

A Study on the Waste Separation at Source and 3R Practice Among the Primary School Children in Muar District, Johor

Laawanya Manimaran¹, Roslinda Ali^{1*}

¹ Department of Civil Engineering Technology, Faculty of Engineering Technology

Universiti Tun Hussein Onn Malaysia, pagoh Higher Education Hub, 84600 Pachor, Johor, Malaysia

*Corresponding Author: linda@uthm.edu.my.

DOI: <https://doi.org/10.30880/peat.2024.05.02.079>

Article Info

Received: 28 December 2023

Accepted: 17 January 2024

Available online: 25 November 2024

Keywords

Solid waste management, waste separation at source and 3R practice

Abstract

Solid Waste Management (SWM) is a multifaceted problem comprising political, socioeconomic, institutional, and environmental aspects. Due to exponential urban growth, it has become one of the most significant issues faced by urban spaces in developing countries. This research aims to investigate the role of education in influencing the waste separation and 3R behaviour of primary school children in Muar District, Johor. Three selected primary schools in Muar are chosen to participate in this study. A total of 480 questionnaires were distributed to the respondents and the results were analyzed by using the SPSS software. From the results, it can be said that there is a relationship between 3R-related activities conducted in school with students' willingness to practice waste segregation and 3R in their daily lives. In addition, it can be concluded that female (88 respondents, 50.6%) are more likely to practice separation at source and 3R in their daily lives compared to male (86 respondents, 49.4%). However, even though the understanding and awareness level of waste segregation and 3R practice among primary school students are considered relatively good, the students did not practice them in their everyday lives. One of the main reasons identified was the unavailability of the recycling bins.

1. Introduction

Solid waste management (SWM) is defined as the control of waste generation, storage, collection, transfer, transport, processing, and disposal of solid wastes consistent with the best practices of public health, economics and finance, engineering, administrative and legal, and environmental considerations [1]. Malaysia is a developing country that is still struggling with improper solid waste management due to a lack of attitude, perception, and willingness among individuals to practice separation at source and 3R [2]. Improper solid waste management will cause many negative effects towards the environment and human health as well. To resolve this issue, the Malaysian government enforced mandatory waste separation in the year 2016. Mandatory waste separation is a process where households must segregate their wastes into recyclable items such as plastic, paper, metal, aluminium, glass, and e-waste, and non-recyclable items (general wastes) [3].

Early education plays a major role in educating the students about recycling, and other environmental issues. Primary school students are at the best age to learn and become aware of recycling which in turn, can lead them to develop proper environmental attitudes and adopt pro-environmental behaviors later as adults [3]. Although environmental education has successfully increased environmental awareness among students, it is still not

effective in changing the attitude and behavior of the students to practice waste separation and 3R [4]. Therefore, this study is interested in determining the understanding and awareness level of waste separation and 3R knowledge among the primary school children in Muar District, Johor. In addition, this study is also to investigate how far the respondents practice waste separation and 3R in their daily activities and to determine the factors that prohibit the respondents from practicing waste separation and 3R practice in their daily lives.

2. Literature Review

Many studies have been conducted by scholars from all around the world regarding separation at source and 3R. From this research, there are a few factors have been identified that play a role in shaping one's behaviour to practice separation at source and 3R. These factors include i) knowledge on waste separation, ii) insufficient waste collection and recycling facilities, and iii) Accessibility of recycling bins. This will be elaborated in detail in the following sub-sections.

2.1 Knowledge on waste separation

Students are viewed as unique individuals who can create their own identities and lives. Therefore, the foundation for establishing knowledge, attitudes, and values of sustainable development must be formed at a young age [11]. However, according to [11], the students are aware of the waste separation and 3R practices, but they are not practicing it. This is because, research by [12] stated that, some schools are not conducted any recycling programs to primary school students thus they did not to get the opportunity to practice it. According to [12], one of the factor students prohibit to practice waste separation at source and 3R is because the absence of recycling bins in schools' surroundings. Therefore, these factors make them to refuse to practice waste separation therefore, without practicing waste separation they are lack of knowledge.

