

**WASTE SEPARATION AT SOURCE BEHAVIOUR AMONG
UNDERGRADUATE STUDENT IN UNIVERSITI
TEKNOLOGI MARA (UiTM) CAWANGAN SELANGOR
KAMPUS PUNCAK ALAM**

ABSTRACT

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Source separation of waste is essential to address the crisis in waste management in Malaysia. Effective and efficient system to manage the accumulated waste generated is required as to reduce the drawback posed to the environment and human health. Consequently, the government has taken various approaches to open the eye of the public regarding current situation and the urgency to minimise the waste disposed in the landfill. However, the efforts taken were focussing among households rather than the young generations like university students. Therefore, by the application of the theoretical framework; Theory of Planned Behaviour (TPB), a study on waste separation at source behaviour was conducted among students as to determine the factors that most influence their intention to conduct source separation behaviour. In this cross-sectional study, 197 undergraduate students from Faculty of Health Sciences, UiTM Puncak Alam were involved. An online questionnaire were administered for assessing socio-demographic and TPB constructs which composed of attitude, subjective norms, perceived behavioural control (PBC), separation intention, and waste separation behaviour. The findings demonstrate that subjective norms are the factor that most influence the intention to perform waste separation behaviour, whereas PBC is the critical factor that directly influences the waste separation behaviour.

Keywords: Source separation, waste management, Theory of Planned Behaviour (TPB), waste separation behaviour, university's student.

1.0 INTRODUCTION

In recent decades, municipal solid waste (MSW) management has been and will continue to be one of the significant issues faced by countries worldwide, especially in developing countries including Malaysia. The generation of MSWs in Malaysia marked increment 100.75% where 38,142 tonnes on 2018 compared to 19,000 on 2005 (Muhammad Yusri Muzamir, 2020). Ballooning population, rapid urbanization and industrialization in urban areas are the major factors that contribute to the risen of MSW amount (Yousefloo & Babazadeh, 2020). According to The World Bank (2019), the generation of MSW in urban areas is predicted to reach around 6.1 million tons per day by 2025. This can be supported by the statement stated by Yousefloo & Babazadeh (2020), which claimed that MSW is one of the significant peripheral product of the city, while Artiola (2019) added that waste generation rate are proportional to the social standards as the more wealthy and advance the individuals or societies, the more waste are produced. However, the risen of MSW number does not cause any changes in the method of disposal as Malaysia still depends on landfilling, which is the least preferred option in the hierarchy of solid waste management.

To tackle the issue posed by the MSW, Malaysian government has taken a wise step by privatising and integrating its solid waste management. Privatization has given to the private companies such as Alam Flora Sdn Bhd and SWM Environment Sdn Bhd. Legislation such as Solid Waste and Public Cleansing Management Act 2007 (Act 672) and Local Government Act 1976 (Act 171) has been enacted with the aims to provide and regulate the management of solid waste and public cleansing in order to maintain a proper sanitation. Local authority also has extensively conducted

campaigns that aim to create awareness among Malaysian regarding current condition or situation faced by the government to dispose the MSW generated.

In fact, Malaysia is one of the participating countries with 2030 Agenda for Sustainable Development, in specific known as 17 Sustainable Development Goals (SDGs) or Global Goals introduced by United Nations. Therefore, Separation at Source Initiative (SSI) under Solid Waste and Public Cleansing Management Act 2007 (Act 672) has been launched and effective in September 2005 that requires Malaysians to participate in practicing waste separation at home as it is also under the responsible consumption and production goals category. Corresponding to the government's effort, Solid Waste Management and Public Cleanliness (SWCorp) Malaysia also has executed SWCorp Strategic Plan 2014–2020, which emphasises on mind set, behaviour and culture, collaboration and synergy, policy and regulations, organizational capacity, technology system and facilities, law enforcement, and delivery system and at the same time to achieve the objectives stated in National Solid Waste Management Policy (Moh & Abd Manaf, 2017).

Although Malaysian government is committed to improve this significant issue, based on current statistics of solid waste generation, it indicates that the awareness among the public is still low and according to Yoke et al. (2019), in the year 2017, only 17.5% of Malaysian reducing their waste through waste segregation although the SSI has been introduced. Moh & Abd Manaf (2017), also stipulated that public participation and commitments in practicing waste separation at source still lack among Malaysian due to the deficiency of civic responsibility coupled with their perception towards local authorities as the only responsible party in maintaining the MSW problem.

