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MINGACHEVIR
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*DEDICATED TO THE “YEAR OF CONSTITUTION
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CONGRESS PROCEEDINGS BOOK

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A COMPARATIVE EXPLORATION OF WASTE SEPARATION BEHAVIOR AT UNIVERSITIES IN TURKIYE

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Abstract

This study explores waste separation behavior in university settings as a representative site for broader sustainability engagement. Drawing on Behavioral Reasoning Theory (BRT), we investigate how sustainability values influence perceived benefits and barriers, which in turn shape attitudes and intentions. These factors—ranging from environmental and socio-ethical benefits to psychological and usage-related barriers—serve as key reasons for or against engaging in sustainable practices. The moderating role of green campus initiatives is also examined. In a second study, we use fsQCA to identify multiple sufficient configurations—combinations of values, demographic factors, and perceptions—that lead to waste separation. This approach complements PLS-SEM, which offers insights into average effects, while fsQCA reveals how different individuals may reach the same outcome through distinct paths. The use of both methods allows for a more nuanced understanding of behavioral variation. Finally, we complement our findings with abductive qualitative analysis, drawing on interviews with students, faculty, and sustainability officers.

Introduction

The increasing emphasis on sustainability within higher education institutions (HEIs) has driven the implementation of green campus initiatives as a structured approach to fostering environmentally responsible behaviors. Hailed as a “microcosm of the circular economy”(Vergani, 2024) , HEIs play a central role in advancing sustainable development (SD), particularly in aligning with the United Nations Sustainable Development Goals (SDGs), notably Goal 4, which emphasizes inclusive and equitable education (UNESCO, 2022; United Nations, 2015). By embedding sustainability principles into educational frameworks and institutional operations, universities serve as catalysts for societal transformation, requiring strategic collaboration with stakeholders to integrate SD values into curricula, research, and campus management (Menon & Suresh, 2020).

Green campus initiatives function as an environmental management system within the higher education sector, representing an initial step toward broader institutional sustainability (Frizon et al., 2024). HEIs must assume a transformative role, not only incorporating SD principles into their operational policies but also shaping future professionals who actively engage with sustainability challenges (Aleixo et al., 2021; Homer & Khor, 2022). Through curriculum design, interdisciplinary research, and infrastructural innovations, universities can act as co-creators of change, embedding sustainability competencies that extend beyond academic settings into industry and policymaking. A critical aspect of these initiatives is waste separation behavior, which is essential for effective recycling and waste management. Accordingly, we aim to explore the factors influencing waste separation behavior in the context of green campus initiatives, emphasizing the relevance of Behavioral Reasoning Theory (BRT) (Westaby, 2005) in understanding these sustainability-related behaviors. BRT provides a framework for examining how individuals' reasoning processes influence their actions towards sustainability, particularly in the context of reasons for and against such behaviors (Sahu et al., 2020; Ünal et al., 2024).

Although pro-environmental behavior has been widely examined through frameworks such as the Theory of Planned Behavior (Ajzen, 1991) and Value-Belief-Norm theory (Stern et al., 1999)(Stern, 2000), Behavioral

Reasoning Theory (BRT) remains underutilized in explaining how reasons for and against action mediate between values and behavioral intentions. Positioned between theoretical contribution and practical application, this study applies BRT to investigate waste separation behavior within green campus initiatives. By examining how sustainability values shape perceptions of benefits and barriers, the research aims to clarify the mechanisms through which attitudes are formed and translated into action. This dual focus on explanation and intervention enables both a theoretical contribution to environmental behavior literature and actionable insights for improving sustainability practices in higher education.

This study employs a mixed-method approach combining PLS-SEM and fsQCA to examine how sustainability values, perceived benefits, and barriers shape attitudes and influence waste separation behavior. While PLS-SEM captures average linear effects, it overlooks how various configurations of factors operate together; fsQCA addresses this by identifying multiple causal pathways, yet its application to university settings remains limited. By using both methods alongside qualitative interviews with students, faculty, and sustainability officers, the study aims to generate a more context-sensitive understanding of decision-making processes.

This study makes three primary contributions to sustainability research. First, it advances the understanding of waste separation behavior, an essential aspect of sustainable resource management, by emphasizing the role of individual values, perceived benefits and barriers, and institutional initiatives, such as green campus programs. These insights are critical for designing more effective environmental interventions in educational settings. Second, the research operationalizes BRT by exploring both the drivers (benefits) and obstacles (barriers) to sustainable behavior, bridging the gap between values and actions. This approach highlights how attitudes form through reasoning and how these attitudes translate into actual behavior. Finally, by using both PLS-SEM and fsQCA, the study enhances our understanding of both the net effects and the configurational pathways that influence sustainable behavior. Situated within the context of a university, it contributes to the literature on sustainability in higher education, offering evidence-based recommendations for policy makers and campus administrators, while accounting for demographic differences in student populations.

