which is assumed to be largely aware of the dangers of plastic waste to the environment. This encourages researchers to conduct research by making students as respondents, to acknowledge the level of student awareness of the risk of plastic waste through the use of tumbler bottles to replace plastic bottles. Students who were respondents to this study were students of the Faculty of Science and Technology, Universitas Airlangga.

Literature Review

Waste

Waste is an item that is considered to be unused and discarded by the previous owner or user, but for some people it can still be used if managed with the right procedure (Panji, 2013). According to the definition of the World Health Organization (WHO), waste is something that is not used or something that is discarded that comes from human activities and does not happen by itself (Chandra, 2006). The Waste Management Law Number 18 of 2008 states that waste is the remnant of human daily activities and / or from solid natural processes.

American public health experts set some boundaries- waste is something that is not used or something that is discarded, which comes from human activities, and does not happen by itself. Based on this limitation, it can be concluded that waste is the result of human activities that has been disposed of because it is already useless. Thus garbage has the following principles:

1. There is some type of solid material
2. There is a direct / indirect relationship with human activities
3. The object or material is not used anymore (Notoatmodjo, 2003)

The problem of waste material is a difficult thing to solve. In fact, it can be interpreted as a cultural problem because of its impact on various aspects of life, especially in big cities. Therefore, if the waste is not handled properly, it will cause impacts such as water, air, and soil pollution resulting in the source of the disease (Ahmann & Dorgan, 2007).

Plastic

Plastic is one of the organic materials that has been formed when exposed to heat and pressure. Various forms of plastic exist, such as bars, sheets or blocks. Products that use plastic include bottles, food wrappers, pipes, tableware, and others. Plastic composition and material are polymers and other additive substances. Polymer is composed of monomers bound by chemical bond chains. The advantages of plastic compared to other materials include strength, light weight, flexibility, rust resistance, not easily broken, easy to colour, easy to form, and good as heat and electricity insulators.

In general, plastics have properties that are low density; insulation against electricity; have varying mechanical strength; limited temperature resistance; chemical resistance varies.

Impact of Plastic Waste on Environment

Plastic waste buried in the soil cannot be decomposed by soil microorganisms, causing the mineral content of the soil to decrease. This causes fauna in the soil to decrease due to difficulties in obtaining food and shelter. In addition to causing minerals in the soil to decrease, the presence of plastic waste in the soil can cause O2 levels in the soil to decrease. This causes fauna that live in the soil to experience difficulties with breathing and causes eventual death. This has a direct impact on plants that inhabit the area.

Research Methodology

This research was conducted using a quantitative approach. This quantitative approach involves collecting data in the form of numbers which are then interpreted according to the variables that the researcher wants to know. This quantitative method can produce differences between one group and another group, and what influence these differences have on variables that can answer the research objectives (Margiyanti, 2013). The variable that researchers want to measure or know is the level of awareness of students in using tumbler bottles in an effort to reduce the use of plastic bottles.

The data collection method used in the study was distributing questionnaires. A questionnaire is a form that contains questions that are asked to a number of respondents to get responses from these respondents (Atmanta, 2010). The questionnaire distributed in this study contained eight structured questions with multiple choice answers. All answers had to be filled out by the respondent so that each question had the same amount of respondent data.