2.2 Insufficient waste collection and recycling facilities

Insufficient facilities are one of the main challenges faced by primary school students. According to [11],[12], most of the students are willing to practice waste separation if the schools provide better facilities for waste separation, for example, recycling bins. According to [13], the barrier towards household waste recycling in Indonesia revealed that lack of recycling facilities or inappropriate locations of recycling facilities are among the challenges that discourage householders from practising waste separation and recycling [13].

2.3 Accessibility of recycling bins

The presence of recycling bins has a great influence on recycling behaviour as it induces students to participate in recycling and waste separation [14], accessibility to recycling bins is one of the most important attributes in fostering waste separation behaviour among primary school students. Therefore, the recycling bins must be easily accessed in school surroundings where the higher waste is generated. Various colours of recycling bins are recommended for accessibility to recycle waste. The preparation of different colours of recycle bins can influence recycling behavior among students [14]. The most common categories of recycling bins provided for the students include paper, plastics, aluminium, and general bins. Moreover, the placement of the recycling bins must also be considered. Based on a previous study [15], to increase the rate of recycling among students, recycling bins should be located not far away from trash bins in schools. Some students do not think whether their waste is recyclable or not and just go to the nearest bin as it is easier. Therefore, indirectly, when the recycling bins are placed within walking distance from the classrooms, they are willing to practice waste separation or recycling [15]. The students will eventually learn how to segregate their waste to utilize the recycling bins.

3. Methodology

A total of 600 questionnaires were distributed to three selected primary schools in the Muar District, Johor that have been involved in environmental programs and practical knowledge which are conducted by the SWM Environment. The respondents of the study include the Level 1 and Level 2 students. Level 1 students consist of Lower Primary 1, 2 and 3 while Level 2 students consist of Upper Primary 4, 5 and 6. The questionnaire booklet consists of three parts. Part 1 is on the background of the respondents. Part 2 on the other hand, is to identify the factors that motivate the respondents to practice waste segregation and 3R in their daily activities while Part 3 identifies the factors that prohibit the respondents from practising waste segregation and 3R. A 5-point Likert scale was used to explore the level of agreement of the respondents.

The results obtained from the questionnaire survey will be analysed by using the Statistical Package for Social Science (SPSS). Among the analyses used in SPSS Software include descriptive statistics, cross-tabulation analysis, and correlation tests. The overall research methodology is illustrated in Figure 1 below.