Theoretical background

Behavioral Reasoning Theory

Behavioral Reasoning Theory (BRT) posits that individuals' behaviors are influenced by their reasoning processes (Claudy et al., 2015; Westaby, 2005), which involve evaluating the perceived benefits and barriers associated with specific actions (Álvarez-García et al., 2018; Simms et al., 2020). Unlike the Theory of Planned Behavior (Ajzen, 1991) and the Theory of Reasoned Action (Fishbein & Ajzen, 1975), BRT explicitly incorporates context-specific reasons that either support or oppose behaviors. Claudy et al. (2013) applied BRT to green product adoption, demonstrating how reasons for and against adoption influence attitudes and intentions beyond traditional behavioral determinants.

In the context of sustainability studies, BRT has been applied to understand how individuals make decisions regarding pro-environmental behaviors (Chi et al., 2023; Ünal et al., 2024). Ryan and Casidy (2018) utilizes BRT to examine green purchasing decisions, while Sahu et al. (2020) investigated sustainable consumption practices through this lens. Key concepts within BRT include values, reasons for and against, attitude and actual behavior. We conceptualize them as sustainability values, perceived benefits and barriers, attitude and waste separation behavior in our case.

Sustainability values refer to the intrinsic beliefs and principles that motivate individuals to engage in environmentally responsible behaviors (Gimenez-Jimenez & Hanc, 2024). Perceived benefits encompass the positive outcomes individuals associate with waste separation, such as environmental protection and resource conservation (Qu et al., 2023; Stoeva & Alriksson, 2017; Zhang, 2023). Conversely, perceived barriers include the obstacles that hinder individuals from engaging in waste separation, such as lack of knowledge, convenience, and social norms (Kiefer et al., 2018; Simms et al., 2020; Sundar et al., 2023).

Sustainability values and pro-environmental behavior

Pro-environmental values play a significant role in shaping individuals' sustainability behaviors, including waste separation and recycling practices. Research has shown that individuals with strong pro-environmental values are more likely to engage in sustainable consumption behaviors, as they perceive these actions as aligned with their beliefs (Gimenez-Jimenez & Harc, 2024). Solidarity values, which emphasize the interconnectedness of individuals and their responsibility towards the environment, also contribute to pro-environmental behaviors (Fritsche et al., 2018).

Empirical research suggests that individuals who internalize sustainability values are more likely to engage in waste separation as a habitual behavior, yet contextual factors mediate this relationship. Miafodzyeva et al. (2013), in a meta-analysis of recycling behavior studies, reveals that pro-environmental values consistently predicted recycling participation across cultural and institutional settings. In higher education contexts, Kelly et al. (2006) demonstrate that students with strong environmental values exhibited higher engagement in campus recycling programs, reinforcing the role of HEIs in fostering sustainability-driven behaviors. However, Whitmarsh and O'Neill (2010) argue that values alone do not dictate waste separation behaviors, as convenience and infrastructure significantly influence decision-making. Barr et al. (2013) further highlight that the impact of values on waste separation varies between private and public settings, suggesting that institutional interventions—such as accessible waste sorting facilities—are necessary to translate sustainability attitudes into consistent action within university environments. Therefore, we hypothesize:

H1: Sustainability values significantly affect perceived benefits

H2: Sustainability values significantly affect perceived barriers

H3: Sustainability values significantly affect attitude toward waste separation behavior

Perceived Benefits and Barriers to Waste Separation

The perceived benefits of waste separation are multifaceted, encompassing environmental, economic, and socio-ethical dimensions. Environmental benefits include reduced landfill waste, lower greenhouse gas emissions, and conservation of natural resources (Sheau-Ting et al., 2016). Economic benefits may arise from cost savings associated with reduced waste disposal fees and potential revenue from recycling programs (Knickmeyer, 2020). Socio-ethical benefits pertain to the collective responsibility of individuals towards their communities and future generations (Zhang, 2023). Conversely, perceived barriers to waste separation can significantly hinder individuals' engagement in these behaviors. Psychological barriers, such as lack of awareness or knowledge about proper waste separation practices, can discourage participation (Simms et al., 2020; Sundar et al., 2023). Usage barriers, including the inconvenience of accessing recycling bins or the complexity of sorting waste, also play a critical role (Kiefer et al., 2018; Simms et al., 2020). Additionally, value-risk barriers, where individuals weigh the perceived risks of engaging in waste separation against the benefits, can further complicate decision-making processes (Sarigöllü et al., 2020).