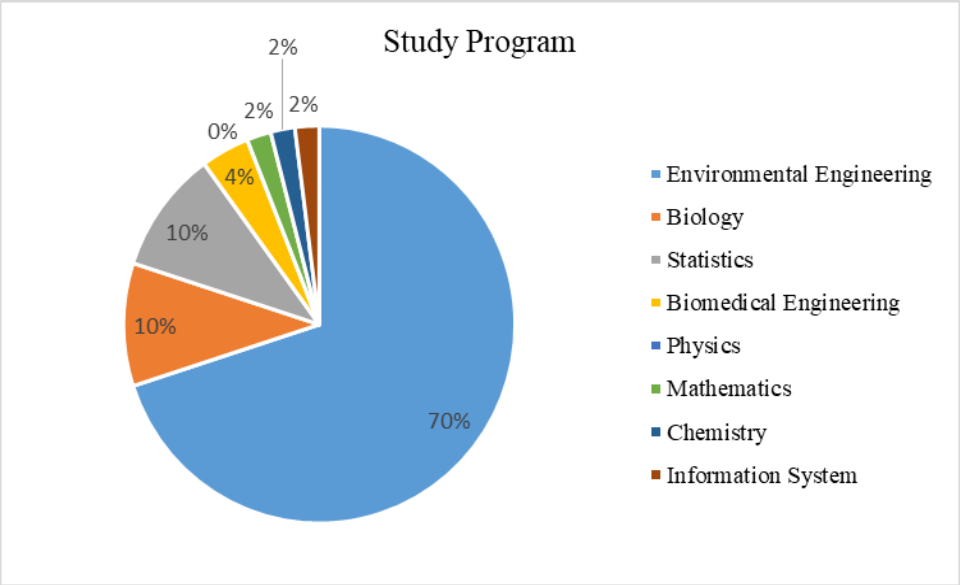
Population and sample research must also be determined because it becomes an important thing in conducting a study. Population is a generalisation area that contains research objects that have certain characteristics that want to be studied and conclusions taken (Joedianto, 2017). The population in this study was a group of students of the Faculty of Science and Technology, Universitas Airlangga. The sample is a part or object that represents the population studied, where the sampling method used in this study is convenience sampling, which is a method of collecting samples that focus on convenience. Convenience sampling is done by selecting samples randomly or intentionally as long as the sample is included in the object of the study population. The sample used in this study was 50 students of the Faculty of Science and Technology, Unversitas Airlangga (Margiyanti, 2013).

Result and Discussion

The research conducted with the method of collecting data using this questionnaire collected data from 50 respondents of the students of the Faculty of Science and Technology, Unversitas Airlangga from various study programs and years of force. The questionnaire contained eight questions, which included study programs, knowledge of tumbler bottles, samples that had brought tumbler bottles, samples that still bought drinks in plastic bottles, frequency of buying plastic bottles in a day, knowledge of plastic bottles as waste hazards , as well as efforts from samples to reduce plastic bottle waste. All questions had to be answered by all respondents and results are varied.

Students of the Faculty of Science and Technology, Universitas Airlangga consist of eight different study programs, namely Mathematics, Physics, Chemistry, Biology, Environmental Engineering, Biomedical Engineering, Statistics, and Information Systems. Based on the questionnaire distributed to 50 respondents, the results are as follows:

Figure 1. Percentage Diagram of Respondents Study Program Diagram

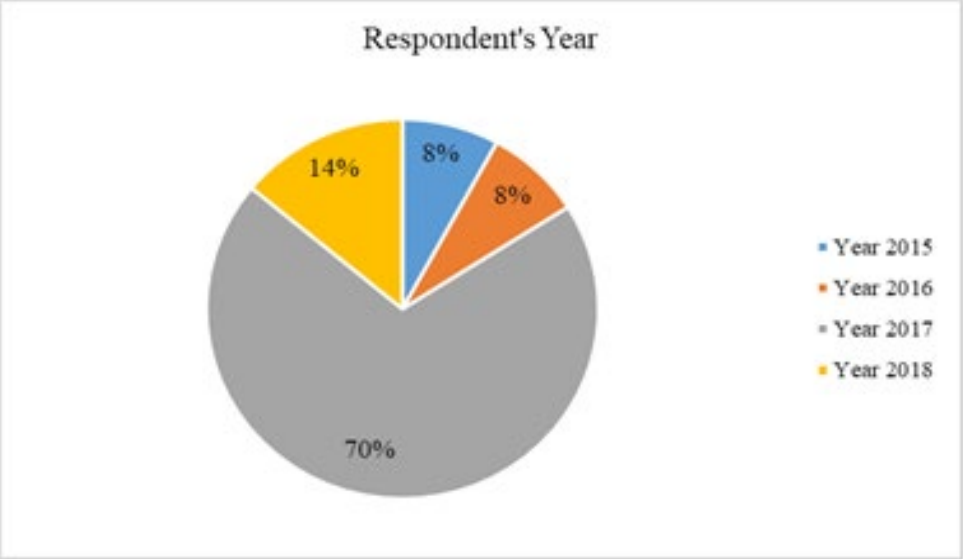


Based on the percentage diagram of the study program of the 50 respondents who filled out the questionnaire, it was found that as many as 70% of the respondents were students of the Environmental Engineering study program. Only 30% of respondents obtained from seven other study programs, 10% came from Statistics and Biology study programs, 4% of Biomedical Engineering student respondents, 2% each came from Information Systems, Chemistry, and Mathematics study programs, while no Physics study students became a respondent. This can show that most students who were willing to take part in the questionnaire were students from the Environmental Engineering study program, where