Current practice in disposing solid waste further aggravates the situation as the method can be considered as the least effective compared to other methods. Even though it is commonly implemented in Malaysia, there is a great number of immoderate landfills without inappropriate bottom liners, leachate collection, or treatment system. Based on the data published by SWCorp (2019), there are a total of 311 landfills where 146 are operated landfills while the rest, 165 are non-operated landfills. However, out of 146 operated landfills, only 18 were categorized as sanitary landfills.

As the landfilling is the least preferred option in the hierarchy of solid waste management, various downside to human and environment can be found in applying this system. From the previous studies, it proved that the by-products of landfill treatment that are leachate and landfill gas posed negative impact to the environment and human health (Hussein et al., 2020; Shabdin et al., 2019).

To address this problem, every party including the citizens themselves need to play their role in ensuring that MSW can be reduced. One of the best ways to overcome this issue is by recycling, where the separation of waste at the source is necessary as a prerequisite (Zhang et al., 2015). Basically, waste separation is a practice, which requires considerable efforts in individuals to sort, assemble and store their waste (Ayob & Sheau-Ting, 2016). National and local government have to be the front-liner to make this movement achievable by encouraging the public participation to high levels since it needs the changes of norm or behaviour to be made in every person to segregate their production of waste at source. However, most of the efforts taken by the government are focussing more on households rather than to the young generations such as students.

The approach taken in the efforts to enhance the solid waste separation should be focused on the young generations. One of the reasons are university usually has a clear and appropriate solid waste management system. The management system of solid waste in the university commonly includes the management of the university and the students' communities, therefore, it is easier to determine stakeholders' responsibilities and strengthen publicity on university campuses rather than in residential areas. Next, it is due to a similar generation of types of waste in a certain concentrated key location. These factors cause the source separation system in campuses becomes uncomplicated and comparably easier to operate. They also can act as source separation forerunners as they are young and highly educated, which can be considered as an advantage as it results in a better understanding of a proper waste segregation and the adoption of new processes to achieve the environmental sustainability (H. Zhang et al., 2017).

Several factors have to be taken into consideration as the decision of waste separation is assumed as a tedious task. Therefore, theory-based studies are needed for a better comprehension regarding the mechanism that is responsible for separation behaviours (D. Zhang et al., 2015). Adhering to the requirement, theory of planned behaviour or TPB as in Figure 1 , provides a theoretical framework to aid identifying the factors that influence the decision of waste separation in individuals as the theory has been broadly used to determine waste behaviours (Hasan et al., 2015; Xu et al., 2017; H. Zhang et al., 2017). According to the theory, individual behaviour is guided by three considerations which are the belief about the likely outcomes of the behaviour (attitude), the belief of normative expectations of others and the motivation to comply to the expectation (subjective norm) and the belief of the presence of the factors that

facilitate or impede the behaviour performance and the perceived power of these factors (perceived behavioural control) (Razali et al., 2020). The combination of these factors in general may lead to the formation of behavioural intentions. Xu et al. (2017) justify that perceived behavioural control is the determinant that can directly anticipate the behaviour.

As to improve the predictive validity of the TPB, some studies have recommended adding another variable such as environmental knowledge and situational factors (Ayob & Sheau-Ting, 2016; Hasan et al., 2015; Ma et al., 2018). However, most of the previous studied conducted are focussing on waste separation among household (Ma et al., 2018; Millati et al., 2019; Nguyen et al., 2015). Very limited number of study conducted among young generations in Malaysia. Therefore, the aim of this study were to determine and evaluate the influential factors that most influence source separation behaviour among university students as young generations at UiTM Puncak Alam, Selangor by application of Theory of Planned Behaviour (TPB).