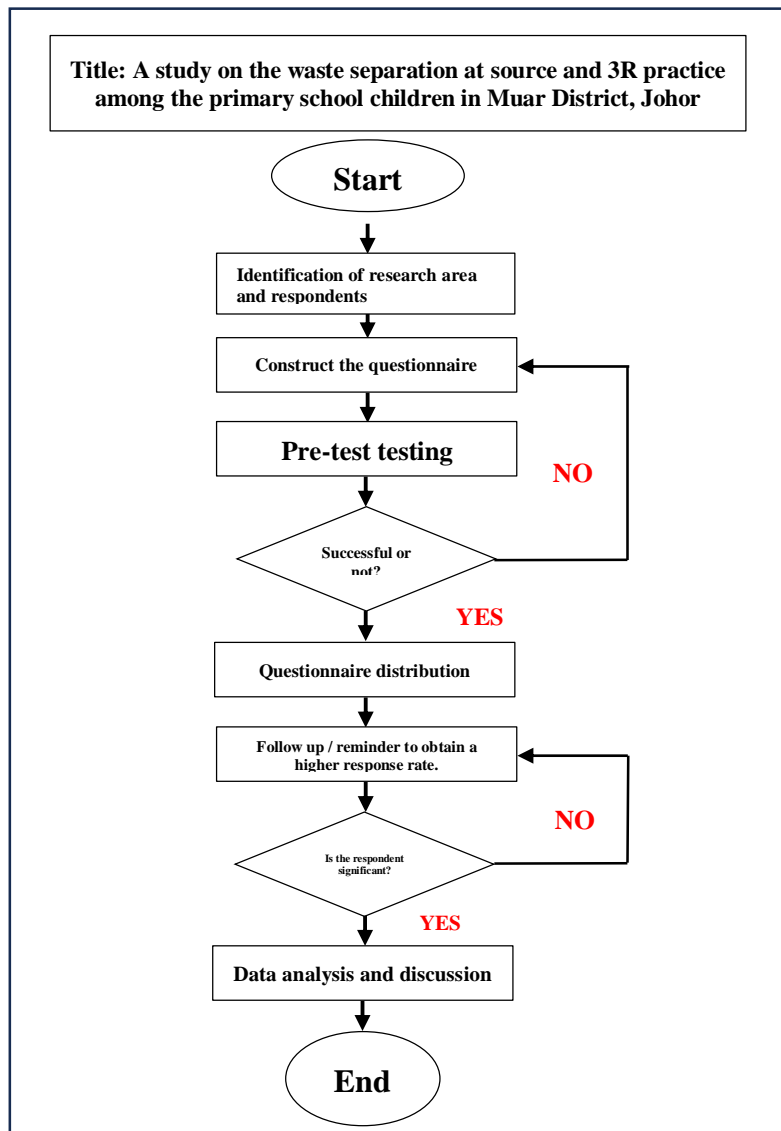


Figure 1: Flowchart of research

2.2 Findings and Discussions

A total of 200 questionnaires were distributed to every school that agreed to participate in this survey which brings to a total sample size of 600. However, for SK Panchor, SK Pekan Pagoh and SK Lenga, only 200,189 questionnaires and 15 questionnaires respectively can be used for data analysis. From this amount, a total of 198 males (49%) and 206 females (51.0%) took part in answering the questionnaire survey for this research. In terms of the level of education, the majority of the respondents that took part in the survey were from the upper primary level with 261 respondents (72.3%) while the balance was from the lower primary level with 143 respondents (27.7 %). Next, most of the respondents who took part in this survey were Malays (400 respondents, 98.4%) followed by Chinese (4 respondents, 1.6%). A summary of the demographic profile is presented in Table 1.

Table 1: Summary of demographic profile

Characteristics:	Category:	Frequency (n):	Percentage (%):
Gender	Male	198	49.0
	Female	206	51.0
Level	Lower primary level	143	35.4
	Upper primary level	261	64.6
Ethnicity	Malay	400	98.4
	Chinese	4	1.6
	Indian	0	0.0
	Others	0	0.0
School	SK Panchor	200	49.5
	SK Pekan Pagoh	189	46.8
	SK Lenga	15	3.7

The respondents were also asked on their knowledge of waste segregation and 3R. The respondents were also asked to choose the correct 3R symbol. The majority of respondents, i.e. 397 respondents answered correctly while the balance, which is 7 respondents could not identify the 3R symbol correctly. Next, the respondents were also asked about the importance of the 3R concept in human life. A total of 377 respondents (93.3%) agreed that the 3R concept plays a major role in human life. Meanwhile, 13 respondents (3.2%) answered 3R concept is not important in human life, and the balance 14 respondents (3.5%) were not sure about this. Respondents view on purpose of waste separation and 3R also were identified. From a total of 404 respondents, a large number of the respondents (258 respondents, 63.7%) chose between 2 and 3 purposes of separation at source and 3R. The purposes are to keep the environment, community, and country clean followed by the separation of waste at source and 3R can generate side income. Moreover, a total of 332 respondents (82.2 %) agreed that the school conducted activities regarding waste separation meanwhile the remaining 72 respondents (17.8%) disagreed with this.

