

RESEARCH ARTICLE

Enhancing waste classification behavior: A psychological perspective

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ABSTRACT

In our rapidly evolving world, propelled by technological advancements and societal progress, the pace of life has accelerated significantly. However, this relentless pursuit of speed has also given birth to pressing ecological challenges, with waste accumulation being a conspicuous concern. Despite concerted efforts to promote waste classification practices through policies and initiatives, the adoption of such behavior remains disappointingly limited. Consequently, the exploration of waste classification behavior has garnered attention in the field of environmental psychology. This paper synthesizes years of domestic and international research to comprehensively review the current state, definition, influencing factors, and potential benefits of waste classification behavior. By adopting a multidimensional approach, it aims to unveil the role of psychology in shaping such behavior, while also addressing the persisting ecological dilemmas that continue to confound contemporary efforts.

Keywords: waste classification behavior; influencing factors; a psychological perspective

1. Introduction

The global surge in waste generation has become a pressing concern, with its adverse environmental and economic consequences. In 2020, the world produced a staggering 2.24 billion tons of solid waste, translating to approximately 0.79 kilograms per person per day. Anticipated population growth and rapid urbanization paint a worrisome picture: annual waste generation is projected to surge by 73% from 2020 levels to a staggering 3.88 billion tons by 2050^[1]. The resulting environmental degradation poses serious threats to public health and economic stability in numerous nations. Thus, effective waste classification has emerged as a critical challenge demanding immediate attention^[2]. The Chinese government has put forward some measures to address this problem^[3]. Nevertheless, research reveals the performance of individuals in the practice of waste classification is relatively poor. Considering these circumstances, this study explored the definition of waste classification behavior, the influencing factors of waste classification behavior, and the role of individuals exploring waste classification behavior from the perspective of psychology. The primary goal of this study is to investigate additional measures to encourage individuals to adopt more effective waste classification behavior.

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2. Definition of waste classification behavior

The concept of Waste Classification Behavior emerged, advocating the separation of waste into distinct categories following regulations and their subsequent disposal in designated locations^[4]. This strategy encompasses four dimensions: landfill, incineration, recycling, and waste classification^[5]. Recycling and waste classification have garnered more favor than landfills and incineration due to their positive environmental impacts. Waste classification forms the bedrock of successful recycling, serving as a critical precursor to efficient and effective recycling processes^[6]. Positioned at the heart of environmental protection, household-level waste classification adoption not only curtails landfill usage but also reduces waste treatment expenses and minimizes raw material consumption through well-structured recycling schemes. But, regarded as a pivotal strategy for waste management, the triumph of waste classification pivots on active public involvement^[7]. Promoting waste classification remains a formidable challenge for policymakers^[8].

In recent years, the quantity of waste in China has grown rapidly, and the classification of domestic waste has become a national strategy to promote a circular economy and improve the sustainability of the urban environment. Waste classification behavior is a type of prosocial or environmental behavior. It is influenced by psychological factors^[9]. Waste classification plays a crucial role in minimizing the adverse environmental effects of waste and facilitating efficient waste recycling processes^[10]. Therefore, understanding the influencing factors of waste classification behavior and exploring their relationships are of great significance for the formulation of policies aimed at promoting waste classification.

3. Influencing factors of waste classification behavior

Certainly, there is a paragraph discussing the factors that influence waste classification behavior, which can be categorized into objective and subjective factors. Objective factors include the availability of recycling facilities, convenient access to waste disposal bins, and government policies and regulations regarding waste management. These objective factors influence the external environment in which individuals make decisions about waste disposal. On the other hand, subjective factors are more related to an individual's beliefs, attitudes, and personal norms. These factors encompass an individual's level of awareness and understanding of the environmental impact of waste, their sense of responsibility towards sustainable practices, and their perception of social norms regarding waste classification. Together, these objective and subjective factors play a pivotal role in shaping individuals' waste classification behavior.

3.1. Objectives factors

3.1.1. Government institutions

Government institutions, such as policies and regulations, are the key factors supporting environmental protection. The system formulated by the government is a mandatory tool; in areas with waste classification policies, the public participates more in actual waste classification behavior than in areas without such policies^[11]. In addition, the government can also establish flexible management methods, such as an attractive incentive system. For example, residents who correctly participate in recycling can earn points for redeemable gifts^[12]. The government should also lead by example in waste collection, exerting external pressure on residents and strengthening compliance^[13]. The supervision system can be expanded and improved by implementing the community classification heads' supervision responsibility system^[14].

