

RECYCLING BEHAVIOR AMONG UNIVERSITY STUDENTS: A THEORY OF PLANNED BEHAVIOUR PERSPECTIVE

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Abstract. Recycling is an essential strategy for promoting environmental sustainability; however, participation among university students in Malaysia remains inconsistent despite ongoing national initiatives promoting the 3Rs (Reduce, Reuse, and Recycle). This study examines recycling behaviour among students at Universiti Teknologi MARA (UiTM) Negeri Sembilan using the Theory of Planned Behaviour (TPB). Specifically, it investigates the relationships between attitudes, subjective norms, perceived behavioural control, and recycling behaviour. A quantitative cross-sectional survey was conducted involving 300 undergraduate students using a structured questionnaire. The data were analysed using descriptive statistics, reliability analysis, and Pearson correlation in SPSS. The findings revealed that students' recycling behaviour was generally low to moderate and that all three TPB constructs were positively and significantly associated with recycling behaviour. Among the TPB constructs, subjective norms exhibited the strongest positive correlation ($r = .730$), followed by perceived behavioural control ($r = .715$) and attitudes ($r = .674$). These findings suggest that social influence plays a particularly important role in shaping students' recycling behaviour. The study further indicates that promoting sustainable recycling practices requires not only environmental awareness but also supportive social environments and accessible recycling infrastructure. The findings contribute to the application of the Theory of Planned Behaviour in the Malaysian higher education context and provide practical insights for university administrators and policymakers seeking to strengthen campus sustainability initiatives through environmental education, improved recycling facilities, and peer-led programmes.

Keywords: *recycling behaviour, Theory of Planned Behaviour, university students, environmental sustainability, Malaysia*

Introduction

Environmental sustainability has become a global priority, with solid waste management recognised as one of the most pressing environmental challenges (Garg and Arora, 2025; Abubakar et al., 2022). Rapid urbanisation, increased consumption, and changing lifestyles have led to a substantial rise in municipal solid waste, placing considerable pressure on landfills and ecosystems worldwide (Voukkali et al., 2024; UN-Habitat, 2018). In response, governments and institutions have increasingly promoted circular economy principles and the 3Rs (Reduce, Reuse, and Recycle) as key strategies to reduce environmental degradation and encourage sustainable living. Universities play a dual role in advancing environmental sustainability. On the one hand, they contribute substantially to local waste generation through their daily operations, academic activities, and campus events. On the other hand, they serve as important platforms for cultivating environmental awareness and sustainable behaviours among future leaders. Consequently, universities provide a unique setting for promoting sustainable practices that can extend beyond the campus into wider society. In Malaysia, solid waste management remains a major environmental challenge. The country

generates more than 30,000 tonnes of municipal solid waste daily (International Trade Administration, 2022). However, its recycling rate is only about 31%, considerably lower than those of neighbouring countries such as Singapore and South Korea (Malaysian Investment Development Authority, 2022). The 12th Malaysia Plan (2021–2025) aims to achieve a national recycling rate of 40% by 2025, focusing on promoting behavioural change alongside improving infrastructure (Harinderan, 2024). However, despite the government's efforts, public participation in recycling remains inconsistent, especially among young people and university students. Although awareness of environmental issues is increasing, previous studies indicate that Malaysian students often recycle at low rates (Omran et al., 2017; Hassan et al., 2011; Abd Manaf et al., 2009). This suggests a gap between their knowledge of the importance of recycling and their actual behaviour.

