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DETERMINANT OF HOUSEHOLD WASTE SEPARATION BEHAVIOUR IN MALAYSIA: A CONCEPTUAL VIEW

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Abstract:

This study helps to investigate the factors that influence the household's waste separation behaviour among households in Johor. Despite the act that has been introduced, the Solid Waste and Public Cleansing Act 2007 (Act 672), the rapid development and urbanization that was caused by the development and urbanization, and the compliance among households have been seen to remain low, which leads to a greater dependency and environmental impact. With the presence of the Theory of Planned behaviour, this study manages to highlight the attitude, subjective norm, and perceived behavioural control as key determinants that influence the public response toward waste separation. Awareness and current practices and strategies to improve can be assessed with the presence of this study to improve waste separation among households in Johor. The study helps identify the behavioural and contextual drivers influencing compliance, providing policymakers and educators with insights to guide and develop effective waste management strategies and campaigns that enhance awareness and strengthen enforcement, thereby supporting the state's transition toward a cleaner and more sustainable environment.

Keyword:

Environmental Awareness, Household, Theory of Planned Behaviour (TPB), Waste Management, Waste Separation



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Introduction

Waste management has been seen as one of the biggest contributors to the issue of the environment in Malaysia, particularly in rapid development states like Johor. The population increase there has caused a change in consumption pattern among residents and a significant rise in municipal solid waste generation (Fadhullah et al., 2022). To address this situation, waste separation at source has been introduced to ensure a root level of waste segregation can be done, thereby promoting the waste management among households to decrease the dependency in landfill (Razali et al., 2020). The compliance of the act remains low in many parts of Johor due to the lack of enforcement by the authorities to ensure the level of awareness of the residents increase (The Star, 2025).

In order to achieve effective and sustainable waste management, waste separation among households is a crucial aspect. However, this study has highlighted that the low level of compliance among households is often linked to behavioural, social, and infrastructural factors (Kamarudin & Nizam, 2022). Many residents are still unaware of the importance of waste separation as they find it more convenient to dispose of it with a traditional method due to a lack of proper facilities and enforcement (Razali et al., 2020). This highlighted the need for a better understanding of residents' underlying psychological and contextual factors that influence household waste separation behaviour.

Despite the implementation of the Solid Waste and Public Cleansing Management Act 2007 (Act 672), the level of participation and compliance of the residents remains low as there is a gap between policy enforcement and public practices. This problem has been seen becoming more serious as rapid urbanization occurs due to rapid population growth, lack of waste management infrastructure, and limited environmental awareness among the residents. Many people still see this effort as unnecessary and inconvenient due to the lack of motivation and social influence. They prefer to dispose of it by using the traditional method and continue to dispose of it at the landfill. Therefore, apart from every effort done by the government, this paper help to investigate the underlying behavioural, social, and infrastructure factors that become the main character in developing strategies to improve the level of compliance.

This paper aims specifically to examine the factors that impact household waste separation behaviours that were supported with the Theory of Planned behaviour (TPB) (Ajzen, 1991). It's the emphasis of the influencer that influences the behaviour itself (Ajzen, 1991). This paper will help to identify and analyse the variable interaction and contribution toward the actual behaviour of households in performing waste separation.

Literature Review

Theory of Planned Behaviour (TPB)

Waste management has been seen as one of the biggest contributors to the issue of the environment in Malaysia, particularly in rapid development states like Johor. The population increase there has caused a change in consumption pattern among residents and a significant rise in municipal solid waste generation (Fadhullah et al., 2022). To address this situation, waste separation at source has been introduced to ensure a root level of waste segregation can be done, thereby promoting the waste management among households to decrease the dependency in landfill (Razali et al., 2020). The compliance of the act remains low in many parts of Johor due to the lack of enforcement by the authorities to ensure the level of awareness of the residents increase (The Star, 2025).

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Literature Review

Theory of Planned behaviour (TPB)

This study is anchored in the Theory of Planned behaviour (TPB) proposed by Ajzen (1991), which serves as a framework for explaining and predicting household waste separation practices through behavioural intention. Within this theory, intention is shaped by three principal constructs: attitude, subjective norms, and perceived behavioural control. In this research context, attitude denotes households' favourable or unfavourable evaluations of waste separation practices. Subjective norms refer to perceived social expectations from family

members, the community, and governing authorities. Perceived behavioural control reflects the extent to which individuals believe they possess the necessary resources and opportunities such as infrastructure, regulatory enforcement, and access to information to perform waste separation.