In addition, the lack of necessary infrastructure may be one of the most significant obstacles for families to participate in recycling activities^[15]. The willingness to classify and collect household waste is significantly affected by facility conditions^[5]. The convenience of waste classification significantly influences waste classification behavior^[8]. One of the most important factors in improving the classification behavior of

domestic waste is convenience^[16,17]. Therefore, the government has installed a lot of infrastructure on waste classification, and facility accessibility directly promotes waste classification behavior^[18]. Convenient environmental facilities and services can effectively encourage residents to participate in the classification and recycling of domestic waste^[3].

Government laws and infrastructure facilitate the implementation of individual waste classification behavior. This illustrates the influence of government authority on individuals and represents a phenomenon of social conformity. It also presents a practical scenario in which the government, by providing convenient waste separation facilities, can encourage individuals to segregate waste. From a psychological perspective, the government plays a crucial role in promoting waste classification behaviors. Its policies and measures have the potential to influence individuals' attitudes, motivations, perceptions, and social identification. This forms the basis for empirical research and provides insights for psychological experiments.

3.1.2. Economic rewards

Economic incentives refer to personal behavior incentives that increase or decrease the economic value of activities, including cash incentives, prizes, raffles, coupons, taxes, and other forms. For example, survey results show that residents can actively participate in roadside recycling if they provide financial incentives^[19]. There is a significant positive correlation between the intention of the market to encourage waste classification behavior and all economic incentives and waste classification intention^[20]. The study has found that economic incentives are more effective than social mobilization in promoting waste classification. Monetary incentives are one of the most powerful and universally applicable policy interventions for waste collection^[21]. The study has confirmed that the connection between waste classification intentions and behaviors depends on incentives^[22]. Research has shown that using prizes as a reward plan increases waste recycling tendencies. The research pointed out that the introduction of fiscal incentives to promote waste classification in various countries including the Czech Republic, Italy, Finland, and Ghana^[23].

Therefore, from a psychological perspective, it is necessary to further explore the role of direct monetary rewards in waste classification behavior. It is crucial to select appropriate types and levels of rewards. External rewards can prompt short-term behavior change, but rewards that are excessively frequent or conspicuous might undermine intrinsic motivation^[24]. To achieve lasting changes in waste classification behavior, governments should gradually reduce external rewards and encourage the development of intrinsic motivation. Policies should consider how to facilitate a smooth transition, enabling individuals to adopt waste classification behavior and internalize it as a habit^[25].

3.1.3. Social norm

Social norms are informal rules of conduct governing behavior in society or groups, which dictate 'what should be done' and 'what should not be done'^[26,27]. Individuals tend to compare themselves with other similar members of the group, which is a process driven by norm-based social influence; disobedience to social norms may result in punishment or social sanctions^[28]. Previous studies have demonstrated a significant correlation between social norms and residents' waste collection behavior^[29,30]. Descriptive norms-based incentives have a greater impact on recycling behavior^[31]. Subjective norms have a significantly positive impact on waste classification attitudes^[32]. People are more willing to uphold their self-image of social responsibility and act in accordance with pro-social recycling norms^[33].

To conform to social norms, people are more likely to adopt proper waste disposal practices, such as waste classification^[34]. These studies demonstrate that social norms have a significant impact on waste classification behavior. Understanding the role of social norms can help design effective interventions for governments and organizations aiming to promote greater participation in environmentally friendly behavior.

The conclusion of these studies demonstrates a significant relationship between social norms and individual waste classification behavior. It also suggests that we can consider social norms as a key variable for promoting individual waste classification behavior in the future. We can enhance the visibility of social norms, such as through government and organizational efforts that encourage imitation by showing people how to properly sort their garbage through propaganda, signs, posters, etc.^[34]. Additionally, research suggests that people may be more likely to adopt normative behavior when influenced by unconscious social norms. We recommend that governments devise strategies to reinforce social norms for waste classification through environmental arrangements and implicit cues^[35]. To promote the active participation of individuals in garbage classification, we should not rely solely on strict laws and regulations, economic incentives, and the guidance of social norms. Instead, we should also consider the inherent characteristics and factors of individuals to fulfill their environmental responsibilities^[36]. These internal factors may include individual knowledge and information and individuals in the implementation of waste classification norms. Considering these internal factors, such as individual knowledge, information, and adherence to waste classification norms, can more effectively promote the active participation of individuals in waste classification and achieve the goal of environmental protection^[35].

