

Understanding Waste Separation Behavior through the Application of an Extended Form of the Theory of Planned Behavior (TPB)

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Impact of This Thesis on Research and Society

Overall, this thesis contributes to the understanding of an important aspect of our society, namely waste management behavior of citizens and consumers. Indeed, it shows that any waste management procedure (defined by decision makers or service providers) requires a preliminary and thorough understanding of the final user's behavior and motivation in order to be really effective.

This thesis applies an extended form of the "Theory of Planned Behavior" (TPB) by Ajzen (1991) and the "Theory of Reasoned Goal Pursuit" (TRGP) by Ajzen and Kruglanski (2019). The utilization of these socio-psychological theoretical frameworks (in combination with the application of a rigorous scientific methodology) enhances the academic knowledge on people's waste separation behavior in middle-to-big size cities in Europe. Specifically, this thesis provides valuable insights on human behavior and useful suggestions to researchers for future studies in this field. Furthermore, this thesis offers some practical recommendations to several waste stakeholders, especially to institutions, waste service providers and educators. For these reasons, this thesis impacts the theoretical and empirical fields with its own contribution as described in the next sections.

Contribution and Relevance of This Thesis to the Scientific Field

On the theoretical side, this thesis addresses waste-related behaviors starting from the analysis of the body of academic literature in this field, mapping the conceptual structure and individuating knowledge gaps. Specifically, Chapter 2 provides a valuable summary of the academic literature on waste-related behaviors, which include not only waste separation but also waste re-utilization, minimization, recycling, etc. Chapter 2 also applies and promotes an interdisciplinary approach in order to better comprehend the interconnection of socio-psychological sciences with economics, law, engineering, ecology, sustainable development, etc. Considering the complexity and relevance of waste-related behaviors, this study proposes a useful classification of the myriad of factors and conditions influencing these behaviors. In fact, it helps scholars and practitioners of different disciplines to extricate themselves in this complex field by offering a useful guide for understanding the main theoretical frameworks, concepts, factors and conditions related to this topic. Furthermore, Chapter 2 points out trends and gaps in the existing research. For example, it highlights leading nations and journals in the research on pro-environmental consumer behavior; also, it points out weak areas in current studies such as the limited research on the effectiveness of the intervention measures adopted by governments and institutions.

Chapter 3 defines the conceptual structure of studies on recycling behavior through specific scientific methodologies such as bibliometric analysis, science mapping and text mining; it identifies current trends, the research network and hot topics by analyzing 2061 articles produced between 1975 and 2020 from three different databases. Chapter 3 highlights leading nations and the intellectual configuration of knowledge on recycling behavior; it identifies key areas such as food waste, "waste electric and electronic equipment" and waste management systems. It also points out that the effects of innovation and technology on waste-related behaviors need to be further analyzed (e.g., "Internet of Things", smart cities). In this regard, recent technological advances offer the possibility to better monitor consumer behavior in relation to purchase of goods and subsequent waste production, therefore they can contribute to a better understanding of the actual recycling behavior.

Chapter 4 also contributes to the body of literature on recycling behavior by showing the benefits of considering the effects of habits and environmental motivation when the TPB framework is applied to waste separation behavior. These additional constructs (habits and motivation) are not in contrast with the TPB principles; actually, they better explain some peculiarities of separation behavior. For example, habits highlight the repetitive nature of recycling, whereas a lack of environmental motivation can explain why a person does not recycle although he/she is able to do it and people around him/her regularly do so. This chapter shows that waste separation behavior is goal-driven as

well (even if it may not seem to be influenced by goals). In fact, this study proves that, although recycling activities are usually mandatory for citizens in advanced economies, motivation is pivotal in promoting separation behavior because it has the capability to spark the intention to separate, whereas the typical predictors of the TPB framework (attitude to separate, one's own norms and the intention to separate) alone may not be enough for doing that.

Chapter 5 represents, to the author's knowledge, the first application of TRGP to waste-related behaviors (as of September 2022). After the first application of TRGP to physical activity in an academic paper in the English language (Hamilton et al., 2022), this chapter represents a seminal study in the field of pro-environmental behavior. TRGP introduces the constructs of "active procurement goals" and "active approval goals": the former are the "desired outcomes and experiences that follow from" (Ajzen & Kruglanski, 2019, p. 779) separating waste, the latter aim at obtaining the approval of people important to us. Chapter 5's findings highlight the importance of active goals and motivation in addition to the typical TPB predictors; in particular, "active procurement goals" have a predominant effect on the precursors of the intention to separate compared to "active approval goals". This situation is due to several reasons such as the fact that nowadays waste separation is a mandatory activity in advanced economies, therefore people have somehow accepted recycling procedures, and recycling has become a routine activity. In addition, people living in these economies have developed an enhanced environmental awareness and they presume that neighbors and friends perform waste separation on a regular basis. This chapter supports the validity of the TRGP model in the study of recycling behavior. In particular, Chapter 5 demonstrates that TRGP shows a strong explanatory capability for behavior not under full volitional control such as routine behaviors. Nevertheless, it is essential to test TRGP with other case studies and in different contexts. In addition, future research should focus attention on the dynamic characteristics of goals because a goal may change over time depending on the situation (e.g., it may become inactive or predominant).