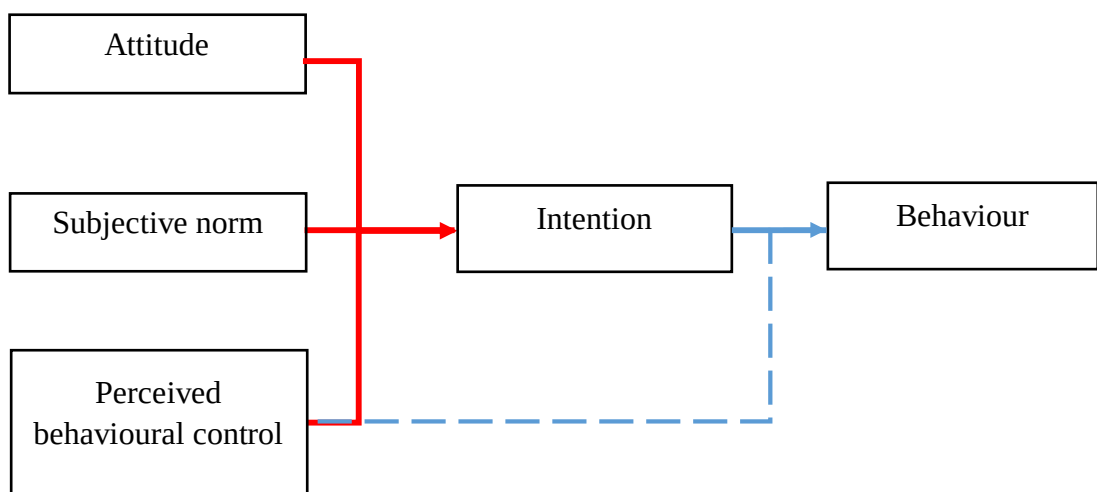


Figure 1. The model of the Theory of Planned Behaviour (TPB)

2.0 METHODOLOGY

2.1 *Research Design*

This study is a quantitative study and the design of the study is a cross-sectional study. Based on Cherry (2019), cross-sectional studies are commonly used in developmental psychology such as individual's beliefs, attitude and behaviours. Therefore, this type of research design was selected to describe the prevalence of waste separation behaviour among university students specifically the students under Faculty of Health Sciences in UiTM Puncak Alam, Selangor. The data was collected within three months, particularly from October until December 2020.

2.2 *Sampling*

Non-probability sampling design specifically the convenience sampling or also known as the availability sampling was employed where the students were conveniently available to participate in the study. Generally, non-probability sampling does not rely on a random selection as in probability sampling, so, the participants can be biased as they are not belong to the population required in the study (Yousaf Saeed, 2018). To counter this issue, more samples are taken and inclusion and exclusion criteria of the samples have been set before the data is collected.

Undergraduate and full time students from Faculty of Health Sciences in UiTM Puncak Alam were the sample population in this study. The number of sample involved for this study was 197 samples as its population size is 418. This sample size (S) was determined by using the Krejcie and Morgan (1970) formula and Raosoft (2004) sample size calculator website was used to reconfirm the calculation.

$$\frac{S = X^2 NP(1-P)}{d^2(N-1)}$$

S is the sample size, X^2 is the table value of chi-square for 1 degree of freedom at the desired confidence level, (for the selection of 95% confidence level, the value is 3.841), P is the proportion of population (0.5 is assumed would provide maximum sample size), d is the degree of accuracy which expressed as a proportion 0.05 and N is the size of population.

2.3 Research Instrument

An online questionnaire was utilized as survey instrument in this study to obtain the information from respondents in order to answer the research question in this study. Generally, the questionnaire is an adopt questions mainly from Tonglet et al. (2004); Karim Ghani et al. (2013); D. Zhang et al. (2015); Stoeva & Alriksson (2017); Razali et al. (2020). The questionnaire was administered through an online survey form, namely Google Form. It has been posted in social media that have relation with the study population in order to avoid respondents which do not fall under the category of the study population.

In terms of type of questions, it is a series of closed ended questions where the possible answers are provided for respondents to choose. The questionnaire are consists of six sections namely the demographic information, specific attitude, subjective norms, perceived behavioural control (PBC), behavioural intention and waste separation behaviour. The questions are provided with likert scale or also known as the summated rating scale, which is one of the attitudinal scales designed to measure

the behaviour of respondents towards waste separation. Respondents can categorize their agreements using a five-point scale, where one indicates “strongly disagree and five signifies “strongly agree”. Some of the questions was adapted from the previous study that was related to waste separation and TPB.

2.4 Pilot Study

Online questionnaire was distributed to a total of 30 students who were not included in the actual experiment as a pre-test. This pre-test can be referred as piloting a questionnaire process as it aims to test various aspects of the surveys including the questionnaire. By conducting piloting, it helps in increasing the internal validity of the questionnaire. It also essential to determine the indicators and the questionnaire suitability as a whole by evaluating using internal consistency or reliability approach, namely Cronbach’s alpha in IBM Statistical Program for Social Sciences (SPSS) Statistics (Version 21) . The result from analysis conducted showed that the questionnaire was reliable as the result was 0.928. According to Ursachi et al. (2015), reliability coefficient values (α) of 0.8 or greater indicates a very good level of reliability.