Environmental Engineering students are involved in this field, namely problems concerning the environment. Environmental Engineering students who discuss their daily impacts and ways to overcome problems in the environment have a tendency to participate in things that are in harmony with their fields. Students from other study programs, who in their daily life do not discuss much about environmental issues, mostly were not willing to fill in the questionnaire, but do not rule out the possibility that other study program students also care about environmental problems. This level of concern will be answered through the next questionnaire points.

Students of the Faculty of Science and Technology, Unversitas Airlangga who are still active in taking courses on campus consist of four different academic years, namely the class of 2015, class of 2016, class of 2017, and class of 2018. Students from these different academic years are quite easy to find in the campus environment, so it's easy to share questionnaires. Some students from the older generation of 2015 are also still in the campus environment, yet difficult to find, so the authors distributed questionnaires only to the sample from 2015 to 2018 academic year students. Based on the questionnaire distributed to 50 respondents, the results are as follows:

Figure 2. Percentage Diagram of Respondents's Year Percentage

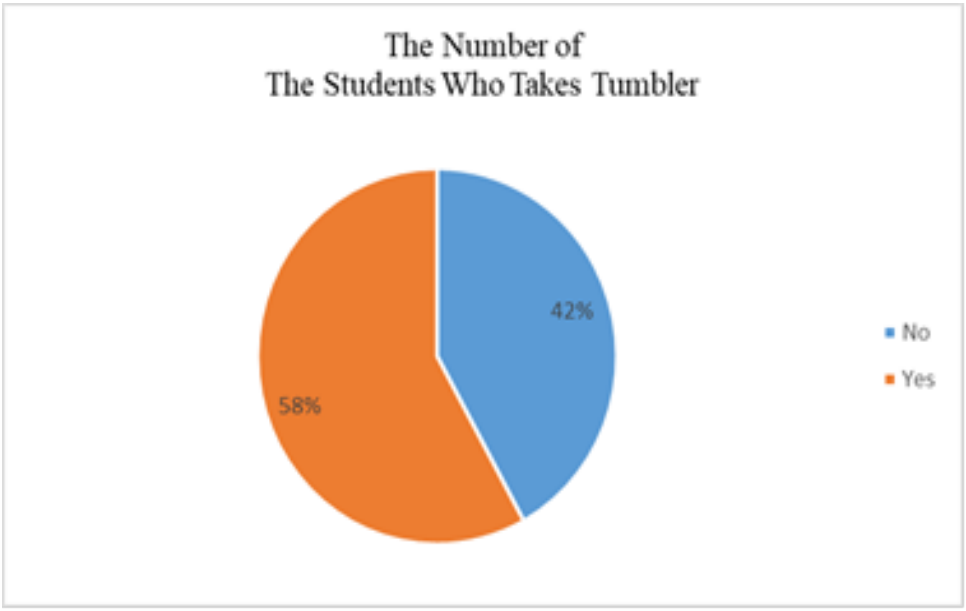


Based on the percentage year diagram of the respondents above, out of 50 student respondents, as much as 70% of respondents, 35 students are from the year 2017. The 2018 batch of students is 14% or seven students, while students from 2015 and 2016 are willing to participate in filling out this questionnaire comes to only four students or 8%. The number of students from the class of 2015 and 2016 which at the time of data collection was on campus is not too much, so that the sample of students from the two classes was only a little. This does not necessarily mean that students of 2015 and 2016 have no desire to participate,

but there are not too many students, so that the sample obtained is also small. Students of 2017 and 2018 who are still frequently passing around the campus caused this sample of students from 2017 and 2018 to be easily found and willing to fill out questionnaires.

