

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

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## Summary

Chapter 1 introduces the topic of investigation by providing the background of the study, its purpose, rationale and significance. It analyzes the main available theoretical frameworks, and it introduces the proposed conceptual framework in order to be able to answer the research questions.

Building on the fact that nowadays waste management is a topical issue and individual behavior represents a key aspect of the success of waste management procedures, Chapter 1 highlights that the role of motivation and goals in recycling behavior is often underestimated or omitted in the most diffused socio-psychological theoretical frameworks (e.g., Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1970), Theory of Planned Behavior (TPB) by Ajzen (1991), Norm Activation Model (NAM) by Schwartz (1977), Value Belief Norm (VBN) theory by Stern (2000)). Considering that waste recycling behavior is a kind of habitual act, a correct analysis of this behavior cannot exclude the investigation of habits as well. Acknowledging that several theoretical frameworks have already proved their validity in understanding and predicting recycling behavior (e.g., TRA, TPB), the integration of the original constructs with additional ones creates new conceptual models which may improve the predictive capability of the original theory. In this regard, the recent Theory of Reasoned Goal Pursuit (TRGP) by Ajzen and Kruglanski (2019) combines the construct of goals and motivation with the typical TPB predictors, hence offering a new framework to analyze human behavior.

By answering some specific research questions, this thesis aims at improving the understanding of waste separation behavior through the analysis of the effects of habits, motivation, goals (and other possible constructs) on the intention to separate waste starting from the basis of the TPB, proposing an extended TPB model and applying TRGP to a couple of ad hoc case studies.

In addition, Chapter 1 introduces the overall methodology, and it specifies the assumptions, the delimitations and limitations of the research in order to correctly define the research field and expectations. Lastly, it explains the key terms by defining their meaning, therefore preventing possible misunderstanding and confusion.

Chapter 2 utilizes the systematic literature review methodology to study the concepts and factors related to pro-environmental consumer behavior in relation to waste management through an interdisciplinary approach. In particular it describes how these concepts are addressed in the academic literature on waste management. It investigates the interplay between pro-environmental consumer behavior (PECB) and generic consumer behavior (GenCB); moreover, it analyzes the factors and conditions which favor this interplay. To ensure a robust and rigorous approach, this systematic review utilizes three databases in the timeframe 1975-2019, it applies a solid search query, it follows the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses” (PRISMA) guidelines (Moher et al., 2009) and it reduces the risk of bias by adopting the “ROBIS” methodology. The findings reveal that, regardless of the numerous types of behavioral models applied to pro-environmental behaviors, these models mainly refer to a limited number of theoretical frameworks, namely TRA, TPB, NAM and VBN. Moreover, the above-mentioned level of interplay is quite limited, however it is significantly influenced by a favorable context or institutional-legal framework. The spectrum of promoting factors and conditions is wide and it involves different sectors such as economics, law, social psychology, government and institutions. Lastly, this chapter highlights the limitations of the research in this field, the importance of a more interdisciplinary approach, the role of intervention measures by key stakeholders and the need for a clear classification of factors and conditions.

Chapter 3 applies bibliometrics and knowledge domain mapping to recycling behavior through the study of the body of literature produced in the timeframe 1975-2020. More than 2,000 articles coming from three scientific databases are analyzed through two bibliometric tools and text mining. The

findings reveal that the production of papers on recycling behavior keeps growing at an exponential rate and 60% of papers have been published between 2015 and 2020, confirming the global interest on this topic. Leading nations are mainly from the European Union, North America and Commonwealth. However, other nations such as China and Malaysia are expanding their academic production. This chapter describes the intellectual configuration of the knowledge on recycling behavior and individuates several conceptual sub-domains focused, for example, on food waste, waste electric and electronic equipment (WEEE), plastic bags, determinants of recycling behavior; other sectors are also getting topical such as Internet of Things (IoT), Life Cycle Analysis (LCA), utilization of bitcoins, circular and smart cities, products obsolescence. Moreover, the findings indicate that waste management and the related human behavior represent a universal challenge and requires an interdisciplinary approach at all levels ranging from the individual to the institutional. In fact, this chapter highlights the importance of a more comprehensive view of the area of investigation starting from the holistic analysis of all stakeholders including their goals and motivation.