This study is underpinned by the Theory of Planned Behaviour (TPB) (Ajzen, 1991), which proposes that behaviour is shaped by three key determinants: attitudes, subjective norms, and perceived behavioural control. In the context of recycling, these constructs explain why individuals may express positive intentions towards recycling yet fail to translate them into consistent behaviour. Previous studies have successfully applied the TPB to investigate recycling behaviour across different populations, including university students (She et al., 2024; Yusoff et al., 2024; Djafarova and Foots, 2022; Wu et al., 2022; Omran et al., 2017). Although the Theory of Planned Behaviour has been widely applied to explain recycling behaviour, previous studies have primarily focused on urban universities or general community populations. Comparatively little attention has been given to students studying in semi-urban Malaysian public universities, where institutional resources, campus infrastructure, and socio-cultural characteristics may differ considerably. Furthermore, previous studies have reported inconsistent findings regarding the relative importance of attitudes, subjective norms, and perceived behavioural control in explaining recycling behaviour across different settings. These gaps highlight the need to examine the relationships between TPB constructs and recycling behaviour within different educational contexts. This study focuses on UiTM Negeri Sembilan, a semi-urban public university with a predominantly Bumiputera student population from diverse socio-economic backgrounds. This setting provides an appropriate context for examining how psychological, social, and contextual factors are associated with students' recycling behaviour. Unlike studies conducted in highly urbanised universities, the present study offers insights into recycling behaviour within a semi-urban higher education environment where infrastructural constraints and social influences may shape students' environmental practices differently. In light of this context, the study aims to investigate recycling behaviour among students at UiTM Negeri Sembilan using the Theory of Planned Behaviour (TPB). The objectives of the study are: (1) To determine the level of recycling behaviour among students at UiTM Negeri Sembilan. (2) To examine the relationships between attitudes, subjective norms, perceived behavioural control, and recycling behaviour among students at UiTM Negeri Sembilan.

Literature review

Recycling behaviour has become an important focus of sustainability research, particularly within higher education institutions (HEIs), which generate substantial waste while serving as catalysts for environmental stewardship (Khan et al., 2022; Steg and Vlek, 2009). Universities are uniquely positioned to cultivate pro-environmental

values and behaviours during students' formative years, thereby encouraging sustainable practices that extend beyond campus. This role is particularly important in Malaysia, where universities are expected to contribute to the sustainability agenda outlined in the Malaysia Education Blueprint (Higher Education) 2015–2025 (Ministry of Higher Education Malaysia, 2015). Despite growing environmental awareness, recycling behaviour among Malaysian university students remains inconsistent. Tiew et al. (2019) identified a substantial gap between students' intentions to recycle and their actual recycling practices. Although many students recognise the importance of environmental sustainability, they frequently encounter structural barriers, including inadequate recycling facilities, unclear waste segregation guidelines, and limited institutional support. Psychological barriers, such as perceived inconvenience and scepticism regarding the effectiveness of recycling, further discourage participation. Similar challenges have been reported in higher education institutions across Asia and Europe (Karimi et al., 2021; Linder et al., 2018). However, the Malaysian context presents distinct cultural and infrastructural characteristics that warrant further investigation.

Attitudes toward recycling

Within the Theory of Planned Behaviour, attitudes refer to individuals' positive or negative evaluations of performing a particular behaviour (Ajzen, 1991). Previous studies consistently demonstrate that favourable attitudes towards recycling are positively associated with recycling intentions and behaviour (Yılmaz and Arı, 2022; Ramayah et al., 2010; Bamberg and Möser, 2007). Students who perceive recycling as environmentally beneficial and socially responsible are generally more willing to participate in recycling activities. Nevertheless, positive attitudes alone do not necessarily translate into consistent recycling behaviour. Tiew et al. (2019) reported that although Malaysian university students generally recognise the importance of recycling, many fail to recycle regularly because of limited motivation, inadequate facilities, and perceived inconvenience. These findings suggest that favourable attitudes require supportive environmental and institutional conditions before they can be translated into consistent behaviour.