3.2. Subjective factors

3.2.1. Information knowledge and publicity

Raising people's awareness of the importance of waste issues and educating them about proper classification can encourage individuals to adopt an environmentally friendly lifestyle^[37,38]. Environmental knowledge helps change behavior patterns^[39]. There is a significant positive correlation between individuals' level of knowledge about waste classification and waste classification and recycling behavior^[40]. Studies have found that knowledge of waste classification is directly and significantly related to residents' willingness to classify waste^[41]. Research has shown that improving knowledge levels has a positive impact on waste classification behavior in China^[22]. The research shows that residents' environmental knowledge and information are significantly related to their environmental behavior^[3].

From a psychological perspective, environmental knowledge plays a crucial role in promoting individuals' engagement in waste classification behavior^[42]. Having sufficient environmental knowledge enables individuals to recognize the environmental value of waste classification, leading to the formation of positive attitudes and a willingness to act^[43]. Furthermore, knowledge enhances individuals' self-efficacy, making them believe in their ability to correctly engage in waste classification, thus making them more likely to participate^[44]. Simultaneously, knowledge can shape individuals' social identity, incorporating environmentally responsible behavior into their self-concept, thereby encouraging them to play active roles in society^[45]. To encourage individuals to engage in more waste classification behavior, it is essential for individuals to acquire a sufficient knowledge of waste classification.

3.2.2. Personal norm

According to the norm activation model, personal norms represent a sense of self-ethical obligation for individuals to guide their actions. Personal norms emphasize moral obligations over social pressure. Personal norms are a sense of moral obligation rooted in an awareness of the consequences of misconduct and a sense of personal responsibility^[46]. Various studies have empirically supported the role of personal norms as predictive indicators of intentions and environmental protection behaviors in the context of waste classification^[18,47]. Personal norms are the primary factor influencing the willingness of Chinese residents to classify waste^[18]. Personal norms are the most influential determinant in enhancing the internal motivation of households to participate in waste classification efforts^[48]. Studies have found that personal norms are the key

driver of tourists' waste classification behavior^[49]. These findings are valuable for policymakers in their efforts to promote and plan waste classification programs aimed at addressing waste disposal issues^[18].

From a psychological point of view, personal norms play a crucial role in shaping waste classification behavior. The government can emphasize that waste classification is part of an individual's moral responsibility. By reinforcing an individual's sense of moral obligation, they can enhance their intrinsic motivation for waste classification^[34]. Encourage individuals to reflect on their norms and values to identify intrinsic motivations related to environmental protection. Individuals are more likely to act based on their intrinsic values^[50]. By focusing on individual norms, governments and organizations can more effectively promote individual participation in waste classification activities, thereby achieving more sustainable environmental goals^[22].

4. The effect of waste classification

Through an analysis of the factors affecting individual garbage classification behavior, this study found that arises not only from laws, regulations, and other objective factors but also from personal norms and other subjective factors. Individual garbage classification helps maintain a clean-living environment and fulfills individuals' basic physiological and psychological needs^[51]. The ability of individuals to successfully sort waste can enhance their sense of self-efficacy, i.e., their confidence in their ability to complete the task^[52]. Furthermore, positive environmental behaviors like waste classification can strengthen individuals' social identity within the environmental community and foster a positive social identity. In addition, individual garbage classification has many advantages.

4.1. Promote cooperation between individuals

Waste classification is a common environmental protection action, requiring the cooperation and coordination of community residents. By participating in waste classification, individuals can work together to protect the environment and thereby foster social cooperation and solidarity^[43]. Previous research has shown that the development of environmental behavior can convey certain personal characteristics to others, such as social status and credibility. Through incentive experiments, we have demonstrated that individuals who are well-known for their pro-environmental behaviors are expected to cooperate more, be preferred as partners, and cause more cooperation from others. Therefore, the existence of environment-friendly individuals may encourage others to make more efforts to achieve the cooperation goals. However, those who exhibit pro-environmental behavior are not actually more cooperative than those who exhibit less pro-environmental behavior^[53].