2.5 Statistical Analysis

Analysis of data was performed by using IBM Statistical Package for Social Sciences for Windows (SPSS, v21). First and foremost, Cronbach’s alpha test was applied to identify the reliability of the online questionnaire provided to the respondents as to ensure every question under a variable is measured under similar underlying attributes.

Descriptive statistics specifically the frequencies were used to describe the respondents' socio-demographics data and the mean score for influential variables. To determine the relationship and the strength of relationship between the determinants or predictor and the students' behavioural intention, bivariate analysis, particularly Spearman's correlation was applied as the data distribution was not normally distributed. Next, multiple regression analysis using Enter method was performed to identify the predictor that most influences the waste separation at source behaviour among students.

The identity of the respondents was not revealed as to keep confidential of the respondents' dignity. However, belief and intention prevalence of respondents would not be known, thus the validity of the answers given could not be proven as this study is a cross-sectional study. Therefore, assumption was made that all the respondents being honest in answering the questionnaire given and all data received is valid.

3.0 RESULTS AND DISCUSSIONS

3.1 *Questionnaire data and demographic features*

The demographic data extracted from the field of questionnaire was tabulated in Table 1. A total of 197 respondents that answer the administered online questionnaires are full-time students from Faculty of Health Sciences. Full-time students can be referred as a student that spend more time in class during a semester compare to a part-time student. It is one of the inclusion criteria in the selection of sample in this study.

Most of the respondents were in the age group of 21-23 years (45.2%), followed by students aged 18-20 years (36.0%), 24-26 years (13.2%) and at least were students aged above 27 (5.6%). 83.2% of respondents are female and only 16.8% are male as the actual total number of male students in the population is less than female students. Majority of the respondents do their studies in Environmental Health and Safety field (52.8%), followed by Medical Laboratory (13.2%), Occupational Therapy (9.6%) Nutrition and Dietetics (8.1%), Optometry (5.1%), Physiotherapy (4.6%), and the least are respondents who do studies in Medical Imaging field (2.5%).

Table 1. Summary of respondent's demographic characteristics.

Demographic attribute	Frequency, <i>n</i>	Percentage, %
<i>Age</i>		
18-20	71	36.0
21-23	89	45.2
24-26	26	13.2
Above 27	11	5.6
<i>Gender</i>		
Male	33	16.8
Female	164	83.2
<i>Mode of Study</i>		
Full-time	197	100
Part-time	0	0
<i>Field of Study</i>		
Environmental Health and Safety	104	52.8
Medical Laboratory	26	13.2
Nursing	8	4.1
Nutrition and Dietetics	16	8.1
Optometry	10	5.1
Physiotherapy	9	4.6
Occupational Therapy	19	9.6
Medical Imaging	5	2.5

3.2 Mean difference of factors influencing waste separation behaviour

In this study, Theory of Planned Behaviour (TPB) was used as a framework to understand the waste separation behaviour among students. Under the TPB, there are three antecedents that influence one in performing a specific behaviour. The antecedents stated in the TPB include attitude, subjective norms, and perceived behavioural control. These three factors will lead to the intention that is considered as motivational factors associated to a particular behaviour.

Waste separation behaviour was assessed among students through the application of TPB. According to Table 2, all variables under TPB were evaluated and majority of the respondents showed a positive response to the attitude variable as it was much higher that is 4.72 compared to the other variables. Generally, attitude is described as an individual evaluation being either positive or negative in performing a particular behaviour. Based on the questions asked, it indicated that majority of the respondents interested in separating solid waste at source and they feel responsible to reduce the amount of waste generated. They also opined that waste separation at source is useful, good for environment, sensible as well as rewarding. The plausible reasons for the finding was the current environmental-related knowledge exist among students affect their evaluation toward the behaviour as it been taught indirectly since primary education through the implementation of environmental values in the course outline in Malaysia (Hasan et al., 2015).

As overall, it explained that most of students had positive perceptions and the tendencies of exhibiting waste separation behaviour. According to Shen et al. (2019), young generations will become more aware of the importance of waste separation for they do have a positive attitude towards the segregation of waste.

Table 2. Means of TPB variables.