Subjective norms

Subjective norms refer to individuals' perceptions of social expectations regarding a particular behaviour (Ajzen, 1991). Within university environments, these expectations are shaped by peers, lecturers, institutional culture, and social networks (Wu et al., 2022). In collectivist societies such as Malaysia, social expectations often exert a stronger influence on behaviour because individuals tend to value conformity and group harmony. Studies conducted at East Asian universities similarly demonstrate that participation in recycling increases when students perceive it as a socially accepted or expected behaviour. In contrast, studies conducted in more individualistic societies often report that personal attitudes exert a stronger influence than subjective norms. These differences highlight the importance of considering cultural context when applying the Theory of Planned Behaviour.

Perceived behavioural control

Perceived behavioural control (PBC) refers to individuals' perceptions of their ability to perform a particular behaviour (Ajzen, 1991). In the context of recycling, PBC

reflects students' confidence in their ability to recycle and their perception of whether sufficient resources and opportunities are available. Previous studies have shown that accessible recycling facilities, clear waste segregation systems, and environmental knowledge enhance perceived behavioural control and encourage recycling behaviour (Karimi et al., 2021; Linder et al., 2018). In Malaysia, inadequate recycling facilities and inconsistent waste management practices remain significant barriers to participation in recycling (Ogiri, 2019). Even students with positive environmental attitudes may be discouraged from recycling if facilities are inaccessible or poorly maintained. These findings highlight the importance of strengthening institutional support to improve students' perceived behavioural control and encourage sustainable recycling practices.

Theory of planned behaviour in environmental studies

The Theory of Planned Behaviour (TPB), proposed by Ajzen (1991), is one of the most widely applied theoretical frameworks for explaining pro-environmental behaviours, including recycling, energy conservation, and sustainable consumption. The theory proposes that behaviour is associated with three key constructs: attitudes, subjective norms, and perceived behavioural control. Collectively, these constructs provide a useful framework for understanding why individuals choose to engage in or refrain from environmentally responsible behaviour. Previous studies have demonstrated the usefulness of the TPB in explaining recycling behaviour across diverse cultural and educational contexts (Juliana et al., 2022; Liu et al., 2022; Bamberg and Möser, 2007). However, the relative importance of TPB constructs varies across studies, suggesting that contextual factors such as culture, institutional support, and infrastructure influence recycling behaviour. Consequently, applying the TPB within different higher education settings remains important for extending the understanding of students' recycling behaviour.

Conceptual framework

This study utilises the Theory of Planned Behaviour (TPB), introduced by Icek Ajzen in 1991, as a foundational framework to explore recycling behaviour among students (Figure 1). The TPB asserts that an individual's actions are shaped by three interconnected factors: attitudes, subjective norms, and perceived behavioural control. In this context, attitudes encompass students' evaluations of recycling, both positive and negative. Research indicates that students who view recycling as beneficial, important, and responsible are more inclined to practice it regularly. Thus, fostering positive attitudes toward recycling can significantly increase the likelihood that students engage in sustainable practices (Juliana et al., 2022; Ajzen, 1991). Subjective norms reflect the perceived social pressures that influence whether individuals engage in certain behaviours. For university students, these norms are often shaped by the expectations of peers, faculty, and the broader campus culture. When students sense that those who matter to them anticipate active participation in recycling initiatives, they are more likely to conform to those expectations. This aspect is particularly salient in collectivist cultures, where social influence is a crucial determinant of behaviour (Hofstede, 2011).

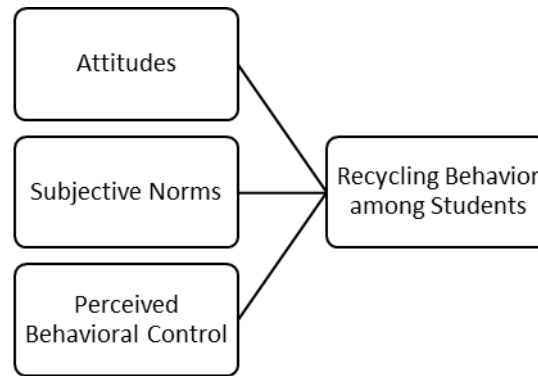


Figure 1. Conceptual framework.
Source: Ajzen (1991).