A correlation test was conducted to investigate how far the 3R-related activities conducted by the schools influenced the respondents' behaviour to practice waste separation at source and 3R. The results showed that the correlation coefficient (0.026) is relatively lower than the significance level (0.05). This indicates there is a relationship between 3R-related activities conducted in school with students' willingness to practice waste segregation and 3R in their daily lives. This finding supports the results by [10], that stated recycling activities conducted by schools play a major role in primary school students practicing waste separation at source and 3R in their daily lives.

2.2.1 Factors that encourage them to practice separation at source and 3R

A total of 174 respondents (43.1%) practised separation at source and 3R in their daily activities. From this number, 86 of them are males (49.4%) while 88 (50.6%) of them are females. A few factors have been identified that play a major role in influencing respondents to practice waste separation and 3R in their daily lives. The factors include i) attitude, ii) knowledge, and iii) recycling facilities. In terms of attitude, a total of 8 statements were provided to assess how far the attitude of the respondents influenced their willingness to practice waste separation and 3R. The results are presented in Table 2.

Table 2: Level of agreement on the influence of attitude towards respondent’s separation at source and 3R practice

No	Statement	Level of agreement									
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1	I and/or my family think that practicing waste segregation and 3R is a waste of time.	67	38.5	31	17.8	38	21.8	14	8.0	24	13.8
2	I and/or my family think that waste segregation and 3R cannot save disposal processing costs.	49	28.3	57	32.9	33	19.1	22	12.7	12	6.9
3	I and/or my family members are forced by the people around me to practice separation at source and 3R.	42	24.3	50	28.9	39	22.5	29	16.9	13	7.5
4	I and/or my family consider separation at source is responsibility of local authorities.	20	11.5	40	23.0	56	32.2	36	20.7	22	12.6
5	My family members encouraged me to practice separation at source and 3R.	21	12.1	22	12.6	34	19.5	49	26.4	46	26.4
6	I and/or my family practice waste segregation and 3R because it is our responsibility as Malaysians.	33	19.0	20	11.5	24	13.8	38	21.8	59	33.9
7	Waste segregation and 3R programs organized by the government encourage me and/or my family to recycle	20	11.5	25	14.4	35	20.1	27	15.5	67	38.5
8	I and/or my family think that practicing separation at the source and 3R can produce a good citizen	12	6.9	17	9.8	42	24.3	50	28.9	52	30.1

From Table 2, it can be summarized that the respondents strongly agree with 3 out of 8 statements. The first statement is, “I and/or my family practice waste segregation and 3R because it is our responsibility as Malaysians” with 59 respondents (33.9%). This is followed by “Waste segregation and 3R programs organized by the government encourage me and/or my family to recycle” with 67 respondents (38.5%) and lastly, “I and/or my family think that practising separation at the source and 3R can produce a good citizen” with 52 respondents (30.1%). This statement is supported by previous researchers [9],[10]and [11] who claimed that primary school students show more interest in waste separation when people surrounding them show a good attitude towards separation at source and 3R practice. Apart from that, the students tend to practice waste segregation and 3R when encouraged by their family members to do so [10].

In terms of knowledge, a total of 6 statements were provided to assess how far the knowledge of the respondents influenced their willingness to practice waste separation and 3R. The result illustrated in Table 3.