TPB Constructs	N	Mean $\pm$ SD
Attitude	197	4.72 $\pm$ 0.53
Subjective Norm	197	2.40 $\pm$ 1.49
Perceived Behavioural Control (PBC)	197	2.74 $\pm$ 1.27
Separation Intention	197	2.55 $\pm$ 0.85
Separation Behaviour	197	2.22 $\pm$ 1.50

3.3 Correlations of TPB variables towards waste separation behaviour

Correlation among predictors; attitude, subjective norms, and perceived behavioural control with the waste separation intention were identified. From the analysis, it indicated that there was a significant positive relationship among all the variable towards waste separation behaviour as the p-value is less than 0.005.

Based on Figure 2, respondents' subjective norms were highly influential to the waste separation intention compared to the other two. Although its result was proven to be positively significant as it indicated higher coefficient value among the predictors, yet the relationship strength between this predictor and the intention were categorised as a weak correlation, followed by attitude, and perceived behavioural control that fall under the very weak correlation category.

The result of subjective norm shows that majority of the students face social pressure among their family, friends, fellow college residences, and colleagues. As the students stay in the college, friends, college residences and colleagues seem to influence more rather than their parents. This can be proven by the statement given by H. Zhang et al. (2017) which describes that this findings can be explained by the fact that most of the students spend their time more with their friends than their parents. Therefore, it indicates that the development of social norms in the campus most likely to be effective in cultivating waste separation behaviour thus the more likeliness of the students to separate their waste as daily habit. Shen et al., (2019) also points out that young people including students should ascertain that waste separation sorting is a social behaviour which everyone should actively participate. The MSW separation should be included in basic education so that it can be one of the teaching materials, even classes that may become a practice among students. When waste separation

activity successfully becomes a habit, it is not impossible that these students will intentionally and forcefully promote the work of waste sorting amongst their circle in the future. With this manner, it is possible that social civilization can continually be encouraged to create a cycle.

With regard to attitude, it also denote significant positive effect on student's waste separation intention. This findings shows that even though the students recognize the benefits of waste separation and feel responsible in reducing the waste generated, their expression of intention do not shows significant improved as the correlation between attitude and intention results very weak correlation. These results are similar to the past studies conducted by H. Zhang et al. (2017) that reported the relations between attitude and intention among college students are partly accepted.

This implicit an individual who have a positive attitude towards waste segregation unnecessary lead to intention to perform waste separation behaviour. Nevertheless, by facilitate students to comprehend about the damage that has been occur due to highly generation of waste and enhancing their actual attempt to protect the environment would be worthwhile for improving their behaviour. Hence, government especially local authority should call attention to current situation of environment caused by the municipal solid waste to the young generation such as students, so that it can eye opener for them to change their behaviour. Also, by launching more on field campaigns related to waste sorting, it will help students to have a better understanding on their performance of their actual efforts.

Another predictor of waste separation intention in performing segregation of waste is perceived behavioural control (PBC). PBC was proven to have significant and positive effects although the strength of correlation between PBC and intention

indicates very weak correlation compare to the other predictor. From the analysis conducted, it shows that more than half of respondents (63.5%) clarifying their agreement to do waste separation if there is incentives given to them, yet they are agree waste sorting activity do not take much of their time. This clearly pointed out that the level of willingness among the students in involving waste separation at source activity is low even though they know the way to separate and the place to put them and type of solid waste that can be recycled.

This findings quite similar to the research conducted by Shen et al. (2019), but they found that PBC as second greatest among other predictive factors. However, both studies contrary to the Ma et al. (2018), who research on intentions and behaviour of public towards source separation in one of under-developed areas in China. According to Shen et al. (2019), the reasons of the difference may due to the education status itself, which is university students can be categorized as well-educated, have strong belief in own ability to accomplish and willingness to separate their waste rather than senior individuals.

Based on TPB, PBC and behavioural intention are two major factors that can predict behavioural achievements. As for this study, PBC is the strongest factors compare to waste separation intention in predicting waste separation at source behaviour among students. PBC can be considered as special determinant as it able to direct influence the behaviour itself. However, the result of this study signify that PBC influence more on behaviour rather than intention, which contrast with the study conducted by Ari & Yilmaz (2016) where both, intention and behaviour are greatest affected. Consequently, H. Zhang et al. (2017) conclude that the more opportunities and possibilities a person perceives in carrying out a particular behaviour and the less

challenges predicted, the greater the assumed behavioural regulation, making the behaviour more likely to occur.