The application of TPB is particularly relevant, as household participation in waste separation is influenced by both internal dispositions and external policy-related conditions. Empirical evidence indicates that enforcement measures, incentive mechanisms, and the availability of infrastructure significantly influence attitudes, social pressures, and perceived control over such behaviours (Zaini et al., 2022). Furthermore, low participation rates are frequently linked to weak behavioural intention, often resulting from insufficient enforcement and ineffective policy implementation (Moh & Manaf, 2020).

By aligning the study's independent variables with the core dimensions of TPB, this research develops a structured framework to examine how these factors influence actual waste separation behaviour. Overall, TPB offers a robust theoretical basis for analysing both psychological and institutional determinants of household waste separation in Johor, while also providing insights into strategies for promoting sustainable practices at the community level. Notably, this study adopts a modified TPB approach by directly assessing the effects of attitude, subjective norms, and perceived behavioural control on behaviour, excluding the intention construct to simplify the model and focus on observable outcomes. This approach is consistent with prior environmental behaviour studies that establish direct relationships between TPB components and actual behaviour.

Types of Waste

Effective waste management strategies require systematic categorisation to ensure efficient handling and environmentally responsible disposal. Waste is commonly classified into three main categories: recyclable, organic, and hazardous waste, each requiring distinct treatment methods and disposal timelines.

Recyclable materials, including plastics, paper, cardboard, and metals, can be processed into new products, thereby reducing environmental impact and decreasing the volume of waste sent to landfills. This is particularly significant given the increasing pressure on landfill capacity and the environmental consequences of excessive waste generation. Previous research highlights that waste separation plays a vital role in achieving national recycling targets (Moh & Manaf, 2020).

Organic waste consists of biodegradable materials such as food leftovers, kitchen waste, and garden trimmings. These materials can be treated through composting or converted into biogas, offering sustainable waste management solutions. Reports from the Department of Statistics Malaysia indicate that organic waste represents the largest proportion of municipal solid waste, with food waste constituting a substantial share. Composting transforms organic matter into nutrient-rich soil that enhances agricultural productivity, while biogas production contributes to renewable energy generation. Proper management of organic waste reduces environmental degradation and limits greenhouse gas emissions that would otherwise result from decomposition in landfills. (Chen et al., 2021).

Hazardous waste presents a more complex management challenge due to its potential risks to human health and the environment. This category includes items such as batteries, expired pharmaceuticals, chemical solvents, and other toxic substances, all of which require specialised handling and disposal procedures. Improper management can lead to contamination of soil and water, pose health risks to sanitation workers, and disrupt recycling systems. Studies have emphasised that inadequate public awareness often leads to hazardous waste being mixed with general waste, thereby reducing recycling efficiency and increasing environmental risks (Zaini & Md Ariffin, 2022).

Without effective waste management practices and sufficient public education, hazardous and problematic waste streams are frequently combined with general waste. This not only undermines recycling efficiency but also increases disposal costs. Research consistently demonstrates that public awareness and participation are critical for improving recycling rates and ensuring proper segregation of waste streams (Ajinomoto, N. A.).

In summary, the classification of waste into recyclable, organic, and hazardous categories is essential for establishing an efficient and sustainable waste management system. Such categorisation facilitates appropriate treatment processes, enhances resource recovery, supports national recycling objectives, and mitigates environmental risks. The integration of effective policies, enforcement mechanisms, and public education initiatives is crucial for encouraging proper waste separation practices at both household and community levels, ultimately contributing to environmental sustainability in Malaysia.

Impacts of Waste Separation behaviour Among Households

Environmental Impact

Household waste separation plays a critical role in reducing the burden on municipal solid waste systems. By separating recyclable and organic waste, the volume of waste disposed of in landfills is significantly reduced, leading to lower greenhouse gas emissions. Effective waste management enhances recycling efficiency, prevents contamination of recyclable materials, and reduces methane emissions from decomposing organic waste in landfills (Chen et al., 2021). Proper segregation also improves the performance of downstream recycling systems and contributes to the development of sustainable and environmentally friendly urban areas (Kaza et al., 2020).

Socio-Economic Impact

Waste separation contributes to both economic efficiency and social development. When households actively participate in sorting waste, municipalities can reduce operational costs associated with collection, transportation, and landfill management (Guerrero et al., 2020). Additionally, the availability of separated recyclable materials supports the growth of green industries and job creation. Public participation also enhances environmental awareness and fosters long-term behavioural change. Social campaigns, when combined with consistent community involvement, can strengthen collective responsibility and environmental stewardship among residents (Rada & Cioca, 2021).