Chapter 4 analyzes waste separation behavior at the household level in Rome through the utilization of a model based on TPB; specifically, it studies the influence of environmental motivation, habits, past behavior and functionality of bins (besides the typical TPB predictors, namely attitude, perceived behavioral control (PBC) and subjective norms) on the intention to separate waste. The results of this study are analyzed through structural equation modeling (SEM): they confirm not only the validity of the typical TPB predictors, but also the key role of environmental motivation on attitude and habits, and the influence of habits on attitude, PBC, intention and past behavior. This chapter also applies mediation analysis to these constructs; in fact, it reveals that environmental motivation has an indirect effect on intention through attitude, and habits on intention through PBC and attitude. These outcomes clearly show that, when the TPB framework is applied to waste separation behavior, it benefits the addition of habits and environmental motivation. Furthermore, this chapter demonstrates that habitual behaviors such as waste separation are driven by motivation as well. The final part of this chapter proposes some suggestions for policy makers and researchers; for example, it highlights the importance of activating householders' pro-environmental goals to increase the efficacy of recycling campaigns.

Chapter 5 aims at understanding the effects of goals on waste separation intention and at testing TRGP when applied to separation behavior considering this framework has the potential for improving the understanding of human behavior. It is worth mentioning that, at present, no study has verified the efficacy of TRGP on recycling behavior, therefore this chapter applies it to the study of separation behavior of the households of Maastricht and Zwolle, the Netherlands. The outcomes definitely indicate that active procurement goals (APGs) and motivation influence separation intention; specifically, the effects of APGs on attitude and motivation are statistically significant; moreover, motivation is a very reliable proxy of intention to separate. At the same time, active approval goals (AAGs) do not significantly influence subjective norms and motivation. Therefore, this study confirms that the TPB framework can benefit the addition of further constructs by increasing its explanatory power. Furthermore, TRGP changes the "compensatory nature of the expectancy-value model" in which "each product of the belief strength times outcome evaluation is given equal weight" (Ajzen & Kruglanski, 2019, p. 799); in fact, in TRGP, AAPs and APGs have a privileged status and predominate on non-active goals. Lastly, this chapter proposes some suggestions on how to promote behavioral changes.

Chapter 6 recaps the analysis and outcomes of the previous chapters; in particular, it highlights that separation behavior, although habitual in nature, is goal driven. Not only that, the impact of AAGs and motivation on separation behavior are significant and TRGP definitely improves the understanding of this type of behavior. This chapter, after recalling the main limitations of this thesis (e.g., self-reported measures in spite of observed measures), describes the implications of this

research and offers some ways ahead for future research. In particular, it stresses that, in order to increase the efficacy of recycling campaigns, interventionists have to activate final users' pro-environmental goals and tailor their interventions depending on socio-demographic characteristics of final users. In fact, whereas youngsters can be educated, in their early years, to develop pro-environmental values and basic principles such as the respect for biodiversity and the wise exploitation of natural resources, elders require a diverse approach considering that their system of values and goals is differently structured (in this case, ad hoc campaigns could stress 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 and support for elders by interventionists through tailored programs and interventions.

Furthermore, governments have to create a supportive legal-institutional framework to support all stakeholders; in turn, municipalities and waste service providers have to develop a favorable environment for daily recycling activities. This framework is essential to guide and harmonize the efforts of different stakeholders and to adequately support all pro-environmental initiatives from strategic to tactical level. For example, this thesis suggests that governments impose the utilization of reusable containers for all food packaging at the national level, support enterprises which introduce and regularly apply pro-environmental measures; in parallel, municipalities and waste service providers should implement measures such as an optimal distribution of recycling bins (for different types of waste in the neighborhood including exhausted oil and batteries), a reward scheme, and an effective sanctioning system for people not recycling correctly.

Moreover, this thesis recommends that specific competences and new roles are to be developed in governmental offices, industry and waste management companies to fully exploit new technologies. These new roles should be very familiar with the potential of state-of-the-art technologies, define waste programs exploiting this potential, understand the characteristics of the final users, comprehend key factors and barriers to effectively implement these programs.

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 issues are quite often underestimated, but they are pivotal for the full success of waste management.

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