Meanwhile, the correlation between separation intention and waste separation behaviour also convey significant and positive impact to the behaviour but the strength is weak compared to PBC that results moderate correlation with behaviour. This specify intentions in separating waste among students do not much influence as the PBC. Since the PBC has greatest influence to the students, the obstacles that prevent students from implementing waste separation need to be identified and come out with a solution as soon as possible. As an example, facilities needed for waste separation activity such as specific bins like recycling bins should be adequately provided in the areas where mostly waste generated such as café and college, where students resides.

As a general rule, the more favourable of the attitude and subjective norm and the greater the perceived behavioural control, the stronger the individual's intention to perform that particular behaviour or in short, intentions drive the behaviour of the individual, while attitude, subjective norm, and perceived behavioural control are the three determinants that influence the intentions.

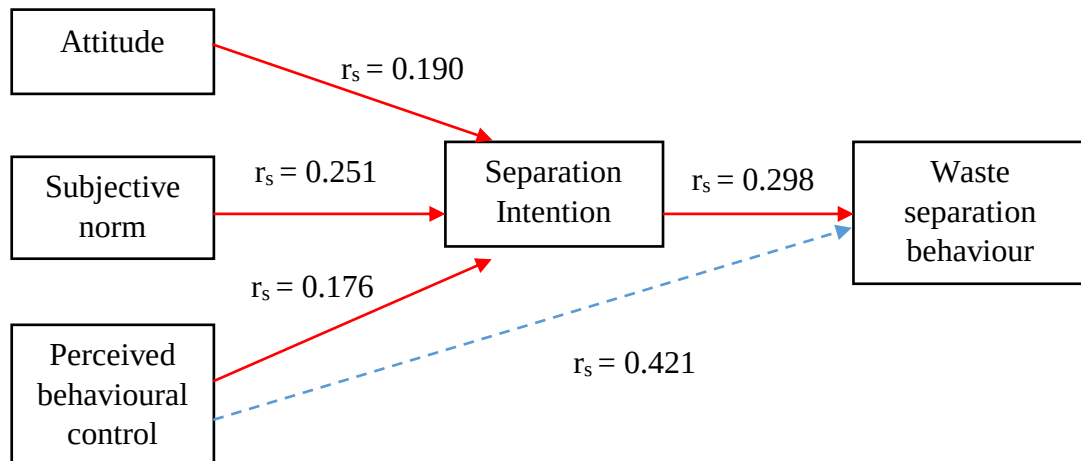


Figure 2. Correlation analysis in application of TPB framework in determination of waste separation behaviour.

3.4 *Factor that most influence waste separation intention*

Subjective norms are proven to be the predictor that most influence the intention among students to commit in waste separation activity as their habit in daily live. It was done by comparing each of the predictor or the determinant relative contribution in explaining the variance towards the intention that can be found out through the beta weight (β) from multiple regression analysis conducted as shown in Table 3. Subjective norm with beta weight 0.200 is much higher compared to other two predictors, attitude and perceived behavioural control.

Since the subjective norm is factors that most influencing the students, the management of university and the government should concentrate promoting activity of waste segregation among the students, so that it can be a norms among them to segregate their waste. However, the impediment that restrain the students from carry out waste sorting should be solved earliest as PBC is the greatest factors that affect separation behaviour rather than intention. Once there is nothing that can hinder the students to perform waste separation, coupled with the high level norms in waste

sorting among the students, the waste separation behaviour can be enhance and influence the future generation.

Table 3. Multiple regression results between determinants.

Factors	Beta, β
Attitude	0.130
Subjective norms	0.200
Perceived behavioural control (PBC)	0.125

4.0 CONCLUSION

Understanding the factors that motivate and influence the intention to perform segregation of waste among students is crucial in order to ensure young generation like students actively participate in this kind of activity. Segregation of waste can be considered as an urgent action that should be implemented by everyone as the amount of waste generated shows alarming situations that can cause various drawbacks to the environment and human health. Effective and efficient of solid waste management is considered as compulsory at this level of situation, but still there is the presence of obstacles that may impede the action. Therefore, by determining the factors that influence the waste separation behaviour among the students by the application of TPB, it can help the authority such as the government and the management of university to identify the deficiency of their current efforts in enhancing the behaviour if segregating the waste and giving ideas for alternative approach to cultivate the awareness among the public especially young generations like students. This study has revealed that subjective norm ($\beta = 0.200$) is the factor that most influence the intention to perform particular behaviour while PBC is the most critical factor that directly affects the source separation behaviour among students. Thus, the corresponding infrastructure that is required should be rational and adequately provided, while to enhancing the norms, comprehensive education and promotion program should be effectuate and proliferate as to strengthen their awareness towards the importance of waste segregation.