Policy and Enforcement Impact

Waste separation behaviour also serves as a key indicator of the effectiveness of environmental policies at both national and local levels. Public compliance reflects the strength of policy implementation, particularly in terms of enforcement and awareness dissemination. Enforcement mechanisms, including penalties and incentive-based approaches, have been shown to significantly improve compliance rates (Wilson et al., 2021). In rapidly urbanising areas, increasing waste generation often outpaces infrastructure development and regulatory enforcement.

Innovative approaches, such as reward-based systems, have demonstrated positive outcomes in enhancing participation. For instance, applications like KLEAN in Malaysia incentivise recycling by converting waste materials into reward points (Chew, 2024). Similarly, studies indicate that incentive-driven programmes can increase community participation rates by over 40% (Al-Sari et al., 2022). These findings highlight the importance of combining regulatory enforcement with motivational strategies to strengthen accountability and promote sustainable behaviour.

Past Studies on Waste Separation Among Household

A growing body of literature has applied the TPB theory to examine the waste separation behaviour across nation and culture context. In Malaysia, research that has been conducted by Razali et al. (2020) highlights that household waste separation behaviour is significantly associated by the attitude and moral norms. Similarly, the study made by Kamarudin and Nizam (2022) found that subjective norms and social influence are the main factors that shape urban communities. This shows that social approval encourages recycling participation. Their study has also pointed out that weak enforcement and limited accessibility to facilities contribute to low levels of public awareness. Another Malaysian study by Mahmud and Osman (2010) reinforces that environmental sustainability is closely linked to behavioural intention that is shaped by education and government support. They believe that when the government provides proper waste management infrastructure it will lead to a community intention to comply with the policies. However, limited and low perceived behavioural control often discourages the participant among the communities especially among households in developing regions.

International studies have also similarity in concept and understanding where Nguyen et al. (2019) believe that perceived behavioural control and subjective norms are the main factors that the residential household in Vietnam has a low intention toward waste separation. In Iran, Yazdanpanah and Forouzani (2015) reported that attitudes and perceived behavioural control had the greatest effect on intention, demonstrating that knowledge provision and accessibility to recycling infrastructure substantially enhance compliance. While in the European region, Botetzagias et al. (2015) extended the TPB framework by providing the moral norms and demographic as the factor that influenced Greece. Their finding indicates that environmental education, policy clarity, and moral obligations have significantly boosted the intention and actual recycling behaviour. These results align with the notion that awareness alone is insufficient, behavioural change requires institutional support and perceived ease of action.

Comparatively, while international studies discuss the role of infrastructure and education, Malaysia research often highlights the social norms and enforcement gaps as the primary factor that is becoming the challenge. This suggests that although the psychological determinants are

universally relevant, contextual factors such as governance, culture, and infrastructure strongly moderate their effects. Overall, these past studies demonstrate that the TPB theory remains one of the most reliable and adaptable frameworks when talking about household waste separation behaviour. This theory allows researchers to easily identify the psychological, social, and structural determinants that shape compliance. By integrating these findings, the current study aims to provide a comprehensive understanding of the behavioural and contextual drivers influencing waste separation in Johor, offering practical implications for improving policy design and public engagement toward sustainable waste management.

TPB Constructs

Attitude Toward Behaviour

Attitude refers to an individual's evaluation of waste separation, whether positive or negative. Households with stronger environmental awareness and a sense of responsibility are more likely to engage in waste separation practices. Research indicates that when individuals perceive waste separation as beneficial and meaningful, they are more consistent in their behaviour. Conversely, if the process is viewed as inconvenient or unnecessary, compliance tends to decline (Moh & Manaf, 2020; Nur Azlin Mangsor, 2023).

Subjective Norm

Subjective norms represent the perceived social pressure to engage in or refrain from waste separation. These pressures may originate from family members, neighbours, or authorities. When waste separation is widely practised and socially supported within a community, individuals are more likely to conform. Social campaigns, community engagement, and visible enforcement play a significant role in reinforcing these norms. For example, areas such as Muar, Johor, demonstrate high compliance levels due to strong community values and collective responsibility (Zazali Musa, 2023).

Perceived Behavioural Control

Perceived behavioural control reflects the extent to which individuals believe they have the capacity and resources to perform waste separation. This includes access to facilities, availability of time, and knowledge of proper sorting practices. A lack of resources or understanding can reduce motivation, even when attitudes and social influences are favourable. Studies highlight that the availability of infrastructure and clear guidance directly influences the likelihood of behavioural adoption (Chen et al., 2021). In Malaysia, effective communication and community outreach initiatives have been shown to enhance participation rates. The combination of information dissemination and practical demonstrations improves understanding and supports behavioural change, whereas a lack of information can hinder the adoption of sustainable practices (Nur Azlin Mangsor & Low, 2023).

