# Overcoming recycling barriers via social media in the European Green Capital of 2021

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# Abstract

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**Abstract:** Continuous development of urban areas poses challenges for sustainable use of resources and the management of complex waste streams. Recycling is seen as a solution for promoting sustainability, especially at the individual-level where waste sorting creates preconditions for successful material recovery operations. Behavior change strategies aim to encourage individuals to implement recycling practices in their daily lives. The effectiveness of behavior change strategies is achieved by broadly influencing capability, opportunity, and motivation to recycle, however, studies claim that many existing strategies are unable to do so.

This study aims to gain an understanding in how extensively a municipal recycling service provider's online communication on social media platforms (Instagram, Facebook, YouTube) enhances capability, opportunity, and motivation to recycle by communicating about means to overcome recycling barriers. Specifically, the study is interested in examining what types of recycling barriers are addressed in online communication and through which means it aims to deliver assistance for overcoming these barriers. Lastly, this study aims to explore the role of social media platform-based online communication as a channel to promote individual recycling behavior.

This study focuses on social media materials published by a municipal service provider in the European Green Capital of 2021. The empirical material builds on a set of data collected from public and locatable online sources. The analysis includes 96 different types (pictural, textual, video) of recycling-themed online content. The data was analyzed by conducting qualitative content analysis. The results indicated that online communication addresses a broad range of recycling barriers. The most common means to overcome these was information provision through which the company aimed to increase knowledge and understanding of recycling practices. Although information provision alone is claimed to be insufficient to profoundly change behavior, results showed that it could serve as a means to generate a broad influence on areas behind behavior formation.

The result of this study suggests that social media platforms as channels for online communication have the potential to create preconditions for overcoming recycling barriers especially through the means of information provision. The development of more profound recycling behavior, however, needs to include a broader range of collaborative information, motivation, and engagement elements that could engage and encourage people to implement more profound recycling behavior. This calls for future research that discovers means to stimulate behavior formation widely to support overcoming recycling barriers and the implementation of profound recycling behavior in everyday lives.

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**Tiivistelmä:** Kaupunkialueiden jatkuva kehitys aiheuttaa merkittäviä resurssikestävyyteen sekä suurten jätemäärien hallitsemiseen liittyviä haasteita. Tutkimukset korostavat kierrätystä tärkeänä ratkaisuna kestävyyden edistämiseksi etenkin yksilötasolla, jossa tapahtuva jätteiden lajittelu luo edellytykset tehokkaan materiaalihyödyntämisen onnistumiselle. Jokapäiväiseen kierrätyskäyttäytymiseen pyritään vaikuttamaan erilaisin käyttäytymisen muutosta edistävien strategioiden avulla. Vaikka tehokkaimmin muutosta saadaan aikaan vahvistamalla monipuolisin keinoin käyttäytymisen muodostumiseen vaikuttavia kykyjä, mahdollisuuksia ja motivaatiota, monet käyttäytymisen muutosta edistävät strategiat eivät ota tätä huomioon.

Tämän tutkimuksen tavoitteena on tarkastella, kuinka laajasti sosiaalisen median alustoilla (Instagram, Facebook, YouTube) tapahtuvan verkkoviestinnän kautta pyritään vahvistamaan kykyjä, mahdollisuuksia ja motivaatiota kierrättää tarjoamalla keinoja kierrätyksen toteuttamiseen vaikuttavien esteiden ylittämiseksi. Erityisesti tutkimuksessa tarkastellaan, millaisia esteitä verkkoviestinnässä on tuotu ilmi ja millaisia ratkaisuja esteiden ylittämiseksi viestinnällä pyritään tarjoamaan. Samalla on tarkoitus tutkia sosiaalisen median kautta tapahtuvan verkkoviestinnän roolia yksilötason kierrätyskäyttäytymisen edistämisen apuvälineenä.

Tässä tutkimuksessa keskitytään vuoden 2021 ympäristöpääkaupungissa sijaitsevan kunnallisen yhdyskunta-jätehuoltoyhtiön sosiaalisen median verkkoviestintämateriaaleihin. Tutkielman empiirinen materiaali perustuu verkosta löytyviin ja julkisiin sosiaalisen median lähteisiin. Analyysi sisältää 96 kierrättämistä käsittelevää kuva-, teksti-, ja videomuotoista verkkosisältöä. Materiaalin analysointi suoritettiin laadullisella sisällönanalyysillä. Tulokset osoittivat, että verkkoviestinnän avulla käsiteltiin laajasti kierrätykseen liitettyjä esteitä ja yleisin keino niiden ylittämiseksi perustui kierrätykseen liittyvän tietämyksen ja ymmärryksen lisäämiseen. Vaikka tiedon lisääminen yksittäisenä vaikutuskeinona on väitetty olevan riittämätön muuttamaan käyttäytymistä perusteellisesti, tulokset osoittivat, että sillä voidaan vaikuttaa laajasti useisiin käyttäytymisen muodostumiseen vaikuttaviin osa-alueisiin.

Tulokset esittävät, että sosiaalisen median kautta tapahtuvalla verkkoviestinnällä voidaan luoda olosuhteet kierrätykseen liitettyjen esteiden ylittämiseksi etenkin silloin, kun muutoksen edistäminen pohjautuu keinoihin tiedon ja ymmärryksen lisäämiseksi. Syvällisemmän kierrätyskäyttäytymisen omaksuminen ja toteuttaminen vaatii kuitenkin tuekseen laajemman valikoiman käyttäytymistä rohkaisevaa tietoa, motivaatiota, ja sitoutumista edistäviä keinoja. Jatkotutkimuksissa tulisi selvittää, miten keinot voitaisiin kohdistaa tukemaan laajemmin etenkin kierrättämisen esteitä sisältäviä käyttäytymisen muodostumiseen vaikuttavia osa-alueita, ja siten edistää tehokkaammin kierrätyskäyttäytymisen toteuttamista arjessa.

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# 1 Introduction

A prevailing goal of today's societies is to discover solutions to adverse effects arising from humankind's extensive and rapid development, such as climate change and resource scarcity. Particularly in Western countries, developmental achievements have enabled large-scale urbanization and a high standard of living, leading to changes in lifestyles, especially in the form of increased production and consumption of different goods and services. Excessive consumption was soon recognized to cause challenges related to the management of complex waste streams originating from production and consumption practices, and the notion has yielded large interest in functional waste management practices, such as recycling, among scientifical and many other social communities (Grimm et al., 2008; Tansel, 2020).

Recycling has been considered a vital pro-environmental practice in an efficient waste management system, especially in modern consumption-centered urban agglomerations. Since the amount of waste and the diversity of different types of waste originating from individual household level is more complex than ever before (Tansel, 2020), prior research among several disciplines has set individual recycling as one of the top areas of interest that could contribute to improving the use of material resources in a more sustainable way (Wilson et al., 2012).