Contribution and Relevance of This Thesis to Society and Societal Actors

Considering this thesis applies predictive theoretical frameworks which aim at understanding human behavior but not at correcting or modifying it, this dissertation overcomes this limitation by providing some empirical recommendations to societal actors involved with waste management. Specifically, this thesis proposes different types of interventions which range from the organizational level (e.g., legal framework) to the individual (e.g., personal goals, changing wrong recycling habits).

First of all, this thesis highlights that the development of an effective separation behavior is highly dependent on creating a supportive institutional-legal framework and a favorable environment for daily recycling activities. This framework is essential to guide and harmonize the efforts of different stakeholders and to support all pro-environmental initiatives from strategic to tactical level. For example, governments should impose the utilization of reusable containers for food packaging at the national level and involve all stakeholders (especially final users) in the decision-making process. Also, municipalities and waste service providers should favor individual recycling through a reward scheme and the optimal distribution of recycling bins in the neighborhood.

Obviously, a supportive legal-institutional framework has to be stable throughout the years, especially in the medium to long term; in fact, economic crises and conflicts challenge the ability of governments to guarantee economic and political stability, hence their key role to support pro-environmental measures and enterprises on a long horizon. In this regard, it is beyond any doubt that timely interventions and investments are fundamental for an effective waste management. For example, enterprises have to find the right balance between profitability and sustainability (A. Zhang et al., 2019) because investing in smart enabling technologies for waste management calls for great expenditures and appreciable results may take a long time.

The full exploitation of these technological advances also presupposes the development of specific competences and new roles in governmental offices, industry and waste management companies. These new roles should be very familiar with the potential of new technologies and define waste programs exploiting this potential. They should understand the characteristics of the final users and comprehend key factors and barriers to the implementation of these programs. In parallel, managers, institutions and decision makers need to develop a culture of innovation in their organization, otherwise the great potential of smart enabling technologies is not going to be exploited.

Governmental organizations should also understand that enterprises work in a very competitive environment, highly driven by market pressure and cost benefit considerations, therefore environmental protection may not represent an organizational goal. If a farsighted enterprise decides to apply smart enabling technologies to improve its waste management with probable benefits in the medium to long term, institutions are called to support it because the enterprise may not have any value recovery from waste management in the short term.

This thesis also explains the importance of a systemic view of waste management starting from the complete analysis of the life cycle of a good or a service. For example, the entire supply chain (including retailers and repair services) actively contributes to waste management as well; in turn, an efficient maintenance service promotes final users' cooperation, who are going to be more motivated to recycle knowing that they can re-utilize or repair their own goods. At the same time, an efficient lifecycle favors the implementation of new technologies, sharing of responsibility among all stakeholders, and the diffusion of pro-environmental values.

In relation to the individual dimension, this thesis also provides suggestions on how to influence goals and motivation. In effect, in order to obtain a specific behavior, it is essential to activate one or more specific goals and motivate people to achieve these goals; therefore, waste service providers and decision makers should understand the goal systems of the targeted population in order to implement effective interventions. In fact, if people live in a context with a high sensitivity for environmental matters, it is beneficial to activate and promote high level altruistic goals such as environmental protection. Vice versa, if people live in a degraded socio-cultural context where they do not perceive the importance of protecting the environment, goals and motivation should also be reinforced through a reward system, especially if the economic conditions are poor.

Even though this research shows a limited influence of "active approval goals" on motivation, Chapter 5 also suggests promoting this type of goals which aim at getting the approval of important people (e.g., parents, teachers). Therefore, interventionists should also encourage this approval, both at the family level and at the workplace or school (Hamilton et al., 2022). For example, schoolteachers should promote environmental goals in the early stages and represent a firm point of reference for pupils; at the same time, parents should be involved in the environmental education of their children and in the diffusion of pro-environmental goals among youngsters.

Chapters 4 and 5 emphasize the need to tailor waste recycling programs to the socio-demographics characteristics of the final users. In effect, different ages and incomes require different measures in order to make waste separation more effective. For example, educational campaigns for youngsters have to develop pro-environmental values and basic principles such as the wise exploitation of natural resources; whereas campaigns for elders require a diverse approach considering their system of values and goals is differently structured. In addition, elders may have inappropriate recycling habits if they have not been correctly explained how to separate waste in their youth. Consequently, behavioral changes of elders can be achieved with ad hoc techniques aiming at showing, for example, the risks to their health in case of inappropriate waste separation and handling. It follows that the gradual ageing of the population in the years to come requires an enhanced attention for elders by interventionists through tailored interventions.

Last but not least, the design of effective behavioral corrective measures requires the understanding of the preferred means of communication by the final users and the type of information these users are looking for. These aspects are quite often underestimated, but they are pivotal for the full success of waste management.