Hypotheses Development

Attitude Toward behaviour

H0: There is no significant relationship between attitude toward behaviour and household waste separation behaviour.

H1: There is a significant relationship between attitude toward behaviour and household waste separation behaviour.

Subjective Norm

H0: There is no significant relationship between subjective norms and household waste separation behaviour.

H1: There is a significant relationship between subjective norms and household waste separation behaviour.

Perceived behavioural Control

H0: There is no significant relationship between perceived behavioural control and household waste separation behaviour.

H1: There is a significant relationship between perceived behavioural control and household waste separation behaviour.

This study adopts the Theory of Planned behaviour (TPB), a prominent social psychological framework developed by Icek Ajzen (1991). The TPB is widely applied across various contexts, particularly in environmental and waste management research, to understand and predict human intentions and behaviours. This theory posits that an individual's intention to perform a specific behaviour is the most immediate determinant of that behaviour.

The TPB extends the Theory of Reasoned Action (TRA) by incorporating perceived behavioural control (PBC) as an additional predictor of intention and behaviour. According to the TPB, three core constructs influence behavioural intentions: attitude toward the behaviour, subjective norm, and perceived behavioural control.

Attitude toward the behaviour refers to an individual's overall positive or negative evaluation of performing a particular action. In the context of waste separation, a positive attitude may stem from the belief that it is an environmental responsibility, while a negative attitude might arise from perceptions of inconvenience or time consumption.

Subjective norm captures the perceived social pressure to perform or refrain from a particular behaviour. This includes influences from family, friends, neighbours, and the wider community. In Malaysia, household waste separation intentions are significantly affected by social expectations, cultural values, and collective norms, with role models often illustrating these influences.

Perceived behavioural control reflects an individual's perception of the ease or difficulty of performing the behaviour, encompassing beliefs about the presence of requisite resources and opportunities, as well as anticipated obstacles. The inclusion of PBC makes the TPB more comprehensive and applicable to real-world situations, such as waste separation, where external barriers like inadequate facilities and enforcement can play a significant role.

Furthermore, the TPB has been extended to include moral norms as a crucial factor influencing pro-environmental intentions and behaviours. Moral norms represent an individual's personal sense of moral obligation to perform a behaviour, often acting as a strong intrinsic motivator.

Studies in Malaysia have highlighted the significant role of moral norms in influencing waste separation behaviour among households.

This theory is crucial as it integrates psychological and contextual factors that influence waste separation behaviour. It considers not only individual motivations and beliefs but also acknowledges the role of social factors and perceived control in shaping and constraining actions. This holistic approach makes the TPB a powerful framework for analysing environmental behaviour among households, helping to identify the gap between awareness and action. Consequently, the TPB serves as a valuable guide for policymakers and researchers to design targeted interventions, educational campaigns, and supportive infrastructure that strengthen behavioural intentions and encourage sustainable practices.

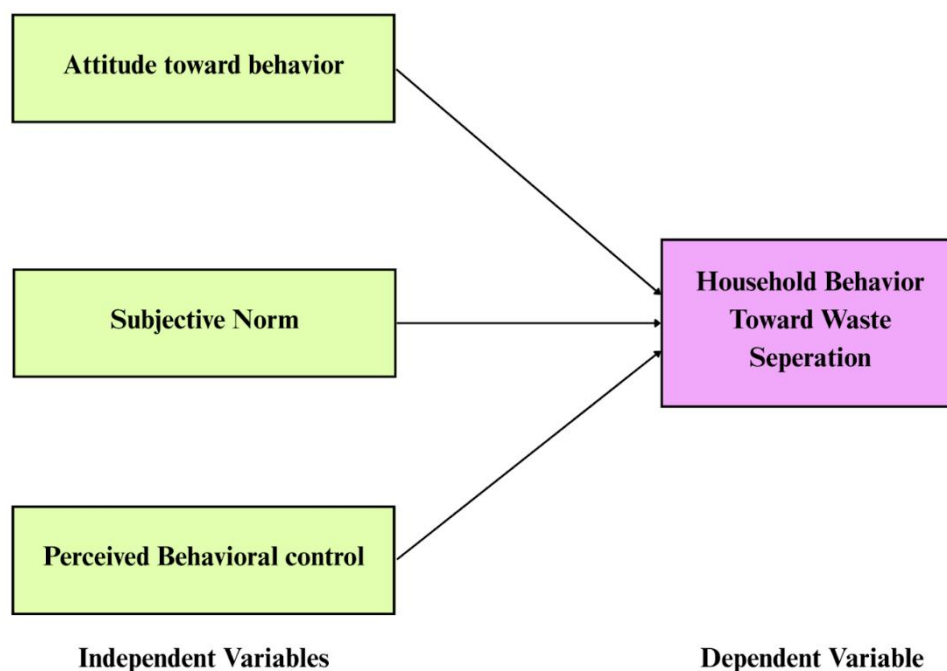


Figure 2.1: Conceptual Model Based on the Theory of Planned Behavior on Household Behavior Toward Waste Separation