Although recycling behavior has been approached by discovering both encouraging and hindering factors of behavior, less is known about the reasons for not performing recycling practices – some are still participating in recycling to a greater extent than others (Thomas & Sharp, 2013). Prior research has shown that despite preconditions for recycling being ideal, it does not automatically increase actual participation in recycling actions. Furthermore, reasons for non-recyclers behavior are challenging to uncover since many people may want to appear in a more socially acceptable light by giving embellished responses in research surveys (Bruvoll et al., 2002; McDonald & Oates, 2003). Previous studies have, however, succeeded in discovering common barriers that are associated as hindering factors in implementing higher-level recycling practices through which the behavior of non-recyclers could be explored more in detail.

Profound and permanent adoption of pro-environmental behavior requires the presence of supportive and enabling internal (psychographic variables), external (social factors), situational (availability of structures), and demographic factors (age, level of income) that creates premises for the implementation of behavior (Kollmuss & Agyeman, 2010). The influence of these factors has been studied from several perspectives by utilizing different models of behavior, including the Behavior Change Wheel constructed by Michie et al. (2011). According to Michie et al. (2011 & 2014), three main sources of behavior, *capability, opportunity*, and *motivation*, create the basis for any behavior formation and serves as areas through which behavior can be developed further. When viewing previous knowledge of common recycling barriers through the lenses of these three main sources of behavior and from the perspective of four factors influencing behavior formation, it may point out a wide array of areas where inhibiting factors of behavior exist and through which the behavior of especially non-recyclers could be most effectively influenced.

Considering the urgent need to invent efficient waste management practices in cities that are already characterized as one of the main sources of harmful environmental impacts (Grimm et al., 2008; MacGregor-Fors et al., 2021), cities are encouraged to develop their strategies and actions towards more sustainable modes of operations (MacGregor-Fors et al., 2021; Pantic & Milijic, 2021). One of these encouragements, the European Green Capital Award (EGCA), was invented by European Commission with the aim of challenging cities to demonstrate efforts and development paths towards sustainability in several areas, including also waste management (European Commission, 2022). A small city in Finland, the city of Lahti, was awarded the European Green Capital 2021, placing Lahti's waste management operations as the central area of interest in this study.

As is typical for the prevalent time, different online technologies have emerged as one of the predominant forms of daily communication tools to interact with others (Tansel, 2020; We are social, 2021). Online platforms, including social media, present a channel through which behavior could be influenced by reaching a large number of social media users in fast and affordable means (Ballew et al., 2015; Sujata et al., 2019). The effectiveness of social media in the promotion of recycling as pro-environmental behavior has so far been studied to less extent, however, the approach offers an innovative way to engage people in recycling by

utilizing functional capacities (*informational, relational, experiential*) of online media platforms (Ballew et al., 2015).

The aim of this research is to study how recycling barriers are addressed via online communication on social media and whether online communication could convey means that assist people towards more profound implementation of recycling practices. This thesis is organized in the following manner. In chapter 2, I will introduce the theoretical background for this study by reviewing prior literature considering pro-environmental behavior and presenting frameworks through which recycling behavior is assessed. Chapter 3 presents the research objectives and research questions of the thesis. In chapter 4, I introduce research materials and methods, which begin with presenting the main focus and scope of the study and proceed by illustrating how the materials and methods were utilized to conduct this study. Chapter 5 describes the results of the data analysis, which I discuss further in chapter 6. Lastly, I provide conclusions of this thesis in chapter 7.

# 2 Theoretical background and previous research

Individual recycling behavior is stated as one of the most influential means to contribute toward a more sustainable future (Bruvoll et al., 2002; Pedersen & Manhice, 2020). Arguably, others perform recycling practices to a higher level than others. A considerable amount of literature from different disciplines introduces specific models and influential factors that encourage people to perform recycling. Although having provided applicable approaches, these models often fail to recognize linkages between influential factors by focusing only on the main drivers of behavior, resulting in a narrow view of fostering long-term and permanent behavioral change (Michie et al., 2011). Furthermore, far less is known about the inhibiting factors having an impact on recycling behavior (McDonald & Oates, 2003). In this study, I will draw on prior studies that, firstly, emphasize the need for a more comprehensive approach to creating permanent behavioral change, and second, focus specifically on literature about barriers that prevent higher recycling behavior.

In this chapter, I am interested in the relationship between two theoretical frameworks for understanding behavior formation. First, I will introduce the concept of pro-environmental behavior, which consists of four main categories having an influence on behavior formation, and I will continue by driving the focus specifically to recycling behavior. In chapter 2.2, I will introduce a multidimensional behavioral change model, the Behavioral Change Wheel (BCW), which aims to provide a more broad approach to examining an array of factors influencing behavior. I proceed by conducting an illustrative literature review of common barriers of recycling which are presented by combining the two above-described theoretical approaches: main categories influencing behavior (Kollmuss & Agyeman, 2010) and the BCW (Michie et al., 2011). Lastly, I present the concept of online technologies as a contemporary channel to promote pro-environmental behaviors, such as recycling.

## 2.1 Pro-environmental behavior

Pro-environmental behavior is a broad umbrella term referring to "behavior that consciously seeks to minimize the negative impact of one's actions on the natural and build world" (Kollmuss & Agyeman, 2010).

Since approximately the 1970s, researchers among disciplines have been growingly interested in examining why other people are engaged in pro-environmentally whilst others are not (Kollmuss & Agyeman, 2010). Several studies have attempted to seek explanations from psychology, economics, sociology, marketing, and various interdisciplinary approaches, which has led to a significant body of literature considering enabling and inhibitory factors for carrying out pro-environmental behavior (Kollmuss & Agyeman, 2010; Thomas & Sharp, 2013). A range of theoretical models has been applied to seek explanations and construct a basis for behavior change strategies to enhance the higher implementation of pro-environmental behaviors (Thomas & Sharp, 2013).

The earliest models explaining pro-environmental behavior from the 1970s were based on the idea of a linear progression model: increasing environmental knowledge would lead to higher environmental attitudes and pro-environmental behavior. However, it was widely noticed that the formation of behavior does not follow such a straightforward development path, and

thus, linear models were soon to be proven wrong (Kollmuss & Agyeman, 2010). Nevertheless, it is worth noting that coming to this day, providing more information to achieve higher participation rates of behavior is still one of the major driving forces in fostering behavior change (Dai et al., 2016; Kollmuss & Agyeman, 2010).

Several behavioral change models have remained permanent throughout history and still serve as a base for contemporary studies (Kollmuss & Agyeman, 2010). These models approach pro-environmental behavior with specific assumptions, e.g., emphasizing the role of beliefs, attitudes, intentions, or rational decision-making to examine the influence of these factors on behavior formation. However, such one-dimensional models can only bring partial explanations about the formation of usually context-dependent behavior under examination (Kollmuss & Agyeman 2010). Since a single factor cannot be the exclusive determinant of behavior, a broader and more thoughtful view of the conflicting factors influencing pro-environmental behavior is needed to increase the effectiveness of behavior change strategies (Dai et al., 2016).