The survey results conducted on fifty science and technology faculty students showed that all of them knew what a tumbler bottle was. . Tumbler bottles can be used to bring drinks and by carrying their tumbler bottles, students indirectly have helped reduce the amount of bottled junk in the faculty. Based on survey data from fifty students who used 29 tumbler bottles, one day they brought bottles to campus, while the remaining 21 did not carry tumbler bottles. The data can be seen in the following chart diagram.

Figure 3. Percentage Diagram of the Number of The Students Who Take Tumblers

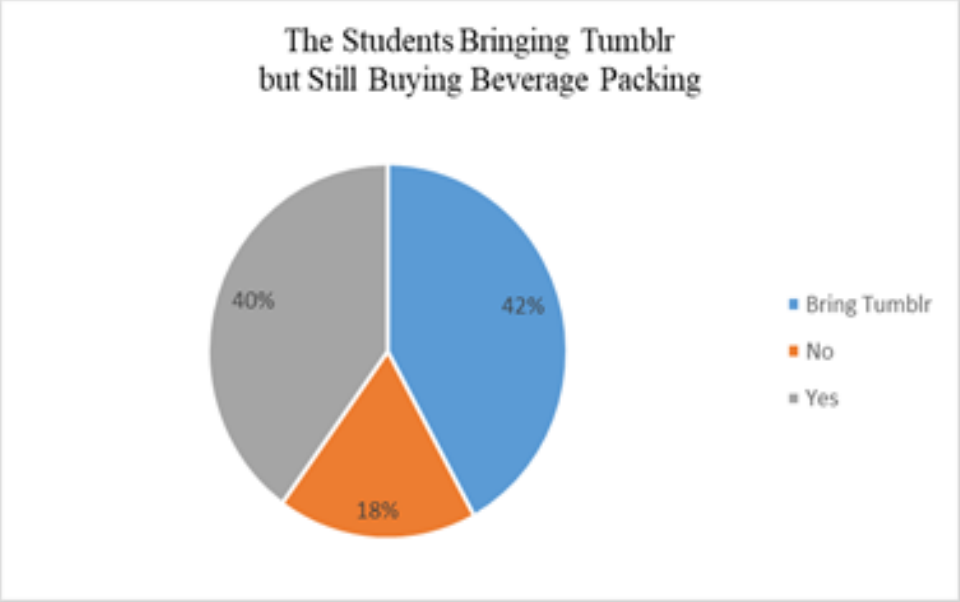


From the diagram above, it can be seen that of the fifty students surveyed, 58% of them had brought plastic bottles to campus every day. This means that 58% of students are already concerned about the environment, because by carrying a tumbler students can reduce the consumption of bottled drinks. . But the remaining 42% still do not use tumblers which shows that there are still many FST students who are not yet aware of the dangers of plastic waste. Data shows that the difference between those who bring tumblers and those that do not carry tumblers is only 16% or around eight people. This slight difference shows that the level of student awareness of the dangers of plastic waste is still low.

Another problem arose when we asked respondents whether when they brought tumbler bottles they still bought packaged drinks, out of the 58% of respondents, 40% of them were still buying plastic packaged drinks, while 18% of them chose not to buy bottled drinks anymore. The reason they keep buying on average is because tumbler bottles alone are not