5.0 REFERENCES

- Ari, E., & Yilmaz, V. (2016). A proposed structural model for housewives' recycling behavior: A case study from Turkey. *Ecological Economics*, 129, 132–142.
- Artiola, J. F. (2019). *Industrial waste and municipal solid waste treatment and disposal* (3rd ed.). Environmental and Pollution Science. Elsevier Inc.
- Ayob, S. F., & Sheau-Ting, L. (2016). Key determinants of waste separation intention among students on campus. *MATEC Web of Conferences*, 66.
- Cherry, K. (October 10, 2019). *How does the cross-sectional research method work?*
<https://www.verywellmind.com/what-is-a-cross-sectional-study-2794978>
- Hasan, S. N. M. S., Harun, R., & Hock, L. K. (2015). Application of Theory of Planned Behavior in measuring the behavior to reduce plastic consumption among students at Universiti Putra Malaysia, Malaysia. *Procedia Environmental Sciences*, 30, 195–200.
- Hussein, M., Yoneda, K., Mohd-zaki, Z., Amir, A., & Othman, N. (2020). Heavy metals in leachate, impacted soils and natural soils of different landfills in Malaysia, An alarming threat. *ECSN*, 128874.
- Karim Ghani, W. A. W. A., Rusli, I. F., Biak, D. R. A., & Idris, A. (2013). An application of the Theory of Planned Behaviour to study the influencing factors of participation in source separation of food waste. *Waste Management*, 33(5), 1276–1281.
- Ma, J., Hipel, K. W., Hanson, M. L., Cai, X., & Liu, Y. (2018). An analysis of influencing factors on municipal solid waste source-separated collection behavior in Guilin, China by using the Theory of Planned Behavior. *Sustainable Cities and Society*, 37(November 2017), 336–343.
- Millati, R., Cahyono, R. B., Ariyanto, T., Azzahrani, I. N., Putri, R. U., & Taherzadeh, M. J. (2019). *Agricultural, industrial, municipal, and forest wastes*. In sustainable resource recovery and zero waste approaches. Elsevier B.V.
- Moh, Y. C., & Abd Manaf, L. (2017). Solid waste management transformation and future challenges of source separation and recycling practice in Malaysia. *Resources, Conservation and Recycling*, 116(2017), 1–14.
- Muhammad Yusri Muzamir. (2020). *Pembuangan sampah negara meningkat 100.75 peratus*.
<https://www.bharian.com.my/berita/nasional/2020/01/643354/pembuangan-sampah-negara-meningkat-10075-peratus>

- Nguyen, T. T. P., Zhu, D., & Le, N. P. (2015). Factors influencing waste separation intention of residential households in a developing country: Evidence from Hanoi, Vietnam. *Habitat International*, 48, 169–176.
- Raosoft. (2004). *Sample size calculator by Raosoft*. <http://www.raosoft.com/samplesize.html>
- Razali, F., Daud, D., Weng-Wai, C., & Anthony Jiram, W. R. (2020). Waste separation at source behaviour among Malaysian households: The Theory of Planned Behaviour with moral norm. *Journal of Cleaner Production*, 271, 122025.
- Shabdin, N. H., Tamunaidu, P., Rambat, S., & Mansor, M. R. (2019). Greenhouse gas emissions trend in old landfill, Malaysia. *Chemical Engineering Transactions*, 72(September 2018), 211–216.
- Shen, L., Si, H., Yu, L., & Si, H. (2019). Factors influencing young people ' s intention toward municipal solid waste sorting. *International Journal of Environmental Research and Public Health*, 16, 1708.
- Stoeva, K., & Alriksson, S. (2017). Influence of recycling programmes on waste separation behaviour. *Waste Management*, 68, 732–741.
- The World Bank. (2019). *Solid waste management*. The World Bank Group. <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>
- Tonglet, M., Phillips, P. S., & Read, A. D. (2004). Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: A case study from Brixworth, UK. *Resources, Conservation and Recycling*, 41(3), 191–214.
- Ursachi, G., Horodnic, I. A., & Zait, A. (2015). How reliable are measurement scales? External factors with indirect influence on reliability estimators. *Procedia Economics and Finance*, 20(15), 679–686.
- Xu, L., Ling, M., Lu, Y., & Shen, M. (2017). External influences on forming residents' waste separation behaviour: Evidence from households in Hangzhou, China. *Habitat International*, 63, 21–33.
- Yoke, C. C., Mun, Y. W., Munusamy, K., Peng, L. M., Nair, M., & Yean, U. L. (2019). Government initiatives and public awareness on sustainable environment. *Journal of Tourism, Hospitality and Environment Management*, 4(14), 40–50.
- Yousaf Saeed. (2018). *Convenience sampling definition: Why and how to convenience sample – advantages, disadvantages of convenience sampling*. <https://ascholarship.com/convenience-sampling-definition-why-and-how-to-convenience-sample-advantages-disadvantages-of-convenience-sampling/>
- Yousefloo, A., & Babazadeh, R. (2020). Designing an integrated municipal solid waste