Existing models and frameworks have commonalities that have been established to have some degree of influence on pro-environmental behavior. These commonalities are divided into four main categories: *situational, external, internal,* and *demographic* factors (Arias & Trujillo, 2020; Kollmuss & Agyeman, 2010). Categories demonstrate the complexity of strongly interlinked factors that are involved in behavior formation, of which effectiveness is usually highly context-specific and varies easily.

*Situational factors* are associated with existing convenience and availability of structures for behavioral actions. These include facilitative elements, such as time, effort to perform a practice, and infrastructure, that can significantly impact pro-environmental behavior (Hornik et al., 1995). *External factors* have an influence that is utterly independent of an individual's personal attributes, such as social and cultural factors. These can also include economic elements in the form of societal incentives and de-incentives. *Internal factors* are psychographic variables, e.g., motivation, values, norms, and priorities, that prior research has stated to have significant explanatory power on behavior. Lastly, *demographic factors*, such as age, gender, level of income, level of education, and type of housing, have shown to have

an influence to some degree, however, they are placed as the least influential factors in terms of recycling behavior (Arias & Trujillo, 2020; Kollmuss & Agyeman, 2010).

The diversity of possible determining factors behind behavior supports the comprehension that there is no single path to visualize and explain the formation of pro-environmental behavior, nor an agreement on whether a narrow model would be practical to begin with (Kollmuss & Agyeman 2010). A narrow model can more easily fail to cover a thorough range of possible influential factors, which can more likely result in superficial premises for designing behavioral change strategies (Michie et al., 2011). Although these narrow models of behavior change have succeeded in providing valuable insights into the appearance of determining factors of behavior, context-specific long-lasting effects on behavior remain largely obscure (Varotto & Spagnolli, 2017). Hence, a more in-depth understanding of the relationship between factors influencing pro-environmental behavior is needed, which also applies to the context of recycling behavior.

### 2.1.1 Recycling as pro-environmental behavior

Recycling is one of the most studied pro-environmental behaviors due to the possibilities it provides for individual actors to significantly contribute to more sustainable lifestyles (Bruvoll et al., 2002; Pedersen & Manhice, 2020). Generally defined, recycling refers to a broad set of processes through which previously used materials are transformed into resources with an economic value. In addition to economic benefits, recycling enhances the preservation of energy and resources and decreases the need for conventional waste disposal creating environmental and societal benefits (Varotti & Spagnolli, 2017). This thesis will focus specifically on individual-level recycling as everyday life practice that involves different phases of actions (e.g., retain, wash, sort, store, transport) in order to dispose of discharge appropriately for subsequent waste treatment processes.

In addition to scientific research, the importance of recycling is visible in sustainable strategies from the European Union level to municipal measures (European Commission 2022; The city of Lahti, n.d.) since urban areas are in the spotlight of functioning as significant causes for adverse environmental effects (Grimm et al., 2008). Many countries, such as Finland, thus

compete their way towards improved regeneration and sustainable values. Recently, Finland's efforts have been recognized in the form of the European Green Capital Award, which focuses specifically on improving the environmental stage of urban areas, including recycling as a vital part of the waste management system (European Commission, 2022; Pantic & Milijic, 2021).

Similar to many other pro-environmental behaviors, recycling behavior is formed by a complex set of determining factors. However, according to previous literature, a general agreement is that majority of people are engaged with recycling in one way or another since recycling is often perceived as a correct duty to perform together with other everyday household chores (Bruvoll et al., 2002; Massarutto et al., 2019; Pedersen & Manhice, 2020). In addition, several studies have shown relatively high recycling participation rates of 70 percent and above, which also demonstrates a positive attitude towards recycling (Best & Kneip, 2011; Bruvoll et al., 2002; Czajkowski et al., 2017; Pedersen & Manhice, 2020).

Although several models aim to explain recycling behavior, a more thorough analysis of specific features and underlying factors of behavior is needed to achieve sufficient recycling rates. Relatively little is known about people who do not participate in recycling practices, and the question of 'why others are performing recycling whereas others are not' still remains complex and unanswered (Kollmuss & Agyeman, 2010). Even successfully established recycling facilities cannot lead to sufficient recycling rates if residents do not cooperate in waste sorting efforts (McDonald & Oates, 2003). Since individuals have significant responsibility for primary waste separation actions (Pedersen & Manhice, 2020; Varotti & Spagnolli, 2017), individual participation is a key to achieving higher recycling rates, and thus it has been a strong focus in recycling behavior research and concrete behavior change designs. Hence, I will continue by introducing a model through which individual recycling behavior could be approached more comprehensively to reveal a wide array of possible factors that are involved in behavior formation.

## 2.2 The behavioral change wheel

Behavior change models should capture a broad range of mechanisms that may be involved in change, including internal, external, situational, and demographic factors. According to

Michie et al. (2011), many existing behavior change frameworks appear to be uncomprehensive and conceptually uncoherent, in the sense that the emphasis is often on specific primary drivers of behavior, such as beliefs, and no further attention is placed on linkages between different factors. Arguably, each approach is equally important and needs to be assessed coherently to form a more comprehensive behavior change framework.

As a result of Michie et al. (2011) systematic literature review, authors developed the Behavioral Change Wheel (BCW) from 19 frameworks of behavior change. The BCW addresses the limitations of existing frameworks by synthesizing their common features and linking them into a new model of behavior (Michie et al., 2014). The BCW model is sufficiently broad to be applied to any behavior in any circumstances, and it provides a structured approach to designing behavior change strategies (Michie et al., 2011).

Authors of the BCW have built the framework on three components generating behavior: *capability, opportunity*, and *motivation*. These components represent necessary conditions for a volitional and non-volitional behavior by constructing a behavior system in which each component interacts and generate behavior, and the behavior in turn influences the components (Figure 1). Furthermore, a set of nine intervention functions and seven policy categories was yielded from the literature review and added to comprehend the BCW (Figure 2). Therefore, a particular intervention can alter one or more components in the system and change the system dynamics, which is why the BCW serves not only as a behavior model but as a basis for designing behavioral change strategies (Michie et al., 2011).
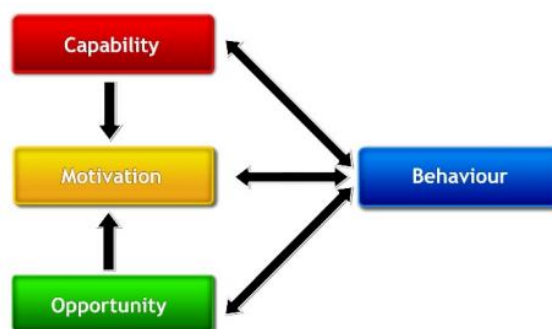


Figure 1. A behavior system for understanding behavior (Michie et al., 2011).