Inconsistencies in findings regarding the perceived benefits and barriers to waste separation highlight the need for further investigation. While some studies emphasize the importance of perceived benefits in promoting waste separation, others suggest that barriers may have a more significant impact on behavior (Testa et al., 2023). Understanding these relationships is crucial for developing targeted interventions that address both perceived benefits and barriers to enhance waste separation behavior. Based on the previous literature, we posit:

H4: Perceived benefits significantly affect attitude toward waste separation behavior

H5: Perceived barriers significantly affect attitude toward waste separation behavior

Attitude-Behavior Relationship in Waste Separation

The attitude-behavior gap is a well-documented phenomenon in sustainability research, where individuals' positive attitudes towards sustainability do not always translate into actual pro-environmental behaviors (Claudy et al., 2013; Westaby, 2005), such as waste separation.

This gap can be attributed to various factors, including perceived barriers, social norms, and contextual influences. Identifying successful behavioral interventions that effectively bridge this gap is crucial for promoting sustainable practices within educational institutions. Future research should focus on developing and testing interventions that target both attitudes and perceived barriers to enhance waste separation behavior among students and faculty.

The present study applies Behavioral Reasoning Theory (BRT) to waste separation behavior in university settings, moving beyond traditional attitude-behavior models by examining both reasons for and against participation. It explicitly assesses the moderating role of green campus initiatives in shaping these behavioral pathways while integrating quantitative analyses with qualitative insights into lived experiences. In addition to pro-environmental values, the study explores the influence of solidarity values as a motivating factor for waste separation.

H6: Attitude significantly affects waste separation behavior

We also analyze mediating role of attitude, therefore we posit:

H7: Attitude significantly mediates the relationship between perceived benefits and waste separation behavior

H8: Attitude significantly mediates the relationship between perceived barriers and waste separation behavior

Moderating role of Green Campus Initiatives

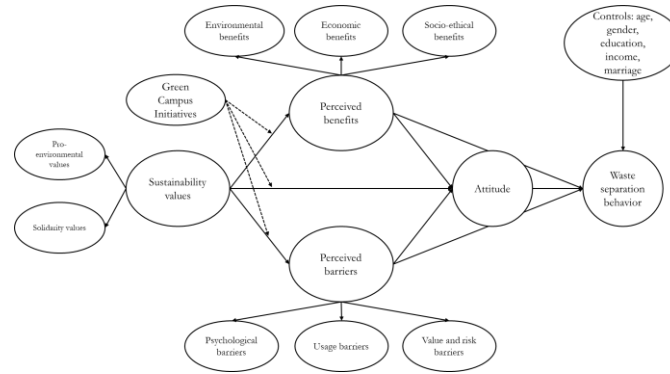
Green campus initiatives encompass a range of programs and policies aimed at promoting sustainability within educational institutions. These initiatives often include awareness campaigns, infrastructure improvements, and incentives for pro-environmental behaviors (Kaplowitz et al., 2009). Research has shown that institutional interventions can significantly impact student and faculty behavior regarding sustainable consumption (Fachrudin & Fachrudin, 2021; Frizon et al., 2024). Moreover, Dagiliūtė et al. (2018) observed that stronger institutional sustainability commitments amplified the impact of perceived benefits on waste separation behavior. The moderating role of green campus initiatives in shaping perceptions of benefits and barriers is critical. Institutional support can amplify the perceived benefits of waste separation by providing resources and infrastructure that facilitate these behaviors (Frizon et al., 2024). Conversely, effective initiatives can also mitigate perceived barriers by addressing issues such as convenience and accessibility (Lu et al., 2020). Based on previous literature we hypothesize:

H9_a: Green campus initiatives significantly moderate the relationship between sustainability values and perceived benefits

H9_b: Green campus initiatives significantly moderate the relationship between sustainability values and perceived barriers

H9_c: Green campus initiatives significantly moderate the relationship between sustainability values and attitude toward waste separation behavior