4.2. The implementation of waste classification can improve the social status of individuals

Previous studies have shown that pro-environmental behaviors and attitudes can convey information about an individual's social status, as well as certain personality traits, such as conscientiousness, amiability, and altruism^[54]. Implementing waste classification practices demonstrates an individual's sense of environmental responsibility and social responsibility, thereby earning recognition and respect in society^[55]. Through active participation in environmental activities, individuals are often perceived as having high moral and trustworthiness values in society, thereby enhancing their social status^[35,36].

Although the existing research shows great hope, this current work attempts to address these issues with at least two limitations. First, we not only study whether environmental protection behavior will affect others' views on actors but also study whether it will affect subsequent social interaction. Secondly, we study whether people consider others' environmentalism rather than hypothetical decisions or survey responses when making decisions related to actual (financial) risks^[45,56,57].

5. Limitations and prospects

Through exploring factors influencing individuals' engagement in waste classification behavior, we have found that while the government has achieved some success in waste management, there are still limitations and shortcomings that require exploration by future scholars. Personal norms and environmental identity can predict behavior more effectively than external social norms. In addition, the impact of social norms on personal norms and environmental identity is partially regulated by group identity. When individuals identify more strongly with groups, prohibitive norms better predict personal norms and environmental identity, while descriptive norms more directly predict them^[58]. Both non-monetary and monetary incentives have a significant positive impact on residents' willingness to participate in online recycling, but there is no significant difference between them^[12]. In addition, it is also found that compared with official information incentives, unofficial information incentives have a greater impact on residents' perceived threat and perceived efficacy and can better promote residents' waste classification willingness^[59,60].

For instance, (1) individuals might exhibit significant cognitive biases towards waste classification behavior, leading to an underestimation of its impact on the environment; (2) Some individuals may lack sufficient intrinsic motivation to engage in waste classification behavior; (3) The impact of external rewards could potentially undermine intrinsic motivation, thus reducing sustained participation in the long term; (4) Even though social norms can influence individuals' behavior, at times, individuals may disregard norms, particularly when unsupervised by others; (5) Furthermore, certain individuals may find it difficult to practice waste classification behavior due to environmental constraints, time pressures, and other factors.

To embark on empirical research regarding waste classification behavior, we propose four considerations: (1) There is a need for further research into the motivations and barriers behind individuals' waste classification behavior, exploring the factors that influence their participation and devising targeted intervention strategies. (2) Long-term studies are essential to comprehend the continuity and changes in individuals' participation in waste classification behavior. Monitoring shifts in individual behavior can uncover trends of concern and suggest potential solutions. (3) Drawing on research findings to design behavioral intervention strategies, such as personalized feedback and introducing social cognitive pressures, can encourage individuals to participate more actively in waste classification. (4) Additionally, it's crucial to consider factors from various cultural and societal backgrounds, such as values, that affect waste classification behavior, and to incorporate these into the research scope. In conclusion, through a more in-depth examination of waste classification behavior, we can enhance our understanding of its psychological mechanisms, ultimately providing a foundation for more effective intervention strategies.

Waste classification is a significant event that benefits both the country and its people. Waste classification is extremely urgent in China due to the increasingly serious environmental pollution. The world is observing and eagerly anticipating China to take decisive action in implementing the "waste classification" initiative. As far as we know, it took 27 years in Japan and 40 years in Germany to sort waste well. The Chinese government is trying to turn pressure and challenges into motivation and opportunities to implement more effectively the "waste classification" initiative. In the future, with the development of China's economy and the continuous improvement of citizens' quality, waste classification will become a fundamental responsibility for all citizens. The waste classification campaign in China can not only save resources and reduce environmental pollution, but also enhance citizens' awareness of environmental protection. After all, waste classification has many advantages. It is equal to protecting the earth and our living home. Building a clean and beautiful world is a shared goal we all strive for^[61].

Author contributions

Conceptualization, YZ; writing—original draft preparation, WF; review and editing, MR. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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