Michie et al. (2011) define the three sources of behavior as follows. *Capability* refers to an individual's psychological and physical ability to engage in a particular behavior. *Psychological capability* refers to the capacity to engage in necessary cognitive processes which can be achieved through imparting knowledge and understanding, whereas *physical capability* refers to the extent to which one can engage in the activity which can be achieved through physical skill development. *Opportunity* is defined as a component that includes external factors making the behavior possible or obstructing it. These factors lay outside of an individual's control, including *physical opportunities* (infrastructure) and *social opportunities* (cultural values, community norms) that can be achieved through a change in the environment. *Motivation* comprises factors internal to an individual, such as brain processes that energize and direct behavior. Motivation can be *reflective,* including plans (intentions) and evaluations (beliefs) of the behavioral target, which can be achieved through increasing knowledge and understanding as well as eliciting positive or negative feelings about the target behavior. *Automatic motivation* includes emotions and impulses that can be achieved through associative learning.
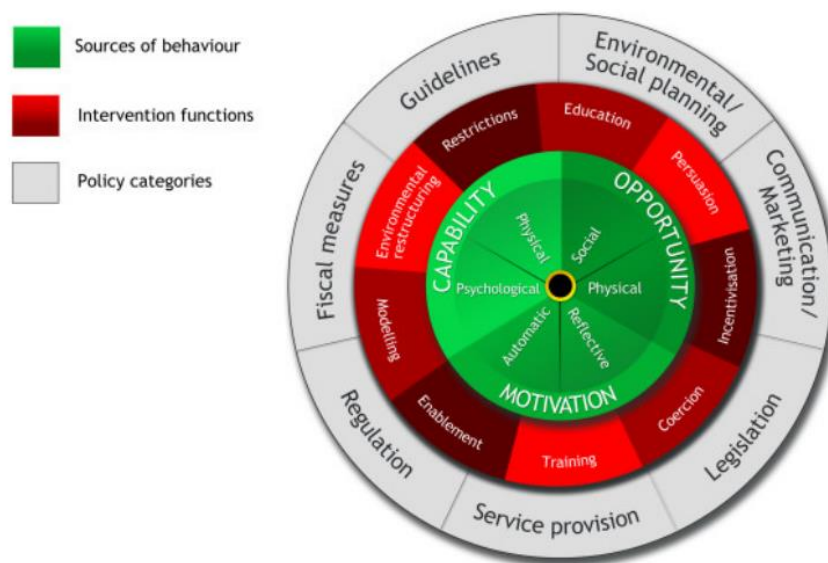


Figure 2. The Behavior Change Wheel (Michie et al., 2011).

As demonstrated in Figure 2, the behavior change wheel consists of three layers. The center of the wheel identifies three sources of behavior, *capability* (C), *opportunity* (O), and *motivation* (M) as interacting determinants of behavior (B) that could be influenced to strive for desired behavior change (also called as COM-B model). The middle layer consists of nine possible intervention functions through which behavior can be influenced. Finally, the outer layer identifies seven types of policy means to deliver intervention functions (Michie et al., 2011 & 2014).

Although the BCW has been mainly utilized in health research, it has also been implemented in the recycling context (see, e.g., Gainforth et al., 2016) and thus brings an interesting perspective to studying recycling behavior. In this study, I will only utilize the center of the wheel as it serves as a guideline for forming an overview of the connection between theoretical framework and appropriate recycling literature to locate in which areas of behavior generation barriers of recycling occur.

### 2.2.1 Literature illustration of common recycling barriers

During this chapter I will review previous recycling-related literature to illustrate findings related to common barriers of recycling. As this study focuses on recycling in Finland, but no sufficiently extensive literature on recycling barriers in the selected area was found to be available, a decision was made to conduct the literature review at the European level. Therefore, differences in, e.g., culture, institutional settings, and social and economic development stage, were considered to a certain extent in search of the literature. Hence, findings can only be viewed at a general level in the context of Finland, however, delivering an indicative outline of barriers most commonly brought up in recent research.

Under the circumstances, the following review is rather illustrative than comprehensive, drawing on nineteen (19) prior individual studies indicating possible inhibiting factors to perform recycling practices from 1993 to 2021. Revealed by the literature, Table 1 illustrates the main barriers of recycling which are divided by the three main sources of behavior (Michie et al., 2011) and the three main categories influencing pro-environmental behaviors (Kollmuss & Agyeman, 2010). Due to the claim that demographic factors have a complex but similarly

low impact on each source that generates behavior, these factors are brought up separately and not explicitly linked to any source of behavior.

According to the literature review, the most significant barriers hindering recycling behavior were the lack of knowledge, doubts about the purposefulness of recycling, and inconveniency elements related to performing recycling practices. The chapter will proceed by presenting findings in a summary table and then discussing recycling barriers more in detail in a textual form from the perspectives of capability, opportunity, and motivation. Lastly, general demographic factors that can influence each source of behavior are brought up in a separate section.

Table 1. Common barriers of recycling yielded from literature illustration. Barriers are divided according to which categories generating behavior and categories influencing behavior formation they can be associated with. Demographic factors are presented generally due to their possible influence on each source of behavior.

| | *Internal factors* | *External factors* | *Situational factors* | *Demographic factors* |
|---|---|---|---|---|
| *Capability: physical* | **Car-ownership** *(Rhodes et al., 2014)* <br><br> **Negative experiences** *(Ajzen, 2002; Thogersen, 1994)* | **Expensive** *(Czajkowski et al., 2014)* | **Difficult to locate & sort** *(Knussen et al., 2004; Thogersen, 1994)* | **Education, age having children** (*Czajkowski et al., 2014*) <br> **Housing type** *(Ordonez et al., 2015)* <br> **Income** *(Huhtala, 2010)* |
| *Capability: psychological* | **Low knowledge & awareness** *(Dai et al. 2016; McDonald & Oates, 2003; Rhodes et al., 2014; Ordonez et al., 2015)* <br><br> **Overwhelm about waste types** *(Czajkowski et al., 2014; McDonald & Oates, 2003)* <br><br> **Lack of willingness to find information** *(Ordonez et al., 2015; Pedersen & Manhice, 2020)* <br><br> **Internalized & generalized imaginaries** *(Ordonez et al., 2015; Pedersen & Manhice, 2020)* | **Lack of feedback** *(Ordonez et al., 2015; Pedersen & Manhice, 2020)* <br><br> **Type of information considering needs of audience** *(Czajkowski et al., 2014)* <br><br> **Poor recycling programs** *(Stoeva & Alriksson, 2017)* | | |
| *Opportunity: physical* | **Disgust, unhygienic** *(Pedersen & Manhice, 2020)* | | **Inconvenience elements:** <br> • effort <br> • lack of space | |