Conceptual Framework

This study's conceptual framework is grounded in the Theory of Planned Behaviour (TPB), originally proposed by Icek Ajzen in 1991. The TPB serves as a robust theoretical lens for understanding the cognitive and social factors that precede and influence human intentions, which, in turn, guide actual behaviours. According to the TPB, an individual's behavioural intention is primarily determined by three interconnected constructs: attitude toward the behaviour, subjective norm, and perceived behavioural control. These three factors collectively shape an individual's intention, which is considered the most immediate antecedent of behaviour

In the context of this study, focusing on household waste separation behaviour in Johor, Malaysia, these three core constructs are operationalized as independent variables that determine the behavioural intentions of households. The proposed relationships are illustrated in Figure 2.0 (Figure 2.0 would typically be inserted here, visually representing the model).

Attitude toward the behaviour refers to an individual's positive or negative evaluation of performing a specific action. For households in Johor, this construct emphasizes their perception of waste separation whether they view it as a beneficial practice for environmental protection or as an inconvenient and burdensome task requiring additional effort. A positive attitude is generally associated with a higher likelihood of consistently engaging in waste separation practices.

Subjective norm represents the perceived social pressure from significant referent individuals or groups to perform or avoid a particular behaviour. In the context of Johor households, this includes the influence of family members, neighbours, and the broader community. The extent to which individuals perceive that important others expect them to separate waste, or observe their peers actively participating in such practices, can significantly impact their compliance with waste separation initiatives.

Perceived behavioural control (PBC) reflects an individual's belief in their capacity to successfully perform a given behaviour. This encompasses their assessment of available resources, such as access to waste separation facilities and policies, sufficient knowledge about proper separation methods, and the time required for the activity. A strong sense of PBC, supported by adequate infrastructure and clear guidelines, can enhance participation. Conversely, weak PBC, often influenced by perceived lack of enforcement or inadequate facilities, can lead to lower engagement in waste separation activities.

This conceptual framework provides a clear and comprehensive understanding of how psychological and contextual factors interact to influence sustainable waste management behaviour among households in Johor. By integrating individual motivations, social influences, and perceived capabilities, the framework not only lays the groundwork for empirical investigation but also assists policymakers and researchers in developing targeted interventions, educational programs, and supportive infrastructure to enhance public compliance and participation in waste separation efforts.

Conclusion

This conceptual paper underscores the critical importance of understanding the behavioural factors that influence waste separation practices among households in Johor, Malaysia. Despite the legislative framework provided by the Solid Waste and Public Cleansing Management Act 2007 (Act 672), which mandates waste separation at source in states that have adopted it, household compliance remains a significant challenge. This persistent issue highlights that achieving effective waste management cannot be accomplished solely through policy enforcement; it necessitates a deeper comprehension of human behaviour and motivations to foster more adaptive and sustainable practices within a changing environmental landscape.

By employing the Theory of Planned Behaviour (TPB), this paper offers a robust theoretical foundation for identifying the key factors and indicators that shape household intentions and actual behaviours regarding waste separation. The framework developed herein integrates psychological and environmental perspectives, thereby providing a more nuanced understanding of the complexities involved in waste management. This conceptual framework serves as a valuable tool for researchers, policymakers, and authorities such as the National Solid Waste Management Department (JPSPN) and Solid Waste Management and Public

Cleansing Corporation (SW Corp), along with municipal councils, to devise targeted strategies for behavioural change.

Specifically, the framework can guide the development of effective awareness campaigns, foster community engagement initiatives, and inform improvements in waste management infrastructure. Furthermore, educators and Non-Governmental Organizations (NGOs) can leverage this framework to promote environmental education and encourage sustainable practices within communities, ultimately contributing to enhanced public participation and compliance with waste separation efforts.

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Ethics Statement: This study was conducted in accordance with ethical research standards. All procedures involving human participants were reviewed and approved by the Universiti Teknologi Mara Review Ethics Committee, approval number FERC/02/2025. Informed consent was obtained from all participants prior to data collection. Participation was voluntary, and respondents were assured of confidentiality and anonymity. The data collected were used solely for academic purposes.

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