Figure 1: Proposed model based on PLS-SEM



Causal configurations for waste separation behavior

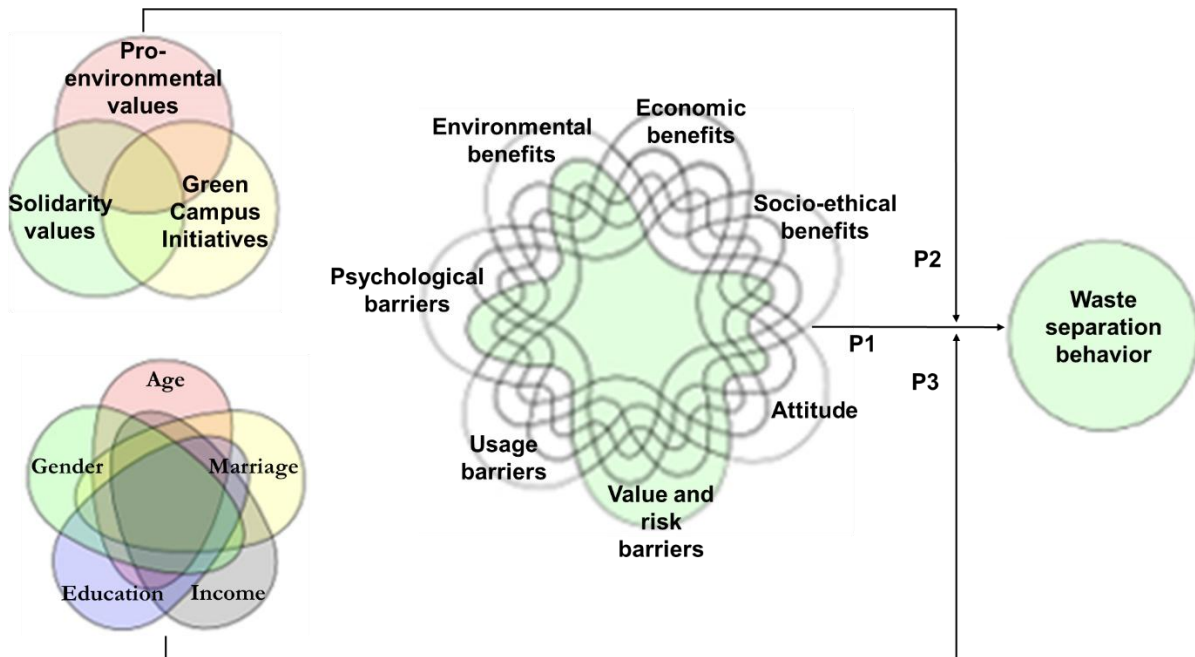
Building on the principles of complexity theory, this study posits several propositions for fsQCA analysis regarding the factors influencing waste separation behaviors. First, we propose that combinations of perceived barriers, benefits, and attitudes can lead to higher waste separation behaviors, as indicated by the necessity of a positive attitude but the sufficiency of specific configurations, such as low barriers combined with high socio-ethical benefits and a positive attitude. Additionally, equifinality suggests that multiple configurations—such as high environmental benefits with low value/risk barriers or strong attitudes with high economic benefits—can yield the same outcome. However, the absence of waste separation behavior is not simply the reverse of these combinations, as causal asymmetry illustrates. Furthermore, a perceived barrier may inhibit behavior in one configuration but not in another, highlighting the contextual contribution. The second proposition extends this framework by incorporating sustainability values and green campus initiatives, showing that their effect depends on their interaction with perceived benefits, barriers, and attitudes. Finally, demographic factors such as age and education also play a critical role, with combinations such as young age, high education, and strong sustainability values predicting higher waste separation behaviors. These findings emphasize the need for a nuanced understanding of how different factors interact to influence environmental behaviors across various contexts.

P1: Different combinations of perceived barriers, benefits, and attitude lead to higher waste separation behaviors

P2: Different combinations of sustainability values and green campus initiatives, combined with P1 variables, lead to higher waste separation behaviors

P3: Different demographic configurations, combined with P2 variables, lead to higher waste separation behaviors

Figure 2: Proposed model based on FsQCA



Method

The study adopts a multi-method research design that integrates quantitative and qualitative techniques. The quantitative component uses structured surveys and advanced statistical methods to measure the relationships among sustainability values, perceived benefits, perceived barriers, attitudes, and waste separation behavior. The qualitative component supplements these findings by using semi-structured interviews to capture contextual insights and reasoning processes that may not be fully expressed through quantitative measures.

This design was chosen because previous research indicates that combining multiple methods offers a fuller picture of complex behavioral phenomena (Prentice, 2020). In this study, the integration of Partial Least Squares Structural Equation Modeling (PLS-SEM) and Fuzzy-Set Qualitative Comparative Analysis (fsQCA) with thematic analysis of interview data enables us to capture both net effects and configurational patterns in the data. This structure not only tests the hypothesized relationships in the research model but also identifies unique combinations of conditions that drive waste separation behavior.