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| | | | |
|---|---|---|---|
| | **Lifestyle**<br>*(Pedersen & Manhice, 2020)*<br><br>**Addition to existing chores**<br>*(Pedersen & Manhice, 2020)*<br><br>**Rationality, choosing differently**<br>*(Pedersen & Manhice 2020; Ordonez et al., 2015)* | | • long travel distance<br>• number of bins<br>• number of waste types<br>• time consuming<br>*(Czajkowski et al., 2014; Digiacomo et al., 2018 McDonald & Oates, 2003; Pedersen & Manhice, 2020)*<br><br>**Choosing differently**<br>*(Pedersen & Manhice 2020; Ordonez et al. 2015)*<br><br>**Design of recycling facilities**<br>*(McDonald & Oates 2003; Keramitsoglou & Tsagarakis, 2018)* |
| *Opportunity: social* | | **Low & high community values**<br>*(Bruvoll et al., 2002; Katzev et al., 1993)*<br><br>**Low community support**<br>*(Knussen et al., 2004)*<br><br>**Low governmental efforts**<br>*(Pedersen & Manhice, 2020; Sujata et al., 2019)*<br><br>**Lack of monetary incentives**<br>*(McDonald & Oates, 2003)* | **Context-specific infrastructure and social structures**<br>*(Dahab et al., 1995; McDonald & Oates, 2003)* |
| *Motivation: reflective* | **Low perceived utility**<br>*(Czajkowski et al., 2014)* | **Unrewarded, unbeneficial, done for public good** | |

| | | | |
|---|---|---|---|
| | **Beliefs about consequences: reliability of company operations** and **environmental effects** *(Bruvoll et al., 2002; Czajkowski et al., 2014)*<br><br>**Purposefulness** *(Czajkowski et al., 2014)*<br><br>**Mistrust, misunderstanding** *(Pedersen & Manhice, 2020)*<br><br>**Unrealistic imaginaries** *(Knussen et al., 2004)* | *(McDonald & Oates 2003)*<br><br>**Other's responsibility, free-riding** *(Massarutto et al., 2019)* | |
| *Motivation: automatic* | **Loose habitual processing** *(Massarutto et al. 2019; Pedersen & Manhice, 2020)*<br><br>**Loose values** *(Massarutto et al., 2019; Pedersen & Manhice, 2020)*<br><br>**No moral duty** *(Czajkowski et al., 2017)*<br><br>**Pure laziness** *(Trudel, 2019)* | | |

*Capability: physical*

Reasons for not being able to physically engage in recycling often occur due to mismatches between the recycling system and the user perspective (Ordonez et al., 2015). Although people feel able to recycle in theory, attempts to do so might have crashed because concrete recycling possibilities are perceived as limited (Thogersen, 1994). For instance, a typical challenge between the system and user can be found in the naming of recycling bins: people associate containers for hazardous waste with all sorts of dangerous discharges, such as electronics and light bulbs (Ordonez et al., 2015). Furthermore, negative recycling experiences in the past may result in negative associations with recycling in the future (Ajzen, 2002). For instance, people might find it difficult to locate recycling stations and discover proper bins for their discharge, which may hinder their future participation (Knussen et al., 2004).

Furthermore, a car-ownership has been stated to have an influence on low recycling rates: people without cars are more likely to recycle less when the distance to the local sorting station increases. On the other hand, people with no access to a car have been found to utilize community recycling stations more than those who have a car (Rhodes et al., 2014). Recycling programs that are poor or difficult to understand thus create unsupportive ground to lay the foundations for recycling skills and understanding of one's capabilities (Rhodes et al. 2014). People might feel that recycling is too expensive, and the extra costs of outsourcing recycling tasks would decrease their interest in recycling efforts even more (Czajkowski et al. 2014). However, since economic factors appear rather vague in terms of having an impact on recycling behavior, the economic barrier could also be overcome by a certain price of not having to recycle (Bruvoll et al. 2002; Czajkowski et al. 2014).

*Capability: psychological*

Several studies highlight the importance of cognitive processes in forming and engaging in behavior. One of the common arguments for not recycling is associated with low knowledge levels which partially supports the high interest in increasing information provision in behavior change strategies (Dai et al., 2016; Rhodes et al., 2014). Lack of basic information and simple

instructions decreases recycling rates of regular discharge and specialty materials, such as electronic waste and batteries. Perceptions about sufficient recycling and questions about how, where, and when one can recycle can play a significant barrier (McDonald & Oates, 2003; Ordonez et al., 2015; Rhodes et al., 2014). These knowledge gaps might originate from poorly communicated and advertised local and municipal recycling programs (Stoeva & Alriksson, 2017). People can have internalized categorizations of different wastes. Hence, an increase in the number and forms of waste types can lead to overwhelming feelings about recyclable items, and thus be discharged incorrectly (Ordonez et al., 2015; Pedersen & Manhice, 2020).

Since individual recyclers can have naturally originating categories and images of recycling practices within themselves, a lack of willingness or awareness of the need to search for additional information might cause lower recycling rates than what could be achieved (Ordonez et al., 2015; Pedersen & Manhice, 2020). However, since there is often no feedback between individuals and the recycling system (Ordonez et al., 2015; Pedersen & Manhice, 2020), it is difficult for an individual to know that there may be room for improvement.

However, providing more information does not automatically result in higher recycling participation, as noted earlier in this thesis. The effectiveness of delivering relevant information varies between people with different stages of experience in recycling (Czajkowski et al., 2014). Additional information does not necessarily reach the level of internalized attitudes, values, or existing level of knowledge which is why the negative response to increasing information provision may originate from authorities' uncomprehensive considerations of the needs of the target audience (Czajkowski et al., 2014)

*Opportunity: physical*

Opportunity plays an essential role in perceptions of recycling abilities since they are often associated with convenience and availability of social and environmental structures to perform a practice (Michie et al., 2011). According to prior studies, inconvenience elements that measure time, effort, and space needed, have a significant discouraging impact on the performance of recycling (Digiacomo et al., 2018; McDonald & Oates, 2003; Pedersen & Manhice, 2020). People feel recycling activities as time-consuming and a burden to perform, e.g., because of long travel distances to the recycling station and an increase in time and effort

needed to sort at home. Similarly, lack of storage space, low number of bins in a household, and many types of waste increase inconveniency and decreases recycling despite individuals' positive relation to recycling (Czajkowski et al., 2014; McDonald & Oates, 2003). Some discouraging factors are also related to the design of recycling bins, considering the size, color, pollution prevention, protectivity, and attractivity (Keramitsoglou & Tsagarakis, 2018; McDonald & Oates, 2003).