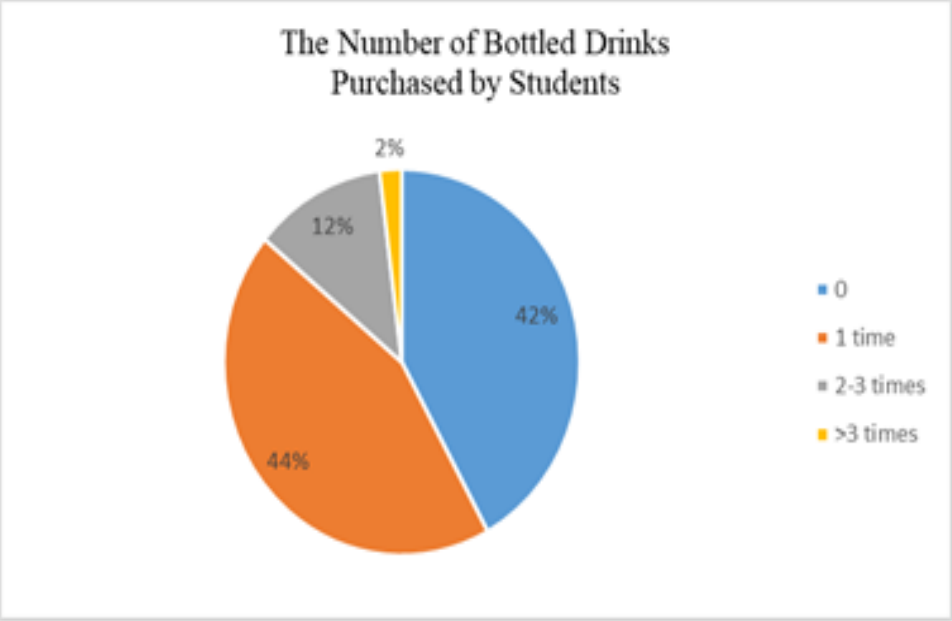
enough to meet their daily water needs. This shows that the percentage of students who buy plastic packaged drinks is even greater, considering that even though they have brought tumblers, most students still buy more plastic packaged drinks. The drinks they buy on average are mineral water used to refill the tumbler bottles they have brought. The data can be seen in the following chart diagram.

Figure 4. Percentage Diagram of the Students Bringing Tumblers but Still Buying Packed Beverages



The number of students who consume plastic packaged drinks can be caused by the many sellers who provide packaged drinks which are actually practical and the prices are very cheap, so students choose to buy rather than having to bother carrying a tumbler from home. Students who have brought tumblers have no choice but to buy plastic packaged drinks to refill their tumbler bottles, because the campus does not provide refill gallons so students can fill their tumblr bottles without having to buy bottled drinks. There is no refill station, which causes an increasing percentage of students who buy bottled drinks, which means more plastic bottles are disposed of at the faculty every day. Students were then asked how many bottles of drinks are purchased each day. Survey data can be seen in the following chart diagram.

Figure 5. Percentage Diagram of the Number of Bottled Drinks Purchased by Students