Data Collection

Data collection is divided into two distinct stages: quantitative and qualitative.

Quantitative Data Collection

Survey Instrument

A structured survey will be administered to collect data on key constructs. The survey instrument is developed based on validated scales from marketing, environmental psychology and sustainability research. Items measuring sustainability values, perceived benefits, perceived barriers, and attitudes are adapted from prior studies and refined through expert feedback. In addition, demographic questions and items to gauge participation in green campus initiatives are included. The present study employs well-established measurement scales to ensure validity and reliability in assessing factors influencing waste sorting behavior. Values will be adapted from Shepherd et al. (2009), while environmental and socio-ethical benefits will follow the framework established by Ünal et al. (2024). Economic benefits will be measured using the approach of Dabbous and Tarhini (2019), capturing financial considerations in waste sorting decisions. Psychological barriers will be assessed using Gifford (2011) framework, while value, usage, and risk barriers will be adapted from Laukkanen (2016) and Sadiq et al. (2021).

Attitudes toward waste sorting will be measured using the scale from Ünal et al. (2024), ensuring consistency in attitudinal assessment. Finally, waste sorting intention will be assessed using the scale developed by Ayob et al. (2017), as later adapted by Rüteliöné et al. (2025), providing a robust measure for predicting behavioral outcomes in the university setting.

Sampling Strategy and analytical approach

The target population consists of students, faculty, and staff at universities known for their active green campus programs. A stratified random sampling technique will be used to ensure representation from different groups. The desired sample size is calculated to achieve sufficient statistical power for PLS-SEM analysis, and pilot testing has indicated that a sample of at least 300 respondents is feasible. The survey will be deployed online using a secure platform, ensuring anonymity and confidentiality.

To analyze the survey data, a multi-method approach will be applied, combining variance-based structural equation modeling (PLS-SEM) and fuzzy set qualitative comparative analysis (fsQCA). PLS-SEM is selected to estimate the linear and additive effects among constructs in the conceptual model and to test the proposed hypotheses. However, because some relationships may be complex, non-linear, or dependent on specific configurations of conditions, fsQCA will be employed as a complementary method. This approach allows for the identification of multiple combinations of conditions that are sufficient for an outcome, as well as configurations that lead to its absence, thus accounting for causal asymmetry and equifinality. The combination of PLS-SEM and fsQCA enables a more comprehensive understanding of the relationships under investigation, capturing both the average effects and the diverse pathways through which the outcome can be achieved. This methodological choice responds to recent calls for greater analytical depth in behavioral research by integrating variable-oriented and case-oriented logic within a single study (Fiss, 2011; Woodside, 2013). Recent studies have employed Partial Least Squares Structural Equation Modeling (PLS-SEM) and fuzzy-set Qualitative Comparative Analysis (fsQCA) to model complex behavioral relationships in sustainability research. PLS-SEM allows researchers to analyze the relationships between multiple variables simultaneously (Hair et al., 2019), which can provide insights into the direct and indirect effects of various factors on waste separation behavior. On the other hand, fsQCA offers a qualitative approach to understanding the configurations of conditions that lead to specific outcomes, allowing for a more nuanced understanding of the interplay between different factors influencing waste separation (Pappas & Woodside, 2021). A combination of PLS-SEM + FsQCA is a useful approach in sustainable consumption setting (E.g., Fan et al., 2024).

Qualitative data collection and analysis

To complement the quantitative findings, semi-structured interviews will be conducted with a subset of survey participants (Patton, 1990). These interviews are designed to explore in detail the reasoning behind waste separation behavior, focusing on the interplay of personal values, perceived benefits, and perceived barriers. An interview protocol will be developed, including open-ended questions that probe into experiences with green campus initiatives, motivations for participation, and perceived challenges. Interview participants will be selected using purposive sampling to capture a diverse range of perspectives. Criteria for selection include active participation in campus sustainability programs, varied demographic backgrounds, and differing levels of waste separation behavior as indicated by survey responses.

Interviews will be conducted face-to-face or via video conferencing, recorded with consent, and later transcribed for analysis. A secure digital recording system and transcription software will be used to ensure data integrity. The interview guide will be pretested in a pilot study with five participants, and feedback has been used to refine the questions. In addition to primary survey data, we will gather secondary data from campus records on participation in sustainability programs, waste management statistics, and other relevant institutional metrics.

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