However, people are not willing to accept visible waste containers as a solution since they are perceived as unhygienic, disgusting, or inappropriate, and thus, they are not willing to recycle more than has been made possible. While the existing recycling equipment may be perceived as inconvenient, other lifestyle and daily activities can also interfere with the obligation of waste separation resulting in lower recycling. People find recycling unappealing if it causes many additional tasks in addition to the usual household chores (Pedersen & Manhice, 2020).

Behavior is often influenced by people's own rationality, which is why they always have the opportunity to act differently and choose alternative outcomes of behavior. According to findings, if recycling is perceived as too much effort and inconvenient, recyclable waste is then mixed with other non-recyclable items. Similarly, if the same type of waste remains low, people might be unbothered to recycle and choose to throw them into residual waste for convenience reasons (Pedersen & Manhice 2020). Furthermore, people living in apartment buildings have the opportunity to leave recyclable items in the waste room if there is no appropriate recycling bin and if it would take too much effort to take the discharge to a proper recycling facility (Ordonez et al. 2015).

*Opportunity: social*

The level of social influence appears to be intensely dependent on contextual factors, such as the location of action (country) and visible waste management guidance, expectations, and structure (Dahab et al., 1995; McDonald & Oates, 2003). It has been argued that community values and norms can have a varying influence on recycling behavior (Bruvoll et al., 2002). Individuals who receive a lower degree of community spirit and support are more unlikely to participate in recycling. According to empirical findings from Glasgow, the city seemed to have provided weak norms of recycling which had led to low social pressures to perform recycling

activities (Knussen et al., 2004). However, the perceived level of social support has no direct connection to participation rates. Feelings of low support may result in more active participation rates compared to feelings of high support, perhaps because a highly supportive atmosphere can create an assumption of an already occurring sufficient level of participation (Katzev et al., 1993).

Society's efforts to decrease the current consumption-centered culture might be perceived as low among people, which is why the contrary between 'what society demands from people' and 'what does the society offer' has been seen as a discouraging element in recycling context. Recycling convenience might be poorly concerned in the production phase, which can partially lead to difficulties in separating different elements of disposable material. The governmental efforts to encourage recycling behavior may be perceived as too low and unmotivating (Pedersen & Manhice, 2020; Sujata et al., 2019). Non-recyclers behavior is also argued to be partially a cause of the lack of monetary incentives, which would encourage and sustain the behavior of especially novice recyclers. However, the influence of economic factors on behavior is a widely debated issue and depends on different context-specific factors (McDonald & Oates, 2003; ).

*Motivation: reflective*

Reflective processing involves the creation of self-conscious plans and evaluations about what is good and bad in life (Cornish et al., 2019). As shown earlier in the study, the majority of people seem to find recycling an important and correct practice to perform. The main motives for recycling are environmental concerns and individual responsibility to contribute to reducing harmful consequences as well as economic reasons (Bruvoll et al., 2002; Czajkowski et al., 2014). However, this thought may not transform into concrete action. In the context of non-recyclers, environmental concerns do not necessarily reach the level of internalized intentions and beliefs even if individuals have an awareness of them (Bruvoll et al., 2002). Prior literature demonstrates that doubts about the purposefulness of recycling, especially in the forms of perceived utility and beliefs about consequences, can hinder recycling behavior.

Whether recycling generates low perceived utility, people tend to prefer weaker recycling activities, e.g., having three recycling bins instead of eight, if the increasing time and effort of

recycling does not correlate with achievement in utility (Czajkowski et al., 2014). Similarly, recycling can be considered a sacrifice and unrewarded effort done by the benefit for the public good but remains unbeneficial for an individual (McDonald & Oates, 2003). People may expect that the responsibility of recycling lies especially on authorities and people interested in the practices, also resulting in so-called free-ride situations (Massarutto et al., 2019). Furthermore, people with less recycling experience may have developed more unrealistic imaginaries about recycling resulting in lower recycling rates (Knussen et al., 2004).

People may also question the purposefulness of recycling and be unconvinced about the consequences of performing recycling practices. Individual observations considering the operations of waste management authorities, e.g., whether the same vehicle picks up different disposal bags and waste fractions get mixed anyway, and how the waste is managed after the pick-up, can result in recycling perceived as a waste of work (Czajkowski et al., 2014). A lack of beliefs in environmental effects can also reduce recycling intentions (Bruvoll et al., 2002). Furthermore, mistrust and misinformation can be proceeded in social communities where people spread rumors and beliefs about what is thought to be correct (Pedersen & Manhice, 2020).

*Motivation: automatic*

Automatic processes that energize and direct behavior in unconscious ways often include habits that can be defined as automatic responses to specific situations (Triandis, 1979). What is commonly agreed is that performing habits requires fairly low engagement or awareness of the habit itself, but demands stimulating cues to repeat the behavior (Aarts et al., 1998). However, complex everyday life behaviors, such as recycling, may be better described as habitual processes that involve 'semiautomatic response patterns' (Ajzen, 2002) since recycling behavior includes several stages of actions that may be relatively automatic, but some form of conscious reflection is usually required to initiate each phase (Knussen et al., 2004). To perform recycling as a fluent habitual process thus requires a well-functioning combination of capability, opportunity, and motivation factors that would reduce the potential for problems at different stages of recycling.

Since recycling practices often demand conscious efforts in different forms, it may hinder the motives of performing such tasks to their full potential. Furthermore, the strength of recycling values might not be robust enough to overcome everyday challenges, needs, obligations, and other values of life to compromise household order to fit recycling (Massarutto et al., 2019; Pedersen & Manhice, 2020), which is why the loose level of habitual processing may easily lead to a low degree of recycling participation. Also, not feeling a moral duty (Czajkowski et al., 2017) and pure laziness (Trudel, 2019) are simply stated as a barrier to beginning recycling in the first place. Feelings about one's inabilities can exceed other possible motives to recycle, such as environmental concerns, and appear as a barrier to performing recycling practices.

*Emerged influential demographic factors*

The most common demographic factors that emerged in the literature review and may have a hindering influence on individual recycling were education, age, and having children (Czajkowski et al., 2014). Furthermore, housing type can influence how barriers of recycling are perceived, especially when comparing people living in residential households and people in apartment buildings (Ordonez et al., 2015). Lastly, income level may serve as a barrier to recycling since high-income individuals may display less effort on pro-environmental behavior because there might be more positive income effect for willingness to pay for the more convenient option, such as an incinerator, than for recycling (Huhtala, 2010).

## 2.3 Social media – a channel to promote recycling behavior

Next, I will present social media as a particular channel to promote and influence recycling behavior, which will simultaneously limit the scope of the thesis to the examination of digital platforms. We are living in an era that is largely under the influence of digital transformation and mass media communication channels through which the physical world can be controlled, communicated, and organized (Tansel, 2020), which is why social media can serve as an innovative tool to promote behavior.