Perceived behavioural control (PBC) refers to the extent to which individuals feel empowered to perform a particular behaviour. It encompasses various factors, including the availability of recycling facilities, knowledge about recycling processes, time constraints, and the overall convenience of recycling options. Students who recognise fewer barriers and perceive recycling as easier to undertake are more likely to engage in such practices (Liu et al., 2022). The framework positions recycling behaviour as the dependent variable, while attitudes, subjective norms, and perceived behavioural control serve as independent variables that influence this behaviour. It posits that these three factors directly affect students' recycling habits. This conceptual framework offers a systematic approach to understanding the psychological and contextual factors that drive recycling behaviour among students. It also enables an investigation into the effectiveness of the TPB in explaining pro-environmental behaviour in higher education contexts, specifically at UiTM Negeri Sembilan. By applying this framework, the study aims to uncover nuanced insights to inform strategies for enhancing students' sustainability practices.

Materials and Methods

This study employed a quantitative cross-sectional survey design to examine recycling behaviour and its associated psychological factors among undergraduate students at Universiti Teknologi MARA (UiTM) Negeri Sembilan. A cross-sectional design was considered appropriate because it enabled the simultaneous examination of the relationships between attitudes, subjective norms, perceived behavioural control, and recycling behaviour at a single point in time. The target population comprised undergraduate students enrolled at the Seremban, Kuala Pilah, and Rembau campuses of UiTM Negeri Sembilan. Collectively, these campuses enrol more than 11,000 students from diverse academic disciplines. Accordingly, a minimum sample size of 373 respondents was required for this population. Convenience sampling was employed because a complete sampling frame of enrolled students was unavailable. Although this non-probability sampling technique limits the generalisability of the findings, it is widely used in behavioural research involving university students where access to respondents is constrained. Participants were invited to complete a structured, self-administered questionnaire distributed electronically via Google Forms. Data were collected using a structured self-administered questionnaire distributed through Google Forms. The questionnaire consisted of five sections: (i) demographic information, (ii)

recycling behaviour, (iii) attitudes, (iv) subjective norms, and (v) perceived behavioural control. Responses were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Measurement items were adapted from Abdul Karim et al. (2023), Rahaman and Rahim (2021), and Sonnenfeld (2018). Of the 373 questionnaires distributed, 300 were completed and deemed suitable for analysis, yielding a response rate of 80.4%. The data were analysed using IBM SPSS Statistics (Version 26). Descriptive statistics were used to describe respondents' demographic characteristics and recycling behaviour, while Pearson correlation analysis was performed to examine the relationships between the TPB constructs and recycling behaviour. Internal consistency was assessed using Cronbach's alpha. The reliability of each construct was evaluated using Cronbach's alpha. As shown in *Table 1*, all constructs exceeded the recommended threshold of 0.70, indicating satisfactory internal consistency. Prior to the analysis, the data were screened for missing values and incomplete responses. Only fully completed questionnaires were included in the analysis. The distribution of the data was examined using skewness and kurtosis values and was found to be within acceptable limits.

Table 1. Reliability analysis of study variables.

Variable	Cronbach's Alpha	No of items
Attitudes	0.849	7
Subjective Norms	0.878	7
Perceived Behavioural Control	0.825	8
Recycling Behaviour	0.890	8