Table 3: Level of agreement on the influence of knowledge towards respondent’s separation at source and 3R practice

No	Statement	Level of agreement									
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1	Separation at the source and 3R can guarantee the income of the people and the country	14	8.0	25	14.4	46	26.4	45	25.9	44	25.3
2	Waste segregation and 3R can reduce the greenhouse effect	35	20.1	40	23.0	45	25.9	18	10.3	35	20.1
3	I am in the opinion that the 3R-related programs conducted in my school are insufficient	29	16.8	34	19.7	66	38.2	21	12.1	23	13.3
4	Waste segregation and 3R practice cannot guarantee employment opportunities for the people and the country	50	28.7	40	23.0	40	23.0	26	14.9	18	10.3
5	Knowledge of waste segregation and 3R practice is lacking among me and/or my family	22	12.7	45	26.0	52	30.1	36	20.8	18	10.4
6	Separation at source and 3R do not provide any benefits	68	39.1	28	16.1	35	20.1	29	16.7	14	8.0

From Table 3, it can be summarized that the respondents chose scale neutral for 4 out of 6 statements in terms of knowledge and respondents’ willingness to practice waste segregation and 3R. The statements are “Separation at the source and 3R can guarantee the income of the people and the country” with 46 respondents (26.4%), “Waste segregation and 3R can reduce the greenhouse effect” with 45 respondents (25.9%), “I am in the opinion that the 3R-related programs conducted in my school are insufficient” with 66 respondents (38.2%) and lastly “Knowledge of waste segregation and 3R practice is lacking among me and/or my family” with 52 respondents (30.2%). This finding is supported by [5] that as individuals can understand better the recycling practice, they tend to become more environmentally conscious and practice them moderately.

In terms of recycling facilities, a total of 2 statements were provided to assess how far the recycling facilities influence their willingness to practice waste separation and 3R. The results are presented in Table 4.

Table 4: Level of agreement on the influence of recycling facilities towards respondent's separation at source and 3R practice

No	Statement	Level of agreement									
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1	I and/or my family could not practice separation at the source and 3R because of the lack of recycling bins at home	36	20.7	57	32.8	38	21.8	26	14.9	17	9.8
2	I and/or my family cannot practice separation at the source and 3R because there not enough garbage collection trucks in my area	29	16.7	56	32.2	47	27.0	27	15.5	15	8.6

From Table 4, it can be summarized that the respondents disagree with both statements. The statements are "I and/or my family could not practice separation at the source and 3R because of the lack of recycling bins at home" with 57 respondents (32.8%) and "I and/or my family cannot practice separation at the source and 3R because there not enough garbage collection trucks in my area" with 56 respondents (32.2%). This finding is like [12] who stated the insufficiency of facilities, including recycling bins coupled with the inappropriateness in the location of recycling facilities and the schedule of collection.

2.2.2 Perception of the respondents' refusal to practice waste separation and 3R

A total of 227 respondents (56.2%) did not practice separation at source and 3R in their daily activities. Of this number, 111 of them are male (48.9%) while 116 (51.1%) of them are female. The respondents were asked about their level of agreement on factors that prohibit them from practicing waste segregation and 3R. A total of 11 statements were prepared for the respondents to answer. The results are presented in Table 5.

Table 5: Level of agreement on respondent's refusal to practice waste separation and 3R

No	Statement	Level of agreement									
		Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1	I and/or my family member carry reusable bags when we go shopping	20	9.0	37	16.7	49	22.1	75	33.8	41	18.5
2	I do not know the location of the recycling bins in my housing area	54	24.4	46	20.8	38	17.2	58	26.2	25	11.3
3	There is no information about separation at source and 3R in my school	57	25.7	41	18.5	62	27.9	36	16.2	26	11.7
4	Practicing waste segregations and 3R cannot protect the environment and cleanliness of our country	100	45.0	46	20.7	26	11.7	24	10.8	26	11.7
5	I and/or my family members believe that waste segregation and 3R practice is a waste of time	91	41.0	48	21.6	40	18.0	24	10.8	19	8.6
6	Separation at source and 3R practice do not have any benefits	83	37.4	77	34.7	31	14.0	22	9.9	9	4.1
7	Activities related to waste segregation and 3R in my school are not beneficial	78	35.1	61	27.5	39	17.6	22	9.9	22	9.9
8	Recycling bins are unsystematic and hard to management recyclables	61	27.5	52	23.4	50	22.5	32	14.4	27	12.2
9	I do not know the location of the recycling bins in my school	58	26.1	51	23.0	52	23.4	39	17.6	22	9.9
10	People surround me do not give me encouragement to practice waste segregation and 3R	45	23.0	65	29.3	61	27.5	30	13.5	21	9.5
11	I and/or my family do not practice waste segregation and 3R because it is not our responsibility to do so	56	25.2	58	26.1	39	17.6	36	16.2	33	14.9