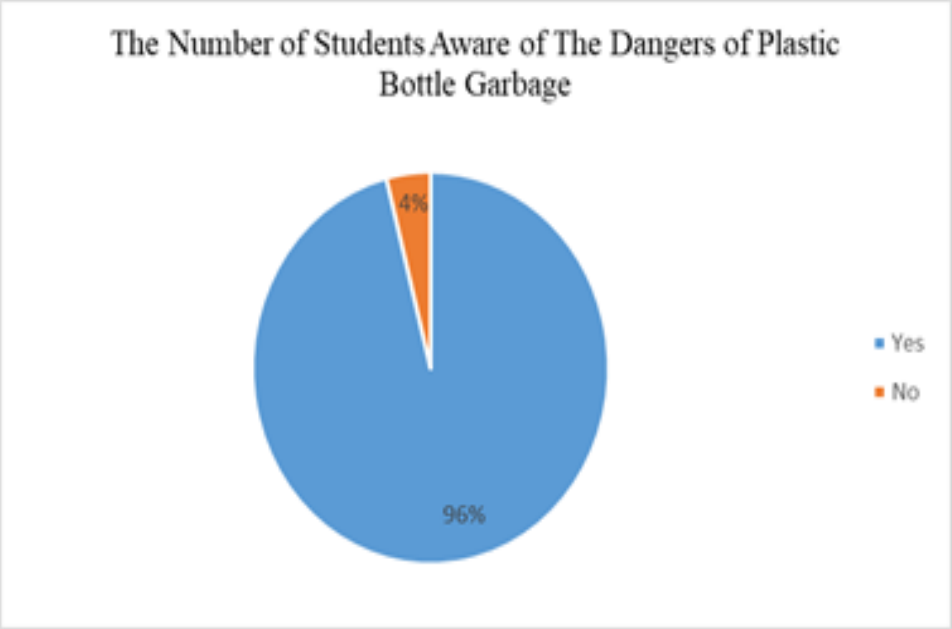


From the survey data it can be seen that 42% of students do not buy bottled drinks, 44% of students buy at least one bottled drink, 12% of students buy at least two to three bottles of drinks every day, and the remaining 2% buy more than three bottled drinks every day. From this data, it can be concluded that there are still many students who buy bottled drinks for consumption every day. This also causes a lot of plastic waste produced by the Faculty of Science and Technology (FST) students every day. From the data, it can be seen that 44% of students buy one bottle of plastic every day, if the number of FST students is as many as one thousand, at least 440 bottles of junk are produced every day. 12% of students buy two to three bottles of drinks; if every student buys three bottles of drinks, at least 360 bottles of waste are produced every day. As many as 2% of students buy more than three bottles a day, if students buy five bottles then the waste produced is as much as one bottle of plastic waste every day. So every day, FST students produce as many as nine hundred bottles of garbage and 27,000 bottles of garbage every month. This fantastic amount shows that FST students are still less concerned with the dangers generated from plastic waste, as seen from the amount of plastic waste produced and the lack of awareness to reduce consumption of bottled drinks by students.

Plastic also requires a very long time to decompose. Plastics can take around 500-1000 years to be absorbed into the environment. Many chemicals are used in the process of making plastic, if these chemicals are too long in the environment, this certainly can have a negative impact on the environment and the health of the human body, such as being able to remove carcinogenic substances that can cause cancer (Oktaviani, 2017). Acknowledging that the impact of plastic bottles is very dangerous, then information about the risks and negative

impacts of plastic waste should become widely known to everyone, so that the use and disposal of plastic bottles can be controlled or even reduced to a minimum.

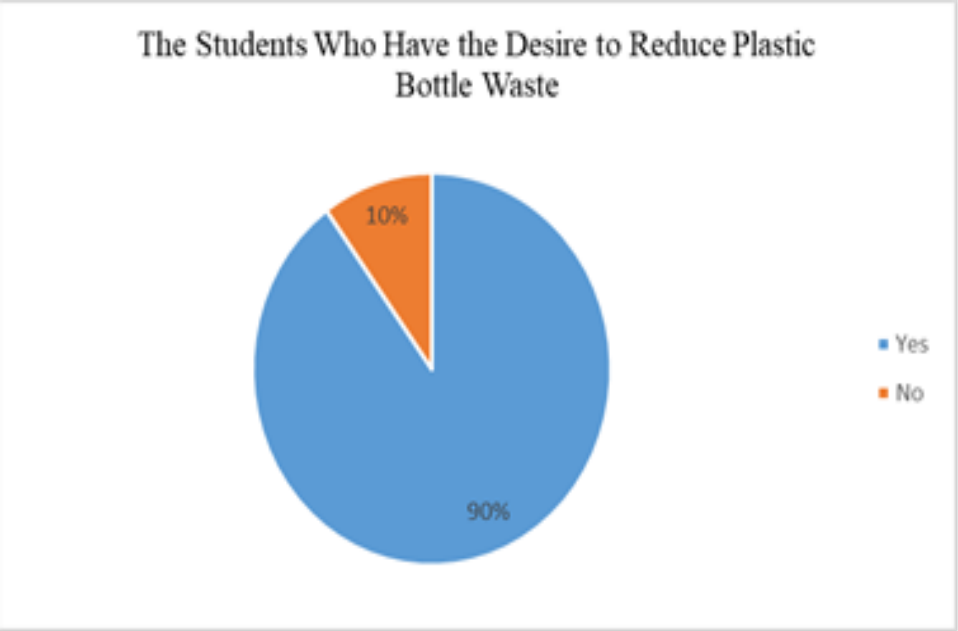
Figure 6. Percentage Diagram of the Number of Students Aware of The Dangers of Plastic Bottle Garbage



The survey results showed that 96% of respondents, as many as 48 students, knew about the dangers that could be caused by plastic bottles. The other 4%, as many as two students, stated that they did not know about the dangers that could be caused by plastic bottles. This shows that most students already know and are aware of the dangers of plastic bottle waste, although there are still some students who do not understand the dangers posed by plastic bottles.

Knowing the dangers posed by plastic bottle waste, which has a negative impact on the environment and health, of course there is a need for efforts to reduce the use and disposal of plastic bottles. Efforts to reduce plastic bottle waste must start from each individual or consumer.