Results and Discussion

Of the 300 respondents, 64.7% were female, while 72.7% were between 18 and 24 years of age. Most respondents were enrolled in the Environmental Administration and Administrative Science programmes. *Table 2* presents the distribution of respondents by level of recycling behaviour. The largest proportion of respondents (34.3%) was classified as having low recycling behaviour, followed by 33.0% with a moderate level and 32.7% with a high level. Although the distribution across the three categories was relatively balanced, approximately 67.3% of respondents fell within the low and moderate categories. These findings suggest that recycling behaviour has not yet become a well-established practice among most students. *Table 3* presents the Pearson correlation coefficients between the TPB constructs and recycling behaviour. The results indicate that all three independent variables were positively and significantly associated with recycling behaviour ($p < .001$). Attitudes demonstrated a strong positive correlation with recycling behaviour ($r = .674$), indicating that students with more favourable attitudes towards recycling tended to report higher levels of recycling behaviour. Subjective norms exhibited the strongest positive correlation ($r = .730$), suggesting that students who perceived stronger social expectations to recycle also reported higher levels of recycling behaviour. Perceived behavioural control was likewise positively correlated with recycling behaviour ($r = .715$), indicating that students who perceived recycling as easier and more manageable tended to engage in recycling more frequently.

Table 2. Level of recycling behaviour.

Level	Percentage
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Low	34.3
Moderate	33.0
High	32.7

Table 3. Pearson correlation matrix of the study variables.

Variable	Recycling Behavior	Attitudes	Subjective Norms	Perceived Behavioural Control
Recycling Behavior	1.00	0.674**	0.730**	0.715**
Attitudes	0.674**	1.00	-	-
Subjective Norms	0.730**	-	1.00	-
Perceived Behavioural Control	0.715**	-	-	1.00

Notes: r =Pearson correlation coefficient. **Correlation is significant at the 0.01 level (2-tailed), $p < .001$, $N = 300$.

This study examined recycling behaviour among students at Universiti Teknologi MARA (UiTM) Negeri Sembilan using the Theory of Planned Behaviour (TPB). Overall, the findings support the applicability of the TPB in explaining recycling behaviour within the Malaysian higher education context. Attitudes, subjective norms, and perceived behavioural control were all positively and significantly associated with recycling behaviour, consistent with Ajzen's (1991) proposition that pro-environmental behaviour is shaped by personal evaluations, perceived social expectations, and individuals' perceptions of behavioural control. The findings further revealed that recycling behaviour was relatively evenly distributed across the low, moderate, and high categories, with the largest proportion of respondents (34.3%) classified as having low recycling behaviour. Although the differences among the three categories were small, approximately two-thirds of the respondents fell within the low and moderate categories, suggesting that recycling has not yet become a consistent practice among most students. This pattern reflects the well-documented gap between environmental awareness and actual behaviour reported in previous studies (Ogiri, 2019; Tiew et al., 2019). Although students generally recognise the importance of recycling, awareness alone is insufficient to promote consistent recycling practices. Structural barriers such as limited recycling facilities, inadequate waste segregation systems, unclear signage, and insufficient environmental education may discourage students from translating positive intentions into actual behaviour (Juliana et al., 2022; Liu et al., 2022). These findings suggest that universities should complement environmental awareness campaigns with supportive infrastructure and practical opportunities that enable students to recycle more consistently.

The findings indicate that all three TPB constructs are positively and significantly associated with recycling behaviour. The positive association between attitudes and recycling behaviour indicates that students who perceive recycling as environmentally beneficial and socially responsible are more likely to engage in recycling activities. This finding is consistent with previous studies that identify favourable environmental attitudes as an important psychological determinant of pro-environmental behaviour (Ramayah et al., 2010; Bamberg and Möser, 2007). Nevertheless, favourable attitudes alone do not necessarily result in consistent recycling behaviour. Despite recognising the importance of recycling, many respondents reported relatively low levels of participation in recycling. This finding reinforces previous evidence suggesting that positive environmental attitudes may fail to translate into behaviour because of perceived inconvenience, competing priorities, or inadequate opportunities to recycle (Tiew et al., 2019). Consequently, interventions aimed at improving recycling behaviour