The development of the Internet and mobile technologies has enabled the rise of a broad array of social media and Web 2.0 technologies: virtual environments to search, share, discuss, and create information (Ballew et al., 2015; Sujata et al., 2019). Web 2.0 refers to contemporary web-technologies (e.g., Google, blogs) allowing users to engage with people and different virtual media content in various ways. Social media, on the other hand, includes Internet-based applications that are based on the technological foundations of Web 2.0. For instance, Social Networking Sites (SNSs) refer to a specific type of social media enabling the creation and exchange of user-generated content in different forms of online spaces or web addresses (e.g., Instagram, Facebook). Hence, users can explore the virtual world regardless of time and place, and operate as both active interactors and passive observers (Ballew et al., 2015; Sujata et al., 2019).

Arguably, Web 2.0 and social media usage is increasing and becoming a more vital element in daily life. According to a 2021 report, approximately 62 % of the world population were active Internet users (with a 5 % increase from 2020), and 58 % had active social media usage (increased 10 % from 2020). In addition, SNSs have been the most used and popular form of the Web 2.0 (We are social, 2021). In the Finnish context, statistics from 2019 showed that roughly 70 % of the Finnish population were participating in SNSs, and the participation rate for social media was approximately 60 %. Similar to a global trend, Finnish social media usage grew by over 16 % within a year (Clausnitzer, 2021). Hence, online platforms could have the potential to enhance pro-environmental behavior and environmental responsibility by reaching a large number of people in a fast and affordable means of online communication (Ballew et al., 2015; Sujata et al., 2019).

Although social media platforms have increasingly become popular, only a few studies have elaborated on social media platforms as a mobilization tool to advance environmental discourse and action (Senbel et al., 2014). Social media usage has been claimed to have a major, albeit weak, influence on pro-environmental behavior if the main focus is merely on information provision. Utilizing technologies that are specialized in creating more multidimensional effects rather than focusing solely on information provision has the potential to serve as a means for more permanent behavior intervention designs (Sujata et al., 2019). Therefore, the content should be created thoughtfully considering different

elements of engagement as well as the audience's needs when interacting with different mass media users (Sujata et al., 2019).

According to (Ballew et al., 2015), Web 2.0 and social media technologies influence behavior through broad informational, relational, and experiential functions. Technologies serving *informational* functions are able to produce, distribute, and collect knowledge and media content. The utilization of informational functionalities has been the prevailing means to influence behavior. *Relational* functions consider people's social goals by enhancing social network development, for instance, constructing social identities, and engaging in dialogue. *Experiential* functions have the capacity to encourage novel online experiences through interactive means.

These functions can therefore generate and/or facilitate pathways towards pro-environmental behavior by influencing internal, external, and situational elements of capability, opportunity, and motivation that are linked to the formation of behavior. More specifically, considering the possibilities offered by social media functionalities, online communication could in particular contribute to fostering factors in the areas of capability and motivation since, as Michie et al. (2011) have described, these sources of behavior are usually influenced through imparting knowledge. Therefore, daily interaction across multiple social media platforms creates a form of communication that could enhance the adoption of recycling behavior and thus, present a reasoned channel for promoting behavior further in the digitally organized contemporary time.

# 3 Research objective & questions

The objective of this study is to explore how online communication is utilized to promote recycling at the city level in Finland. As presented earlier, the complexity of factors influencing pro-environmental behavior needs to be addressed more comprehensively in order to create premises for a more in-depth implementation of recycling practices. Since prior studies emphasize the possibilities of social media technologies in the promotion of pro-environmental behavior, different social media platforms might perform as an influential

instrument for behavior change designers. By looking at how online addresses recycling barriers related to capability, opportunity, and motivation, this study can provide insights into the means of how social media platforms are utilized to conquer barriers of recycling.

Cities play a crucial role in decreasing environmental harm which appears to be a common understanding in both scientific outputs and city-level sustainability strategies. As a response, the European Commission established the European Green Capital Award, which aims to recognize and reward local efforts toward a more sustainable urban environment (European Commission, 2022). As discussed more in detail in chapter 4.1.1., this yearly award emphasizes endeavors to improve the urban ecological stage together with the local economy and the quality of life for its citizens. In 2020, a relatively small urban city in Finland, the city of Lahti, was awarded the 2021 European Green Capital, demonstrating a long-term commitment to enhancing sustainable change in the city. This recent award that highlights successful sustainable efforts makes it especially interesting to view the city of Lahti's contribution to recycling practices.

More precisely, this research is interested in which barriers of recycling are considered in online recycling promotion that occurred in the city of Lahti over the 12-month period of the European Green Capitan year of 2021. I aim to examine how the combination of two theoretical frameworks can be utilized to locate behavioral areas where recycling barriers occur. More particularly, what kind of pro-environmental factors and inhibiting elements of capability, opportunity, and motivation have been considered in attempts to overcome general barriers of recycling in the city of Lahti's recycling-related online content.

Following research questions were formed under the interest of this study:

RQ 1: How has the city of Lahti responded to barriers of recycling through online communication?

RQ 2: Do the observed online responses have the potential to assist in overcoming barriers of recycling?

# 4 Materials and methods

The empirical research object of this thesis is the digital promotion of recycling practices. As there is a growing need to reduce the environmental impacts of large human agglomerations in urban areas, social media is being tested in research to build and organize communities. Especially SNSs are considered as effective in strengthening influences on pro-environmental behavior as they are successful in capturing functions of online technologies (*informational, relational, experiential*) and linking them with pathways toward environmental action (Ballew et al., 2015).

According to the complexity of recycling behavior, the subject will be best approached and described using qualitative methods. This research was conducted by combining Internet-Mediated Research (IMR) to qualitative research. The emergence of Web 2.0 and online technologies has been a contributory factor in the scope and practice of IMR (O'Reilly, 2005), creating innovative ways of studying human behavior. Existing online technologies offer potential sources of rich data, which are easily locatable and content-searchable for the use in qualitative research. IMR thus supports the data collection process by utilizing 'ever-present' content in fluid, interactive, and collective online technologies (Hewson, 2014).

## 4.1 Focus of the study

Since recycling as pro-environmental behavior can be studied from a wide array of perspectives resulting in context-specific outcomes, a more precise definition of the focus of this study is needed. As discussed earlier, cities have a significant role in decreasing harmful human-made environmental impacts. The following sub-chapter presents a concrete city-level approach in the form of the European Green Capital Award (EGCA), which provides a frame to view efforts toward urban sustainability within a particular awarded city in Finland. Furthermore, I will drive the attention toward the winner city of 2021 (the city of Lahti), and provide more detailed insights into its recycling scheme. The utilization of EGCA thus limits the scope of the study and enables to execution of the study within context-specific settings.