management network: A case study. *Journal of Cleaner Production*, 244, 118824.

Zhang, D., Huang, G., Yin, X., & Gong, Q. (2015). Residents' waste separation behaviors at the source: Using SEM with the Theory of Planned Behavior in Guangzhou, China. *International Journal of Environmental Research and Public Health*, 12(8), 9475–9491.

Zhang, H., Liu, J., Wen, Z. guo, & Chen, Y. X. (2017). College students' municipal solid waste source separation behavior and its influential factors: A case study in Beijing, China. *Journal of Cleaner Production*, 164, 444–454.

APPENDIX

APPENDIX A

A Survey on Waste Separation at Source Behaviour among Faculty of Health Sciences Students in Universiti Teknologi MARA (UiTM) Kampus Puncak Alam.

Kajian Mengenai Sikap Pengasingan Sampah dalam Kalangan Pelajar Fakulti Sains Kesihatan di Universiti Teknologi MARA Kampus Puncak Alam.

INSTRUCTIONS: Please check (✓) in the appropriate box to indicate your answer.

PART A: DEMOGRAPHIC INFORMATION

1. Age

18-20 years old

21-23 years old

24-26 years old

Above 27 years old

2. Gender

Male

Female

3. Mode of Study

Part-time student

Full-time student

4. Field of Study

Nursing

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Optometry
 Physiotherapy
 Medical Imaging
 Medical Laboratory
 Occupational Therapy
 Nutrition and Dietetics
 Occupational Safety and Health

Directions: Please indicate your level of agreement or disagreement with each of these statements regarding waste separation. Place ‘✓’ mark in the box of your answer.

1- Strongly disagree 2-Disagree 3-Neutral 4-Agree 5-Strogly agree

PART B: ATTITUDE TOWARDS WASTE SEPARATION BEHAVIOUR

Attitude: Individual evaluation of performing particular behaviour.

		1	2	3	4	5
1.	I am interested in separating solid waste at source.					
2.	For me, waste separation at source is useful.					
3.	Waste separation at source is good for the environment.					
4.	Source separation is sensible and rewarding.					
5.	We have a responsibility to reduce the amount of waste generated.					

PART C: SUBJECTIVE NORMS

Subjective norms: Individual perception of social pressure to perform or not the behaviour.

		1	2	3	4	5
1.	My family think that I should separate solid waste.					
2.	My friends think that waste separation is a good thing to do.					
3.	My fellow college residence think that I should be involved in waste separation.					
4.	My colleagues think that I should be involved in waste separation at source.					

PART D: PERCEIVED BEHAVIORAL CONTROL

Perceived behavioural control: A measure of individual perception of their ability to perform the behaviour in questions.

		1	2	3	4	5
1.	The decision to separate waste is completely up to me.					
2.	I separate waste regardless of whether there are incentives given.					
3.	I know how to separate solid waste generated.					
4.	I know what type of solid waste that can be recycled.					
5.	I know where to put my waste after separation.					
6.	Waste separation at source does not take too much of my time.					

PART E: SEPARATION INTENTION

Separation intention: An evaluation on how likely a person is to perform a behaviour in the future

		1	2	3	4	5
1.	I intend to engage in the government waste separation plan.					
2.	I intend to follow the guidance of the community regarding waste separation.					
3.	I intend to continue the engagement in waste separation.					

PART F: WASTE SEPARATION BEHAVIOUR

Waste separation behaviour: Current practice towards waste separation behaviour.

		1	2	3	4	5
1.	I usually separate my solid waste.					
2.	I regularly separate certain parts of my solid waste by putting them inside the recycling bins.					
3.	I am involved in waste separation activities.					
4.	I have practice waste separation for some time.					