should address both psychological and contextual barriers rather than focusing solely on environmental awareness. Among the three TPB constructs, subjective norms exhibited the strongest positive correlation with recycling behaviour. Although correlation analysis does not establish prediction or causality, the findings suggest that students who perceive stronger social expectations to recycle also report higher levels of recycling behaviour. This observation is consistent with the collectivist orientation of Malaysian society, where individuals tend to value social harmony and conformity to group expectations (Hofstede, 2011). Similar findings have been reported among university students in China (Wu et al., 2022), where peer influence significantly enhanced participation in waste management initiatives. Conversely, studies conducted in more individualistic societies have often found personal attitudes to be more strongly associated with environmental behaviour than subjective norms. These differences highlight the importance of considering cultural context when applying the TPB across different populations. Consequently, peer-led campaigns, student ambassadors, and social norm interventions may represent effective strategies for strengthening recycling behaviour in Malaysian universities.

Perceived behavioural control was also positively associated with recycling behaviour, indicating that students were more likely to recycle when they perceived the behaviour as convenient and manageable. This finding is consistent with previous studies demonstrating that accessible recycling facilities, effective waste segregation systems, and environmental knowledge increase individuals' confidence in performing recycling activities (Karimi et al., 2021; Linder et al., 2018). Within the Malaysian higher education context, infrastructural limitations remain a significant barrier to participation in recycling. Even students with favourable environmental attitudes may be discouraged from recycling when recycling facilities are inadequate or difficult to access. Accordingly, universities should prioritise investment in well-maintained recycling facilities, standardised waste-segregation systems, and ongoing environmental communication to strengthen students' perceived behavioural control and encourage more consistent recycling behaviour. These findings are particularly relevant in the Malaysian higher education context, which presents unique challenges. According to the *New Straits Times*, many campuses lack proper recycling facilities, which can deter even environmentally conscious students from recycling. Therefore, enhancing perceived behavioural control through improved facilities, clear signage, and accessible recycling systems is crucial in bridging the gap between intention and action. Overall, the findings demonstrate that an interaction of psychological, social, and institutional factors shapes recycling behaviour among university students. While the Theory of Planned Behaviour provides a useful framework for understanding these relationships, behavioural change is unlikely to occur through environmental awareness alone. Instead, universities should adopt a comprehensive approach that integrates environmental education, supportive institutional policies, adequate recycling infrastructure, and peer-based social influence. Such an approach is more likely to establish recycling as a routine practice and contribute to broader sustainability goals within higher education institutions.

Conclusion

This study examined recycling behaviour among students at UiTM Negeri Sembilan by investigating the relationships between attitudes, subjective norms, perceived

behavioural control, and recycling behaviour based on the Theory of Planned Behaviour (TPB). Overall, the findings indicate that recycling behaviour has not yet become a consistent practice among most students, despite generally positive psychological dispositions towards recycling. This highlights the persistent gap between environmental awareness and actual recycling practices within the university context. The study further highlights that positive environmental attitudes alone are insufficient to promote consistent recycling behaviour. Instead, students' recycling practices appear to be associated with a combination of psychological, social, and structural factors, including social influence, perceived behavioural control, and the availability of supportive recycling facilities. These findings reinforce the importance of addressing both behavioural and contextual barriers when designing sustainability initiatives.

Consistent with the Theory of Planned Behaviour, attitudes, subjective norms, and perceived behavioural control were all positively associated with recycling behaviour. Among these constructs, subjective norms demonstrated the strongest positive correlation, suggesting that social influence plays a particularly important role in encouraging recycling behaviour within the Malaysian university context. These findings highlight the importance of creating supportive social environments alongside improving institutional infrastructure. From a theoretical perspective, this study supports the applicability of the Theory of Planned Behaviour in explaining recycling behaviour among students in a Malaysian public university. The findings further demonstrate that psychological factors alone are insufficient to explain recycling behaviour unless supported by favourable institutional and social conditions. This reinforces the importance of considering contextual influences when applying the TPB to pro-environmental behaviour.