From Table 5 it can be concluded that the respondents agree with 2 out of 11 statements in terms of respondents refusing to practice waste separation at source and 3R. The statements are "I and/or my family member carry reusable bags when we go shopping" with 75 respondents (33.8%) and "I do not know the location of the recycling bins in my housing area" with 58 respondents (26.2%).

5. Conclusion

In conclusion, waste separation at source and 3R practice is an important thing that everyone needs to understand and know about. It can be seen from the data obtained that there is a relationship between 3R-related activities conducted in school with students' willingness to practice waste segregation and 3R in their daily lives. In addition, female respondents are more likely to practice separation at source and 3R in their daily lives compared to male respondents. From the data obtained, it can be said that females are more aware of the 3R concept than male respondents. Two factors prohibit the respondents from practicing waste segregation and 3R in their daily activities. First and foremost, the location of recycling bins in their housing area is unidentifiable making them reluctant to practice 3R. The second factor is respondents are aware that carrying reusable bag along with them while go shopping is good, but they refuse to do that. This is because some of the retailers are still providing free plastic bags to their customers. Unfortunately, these two factors are prohibiting the respondents from practicing waste separation and 3R practice in their daily lives. As for future recommendation, this survey should be conducted in secondary schools as well to determine the level of awareness between primary and secondary schools. Moreover, the survey should be conducted in the schools which never been exposed to solid waste management by SWM Environment to know their practices on solid waste compared to the schools that get exposure from the programmes conducted by SWM Environment.

References

- [1] Altikolatsi, E., Karasmanaki, E., Parissi, A., & Tsantopoulos, G. (2021). Exploring the Factors Affecting the Recycling Behavior of Primary School Students. *World*, 2(3), 334–350. <https://doi.org/10.3390/world2030021>
- [2] Artika H, N., Mz, Y., & Mt, N. F. (2019). An Overview Of Scheduled Wastes Management In Malaysia. *Journal of Wastes and Biomass Management*, 1(2), 01–04. <https://doi.org/10.26480/jwbm.02.2019.01.04>
- [3] Chua, H. S., Bashir, M. J. K., Tan, K. T., & Chua, H. S. (2019). A sustainable pyrolysis technology for the treatment of municipal solid waste in Malaysia. 6TH INTERNATIONAL CONFERENCE on ENVIRONMENT (ICENV2018): Empowering Environment and Sustainable Engineering Nexus through Green Technology. <https://doi.org/10.1063/1.5117076>
- [4] Daim, N., & Mohamed Radhi, N. A. (2023, March 12). No room for trash in Malaysia by 2050? *New Strait Times*. Retrieved March 14, 2023, from <https://www.nst.com.my/news/nation/2023/03/888278/no-room-trash-malaysia-2050>
- [5] Elliott, R. (2021). Probability and Non-Probability Samples. *GeoPoll*. <https://www.geopoll.com/blog/probability-and-non-probability-samples/>
- [6] Ferronato, N., & Torretta, V. (2019). Waste Mismanagement in Developing Countries: A Review of Global Issues. *International Journal of Environmental Research and Public Health*, 16(6), 1060. <https://doi.org/10.3390/ijerph16061060>.
- [7] Kalton, G., & Conway, F. (2019). Descriptive Statistics. *Applied Statistics*, 12(3), 195. <https://doi.org/10.2307/2985799>
- [8] Khalil, M., Abdullah, S., Abd Manaf, L., Sharaai, A., & Nabegu, A. (2017). Examining the Moderating Role of Perceived Lack of Facilitating Conditions on Household Recycling Intention in Kano, Nigeria. *Recycling*, 2(4), <https://doi.org/10.3390/recycling2040018>