Figure 7. Percentage Diagram of the Students Who Have the Desire to Reduce Plastic Bottle Waste



The survey results showed that there were as many as 90% of respondents; as many as 45 students who had the desire to reduce plastic bottle waste, while 10% of the other respondents, namely as many as five students preferred not to make efforts to reduce plastic waste. Students who choose to reduce plastic bottle waste are students who have known the dangers posed by plastic waste bottles on health and the environment. Students who choose not to reduce plastic bottle waste are some students who do not know the dangers that can be caused by plastic bottles. While the other part is students who already know the dangers posed by plastic bottles but still choose not to make efforts to reduce plastic bottle waste. This shows that there are already many students who are aware of the importance of making efforts to reduce plastic bottle waste, even though there are still students who choose to refuse to do plastic bottles waste storage.

Conclusion

The conclusion that can be drawn from the above analysis is that the students of the Faculty of Science and Technology (FST) of Universitas Airlangga, consisting of 50 respondent students from eight different study programs showed that 58% of students had taken tumblers and the remaining 42% did not carry tumblers. However, of the 58% of the students who brought tumblers as much as 40% of them apparently continued to buy bottled plastic drinking water, while the remaining 18% chose not to buy bottled plastic water. The results of the next survey showed 42% of students did not buy plastic bottles at all, while 44% of students bought at least one bottle a day and 12% of students bought 23 bottles a day, and the

remaining 2% bought up to three or more bottles each day. Amongst the 50 student respondents, 96% of them understood and were aware of the dangers posed by plastic bottles, while the remaining 4% did not yet know. The results of the data also show that only 90% of students have the desire to reduce plastic bottle waste, while the other 10% are reluctant to try. This shows that the students of the Faculty of Science and Technology have understood the impact caused by plastic bottle waste and have the willingness to reduce plastic bottle waste, but students are still reluctant to make a real effort to reduce plastic bottle waste, which is shown through the many plastic bottles purchased by students. Education about the dangers posed by plastic bottles and the importance of reducing the use of plastic bottles still needs to be improved for students to minimise the impact of plastic bottles on health and the environment.

REFERENCES

Agustia, D., Sawarjuwono, T., & Dianawati, W. (2019). The Mediating Effect of Environmental Management Accounting on Green Innovation-Firm Value Relationship. *International Journal of Energy Economics and Policy*, *9*(2), 299-306.

Ahmann, D., & Dorgan, J. R. (2007). Bioengineering for pollution prevention through development of biobased energy and materials state of the science report. *Industrial Biotechnology*, *3*(3), 218-259.

Atmanta, Ignasius Tri Sunarna (2010). *Perception of Use of Library Interior Design at the Atma Jaya University Library in Yogyakarta* (Doctoral dissertation, Faculty of Humanities).

Basuki, B., & Irwanda, R. D. (2018). Environmental cost analysis and reporting to measure environmental performance in realizing eco-efficiency at PT Industri Kereta Api (Persero). *Asian Journal of Accounting Research*, *3*(2), 169-180.

Chandra, B. (2006). Introduction to Environmental Health. Penerbit Buku Kedokteran EGC. (In Bahasa)

Eriandani, R., Narsa, I., & Irwanto, A. (2019). Environmental Risk Disclosure and Cost of Equity. *Polish Journal of Management Studies*, *19*(2), 124-131.

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., ... & Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, *347*(6223), 768-771.

Joedianto, Yovita Diana Belinda. (2017). *Influence of Community Awareness on the Environment on Community Interest in Saving in the "Sawo Kecik" Garbage Bank of Gebang Permai Temple, Yogyakarta.* (Thesis, Universitas Sanata Dharma). (In Bahasa)

Margiyanti, E. T. (2013). *The Effect of Environmental Awareness on Purchasing Intentions of Green Products (Study of Students of Muhammadiyah University of Surakarta)* (Doctoral dissertation, Universitas Muhammadiyah Surakarta). (In Bahasa)

Notoatmodjo, S. (2003). Health education and behavior. *Jakarta: rineka cipta*, *16*, 15-49.

Panji, N. (2013). Guide to Making Liquid Compost. *Jakarta: Pustaka Baru*. (In Bahasa)

Oktaviani, N. (2017). Analysis of Waste Management and Impacts on the Consumption of Residents Around the Final Disposal Site. *Qawãnïn: Journal of Economic Syaria Law*, *1*(1).