Based on these findings, several practical recommendations are proposed. Universities should strengthen recycling infrastructure by providing accessible and clearly labelled recycling facilities across campus. Environmental education should move beyond awareness campaigns by incorporating practical workshops and experiential learning activities that encourage active participation. In addition, peer-led initiatives, student ambassador programmes, and behavioural nudges, such as reminder signage and social norm messaging, should be integrated into campus sustainability programmes. Future research should examine recycling behaviour across different university settings and consider additional psychological and contextual variables that may further explain students' recycling practices. In conclusion, this study contributes to the growing body of literature on pro-environmental behaviour by providing empirical evidence on the relationships between Theory of Planned Behaviour constructs and recycling behaviour among university students in Malaysia. The findings offer practical guidance for university administrators and policymakers seeking to develop more effective sustainability initiatives that combine environmental education, supportive infrastructure, and positive social influence. Collectively, these efforts can foster a stronger culture of recycling and help achieve broader environmental sustainability goals.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

REFERENCES

- [1] Abd Manaf, L., Abu Samah, M.A., Mohd Zukki, N.I. (2009): Municipal solid waste management in Malaysia: Practices and challenges. – *Waste Management* 29(11): 2902-2906.
- [2] Abdul Karim, Z.H., Hasan, Z., Saudid, M.K., Mustakim, N.A., Mokhtar, N., Ebrahim, Z.B., Mohamad Roseli, N.H. (2023): Factors influence recycling intention among university students. – *Jurnal Intelek* 18(2): 35-51.
- [3] Abubakar, I.R., Maniruzzaman, K.M., Dano, U.L., AlShihri, F.S., AlShammari, M.S., Ahmed, S.M.S., Al-Gehlani, W.A.G., Alrawaf, T.I. (2022): Environmental sustainability impacts of solid waste management practices in the Global South. – *International Journal of Environmental Research and Public Health* 19(19): 29p.
- [4] Ajzen, I. (1991): The theory of planned behavior. – *Organizational Behavior and Human Decision Processes* 50(2): 179-211.
- [5] Bamberg, S., Möser, G. (2007): Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. – *Journal of Environmental Psychology* 27(1): 14-25.
- [6] Djafarova, E., Fouts, S. (2022): Exploring ethical consumption of generation Z: Theory of planned behaviour. – *Young Consumers* 23(3): 413-431.
- [7] Garg, S., Arora, P. (2025): Waste management challenges and opportunities: A holistic approach for sustainable development. – *International Journal of Environmental Science and Technology* 22: 14753-14770.
- [8] Harinderan, K. (2024): International Day of Zero Waste: Malaysia's recycling rate attains results amid long-standing issues, says expert. – *BusinessToday Official Portal* 1p.
- [9] Hassan, A., Abd Rahman, N., Syed Abdullah, S.I.S. (2011): The level of environmental knowledge, awareness, attitudes and practices among UKM students. – *Universiti Kebangsaan Malaysia* 13: 5-8.
- [10] Hofstede, G. (2011): Dimensionalizing cultures: The Hofstede model in context. – *Online Readings in Psychology and Culture* 2(1): 26p.
- [11] International Trade Administration (ITA) (2022): Malaysia waste management solutions. – *U.S. Department of Commerce Official Portal* 3p.
- [12] Juliana, N., Lada, S., Chekima, B., Abdul Adis, A.A. (2022): Exploring determinants shaping recycling behavior using an extended theory of planned behavior model: An empirical study of households in Sabah, Malaysia. – *Sustainability* 14(8): 13p.
- [13] Karimi, S., Liobikienė, G., Saadi, H., Sepahvand, F. (2021): The influence of media usage on Iranian students' pro-environmental behaviors: An application of the extended theory of planned behavior. – *Sustainability* 13(15): 17p.
- [14] Khan, S., Naushad, M., Govarthan, M., Iqbal, J., Alfadul, S.M. (2022): Emerging contaminants of high concern for the environment: Current trends and future research. – *Environmental Research* 207: 12p.
- [15] Linder, N., Lindahl, T., Borgström, S. (2018): Using behavioural insights to promote food waste recycling in urban households-Evidence from a longitudinal field experiment. – *Frontiers in Psychology* 9: 14p.
- [16] Liu, Z., Yang, J.Z., Clark, S.S., Shelly, M.A. (2022): Recycling as a planned behavior: The moderating role of perceived behavioral control. – *Environment, Development and Sustainability* 24(9): 11011-11026.