- [9] Kok Siew Ng. (2023). Towards Sustainable Municipal Solid Waste Management in Malaysia. University of Oxford and Brunel University London. Malaysia Population 1950-2023. (2023). Macro Trends. Retrieved April 20, 2023, from <https://www.macrotrends.net/countries/MYS/malaysia/population>
- [10] Mohd Noor, N. H., Soleman, N. A. F., & Khairul Azuan, A. S. (2023). To Recycle or Not to Recycle? Factors Affecting Malaysian Residents' Intention for Recycling E-Waste. Malaysian Journal of Social Sciences and Humanities (MJSSH), 8(2), e002102. <https://doi.org/10.47405/mjssh.v8i2.2102>
- [11] Mohd Rodzi, R., Mohd Nopiah, Z., & Ahmad Basri, N. E. (2019). Analysis of Solid Waste Generation and Composition in Malaysia TVET Campus. International Journal of Integrated Engineering, 11(2). <https://doi.org/10.30880/ijie.2019.11.02.017>
- [12] Parvin, F., & Tareq, S. M. (2021). Impact of landfill leachate contamination on surface and groundwater of Bangladesh: a systematic review and possible public health risks assessment. Applied Water Science, 11(6). <https://doi.org/10.1007/s13201-021-01431->
- [13] Rashid, F. H. Waste-to-energy: The preferred approach for Malaysia's waste management The Malaysian Reserve. <https://themalaysianreserve.com/2023/01/09/waste-to-energy-the-preferred-approach-for-Malaysia-waste>
- [14] Ridzuan, M. B., Zani, A. B. M., Rahman, N. N. A., Rabun, M. N. B., & Yaacob, N. A. (2022). Solid Waste Management and Recycling Practices Among PPR Sri Pantai Residents: A Move Towards Sustainability. International Journal of Academic Research in Business & Social Sciences, 12(9). <https://doi.org/10.6007/ijarbss/v12-i9/14757>
- [15] Samah, M. A. A., Abd Hamid, K. B., & Ishak, M. Y. (2015). Analysis of Municipal Solid Waste Generation and Composition at Administrative Building Café in Universiti Putra Malaysia: A Case Study. Polish Journal of Environmental Studies, 24, 1969–1982. <https://doi.org/10.15244/pjoes/39106>
- [16] Susanto, N., Davidesyta, L., Nurkertamanda, D., & Putranto, T. T. (2019). The influence of behavioral prediction factors and intention in improving 3R (reduce, reuse, recycle) household behavior in Tanjung Mas, Semarang, Indonesia. In Nucleation and Atmospheric Aerosols. American Institute of Physics. <https://doi.org/10.1063/1.5112406>
- [17] SN, C. (2017). Solid Waste Pollution: A Hazard to Environment. Recent Advances in Petrochemical Science, 2(3). <https://doi.org/10.19080/rapsci.2017.02.555586>
- [18] World Health Organization: WHO. (2018). Health-care waste. [www.who.int. https://www.who.int/news-room/fact-sheets/detail/health-care-was](https://www.who.int/news-room/fact-sheets/detail/health-care-was) World Population 1950-2023. (2023). Macro Trends. Retrieved April 19, 2023, from <https://www.macrotrends.net/countries/WLD/world/population>
- [19] Zain, N. M., Anua, S. M., Marzuki, N. S., & Rahman, H. A. (2022). A Comparative Study on the Effectiveness of 3R (Reuse, Reduce and Recycle) Programme among Primary School Students in Tumpat, Kelantan. International Journal of Academic Research in Business & Social Sciences, 12(14). <https://doi.org/10.6007/ijarbss/v12-i14/15823>