- [17] Malaysian Investment Development Authority (MIDA) (2022): Waste to energy for a sustainable future. – MIDA Official Portal 1p.
- [18] Ministry of Higher Education Malaysia (2015): Malaysia Education Blueprint 2015-2025 (Higher Education). – Ministry of Higher Education Malaysia, Putrajaya 240p.
- [19] Ogiri, I.A. (2019): Perception, compliance and economic valuation of solid waste separation at source among households in Putrajaya and Melaka, Malaysia. – Universiti Putra Malaysia, Serdang 200p.
- [20] Omran, A., Bah, M., Baharuddin, A.H. (2017): Investigating the level of environmental awareness and practices on recycling of solid wastes at university's campus in Malaysia. – *Journal of Environmental Management and Tourism* 8(3): 554-566.
- [21] Rahaman, Z.A., Rahim, A.A. (2021): Pengetahuan dan amalan kitar semula dalam kalangan pelajar Universiti Pendidikan Sultan Idris. – *Journal of Tourism, Hospitality and Environment Management* 6(25): 207-218.
- [22] Ramayah, T., Lee, J.W.C., Mohamad, O. (2010): Green product purchase intention: Some insights from a developing country. – *Resources, Conservation and Recycling* 54(12): 1419-1427.
- [23] She, L., Rasiah, R., Weissmann, M.A., Kaur, H. (2024): Using the theory of planned behaviour to explore predictors of financial behaviour among working adults in Malaysia. – *FIIB Business Review* 13(1): 118-135.
- [24] Sonnenfeld, V. (2018): Using the theory of planned behavior to understand university students' recycling behavior. – Undergraduate Thesis, Environmental and Sustainability Studies Program, University of Nebraska-Lincoln 40p.
- [25] Steg, L., Vlek, C. (2009): Encouraging pro-environmental behaviour: An integrative review and research agenda. – *Journal of Environmental Psychology* 29(3): 309-317.
- [26] Tiew, K.G., Basri, N.E.A., Watanabe, K., Zain, S.M., Er, A.C., Deng, H. (2019): Higher educational institutions recycling management in Malaysia. – *International Journal of Business and Society* 20(1): 277-285.
- [27] UN-Habitat (2018): SDG Indicator 11.6.1 training module: Solid waste management in cities. – United Nations Human Settlements Programme, Nairobi 18p.
- [28] Voukkali, I., Papamichael, I., Loizia, P., Zorpas, A.A. (2024): Urbanisation and solid waste production: Prospects and challenges. – *Environmental Science and Pollution Research* 31: 17678-17689.
- [29] Wu, L., Zhu, Y., Zhai, J. (2022): Understanding waste management behavior among university students in China: Environmental knowledge, personal norms, and the theory of planned behavior. – *Frontiers in Psychology* 12: 12p.
- [30] Yılmaz, V., Ari, E. (2022): Investigation of attitudes and behaviors towards recycling with theory planned behavior. – *Journal of Economy Culture and Society* 66: 145-161.
- [31] Yusoff, N.A., Azmi, A., Abd Aziz, N.A., Ghazali Masuri, M., Danis, A., Isa, S.N.I., Ilias, K., Loganathan, M., Md Isa, K.A. (2024): Understanding university students' recycling behaviours: An analysis using the theory of planned behaviour. – *Healthscope: The Official Research Book of Faculty of Health Sciences, UiTM* 7(1): 117-123.