### 4.1.1 European Green Capital Award

Over a decade ago, the European Commission established the European Green Capital Award (EGCA) to reduce the role of cities in causing adverse environmental effects and promote sustainability change (European Commission, 2022). Since 2010, when Stockholm (Sweden) was designated for the first awarded city, many cities have increased their efforts in implementing ambitious goals for improving the urban environment together with economic and societal dimensions of sustainability (Pantic & Milijic, 2021). Cities are evaluated through various indicators that measure, e.g., sustainable land use, water biodiversity, waste, and eco-innovations. Participants must provide evidence of each indicator's current state, the set of means implemented to address them in the past five to ten years, and the short- and long-term approaches to achieving the set goals (European Commission, 2022). A winner city should thus demonstrate exceptional ambition that is credible and feasible in carrying sustainable transformation in urban settings (MacGregor-Fors et al., 2021).

In 2020, the city of Lahti (hereafter: Lahti) was awarded the European Green Capital of 2021. Lahti is the 6th largest Finnish urban centre in the Päijät-Häme region of Southern Finland with approximately 120 000 inhabitants. The journey of transforming the city toward a European Green Capital began in the 1970s when the restoring process of one of the most polluted lakes in Finland started (MacGregor-Fors et al., 2021). Since then, Lahti has made immense efforts and investments to enhance citywide relationship between the ecological, social, and physical dimensions of the city, which are led to major achievements toward ecologically friendlier, healthier, livable, and resilient cities (The city of Lahti, n.d.). Efforts towards recycling were assessed in Lahti's EGCA application as a part of waste management and future approaches towards a circular economy, providing insights into past, prevalent, and future objectives for efficiently organized waste management systems.

### 4.1.2 Waste management in the city of Lahti

Next, I will identify the main characteristics of the waste management system in Lahti by following the EGCA application form, and other appropriate secondary online sources. According to the EGCA application, municipal waste generation was 577 kg/capita/year, and

43 % of municipal waste was recycled. The objectives for waste management and prevention were placed on four main areas: municipal waste, biodegradable waste, construction and demolition waste, and electrical waste. Although the generated amount of municipal waste was still perceived as relatively high, Lahti had succeeded in increasing waste utilization mainly in energy processes, and aims to raise the share of material recycling in the future (The city of Lahti, n.d.).

Salpakierto Ltd. (hereafter: Salpakierto) is a service provider responsible for municipal waste management that is not part of the producers' responsibilities. In line with Lahti's goals, it has a strong operational focus on achieving a 50 % recycling rate via improving material recycling by reducing waste incinerated or taken to landfills. From the beginning of the year 2021, the company changed its name to Salpakierto, aiming to better describe the circular economy's ideology (Salpakierto n.d.). This change also supports a movement towards a mindset where discharge is perceived rather as resources instead of valueless waste (MacArthur, 2013). Producers' responsibilities for waste are organized among producer communities by offering Rinki-ecopoints around the city, in which residents can sort cartons, glass, metal, and plastic for free of charge. Salpakierto and producer communities also aim to provide efficient waste management through cooperative actions (The city of Lahti, n.d.).

The main aim of Salpakierto's municipal waste management system is to encourage sorting all possible wastes at the source. Property owners are responsible for organizing both waste collection and waste transportation. Properties with ten or more apartments are obligated to offer seven waste collection bins: biowaste, energy waste, mixed waste, cartons, metal, paper, and glass. Small residential buildings and properties should have at least two recycling bins for energy and mixed waste, and residents are highly recommended to compost their biowaste. Waste transportation is organized by private transportation businesses. According to Polluters Principle, each property owner pays for emptying their waste bins, which is based on emptying frequency and can be altered by tendering among waste transportation companies (The city of Lahti, n.d.).

Salpakierto has one waste station for more complex and hazardous discharge in Lahti area, with additional transportable compartments offering mobile recycling services. Together with several actors, Salpakierto organizes regular waste and recycling-themed campaigns and

events to promote their goals. The role of modern digital information systems is also considered further by Salpakierto, which provides several types of waste-related assistance on different online platforms. Furthermore, as a concrete yearly informational approach, Salpakierto offers a free recycling-themed "LOKKI" calendar with a diverse range of waste-related assistance and information to all households and companies (The city of Lahti, n.d.).

Table 2. Three main operators and their operational focus in Lahti's waste management system.

| Lahti's waste management operators and their areas of operation | Operational focus |
|---|---|
| *Private businesses* | |
| Daily waste | Waste transportation |
| *Municipal service provider: Salpakierto* | |
| Daily waste | Waste reception<br>Handling of waste<br>Recovery of waste<br>Waste consulting<br>Waste management planning and development |
| Waste station | Sorting station PILLERI |
| Transportable compartments | Mobile services<br>• Roinaralli<br>• Eco-van Kaisla |
| Concrete efforts | By-products<br>• LOKKI calendar<br>Campaigns<br>• Serristoppi |
| Digital efforts | Assistance on online platforms<br>• Websites: Lahti.fi, Salpakierto.fi<br>• Social media platforms: Facebook, Instagram, Youtube |
| *Producer communities* | |
| Waste collection | Waste reception<br>• Rinki-ecopoints |

As a result of reviewing Lahti's waste management system, three main areas of waste management were identified: private businesses, municipal service provider Salpakierto, and producer communities (Table 2). Since the focus of this study is to examine how recycling practices were promoted through social media in Lahti, the following decisions were made to choose the appropriate focus for further data collection. Among the above described three areas, Salpakierto is the main waste management service provider which operates and improves its operations specifically in Lahti. Furthermore, Salpakierto has available online material on social media platforms, which is applicable to the context and timeframe of this study. Therefore, Salpakierto was chosen as a proper operator for further data collection.

## 4.2 Data design

This chapter introduces how the data was designed and collected. First, I will introduce how the data design was formed to suit the purpose of the study. Second, the data collection process is explained more in detail.

The fundamental nature of this study, which lies in the grounds of online communication's abilities to drive sustainable behavioral change, was a strong determining factor in what type of data would provide the best possible outcomes considering the objectives and research questions of the study. With a specific interest in the online material launched during the year of 2021, there was a need to explore among several online platforms that were established and driven by Salpakierto. This study aimed to approach Salpakierto's online materials regardless of the utilized format (e.g., picture, video, text) to provide insights into how the barriers of recycling are considered in the material. Since the study is interested in how individual recycling was promoted, a reasoned approach was to observe the material as it appeared to individual social media users. Hence, the data was collected online by observational means and no close cooperation with Salpakierto was applied to the data design.

The utilization of online data collection was reasoned since it enabled exploration among different social media platforms to discover various forms of materials by easy and accessible means. However, since the focus was purely on online materials originating from social media

platforms, the data design could only provide partial insight into Salpakierto's attempts to promote recycling within limited online boundaries. As assistance for discovering proper type of data, main prerequisites for the data collection process were formed as follows:

1. Materials from social media platforms only apply to the study (other materials, e.g., tv commercials, are only included if they appear as a part of online content)
2. Online content needs to exist during the timeline of interest from January 2021 to December 2021
3. Materials should originate under the name of Salpakierto and indicate a clear connection to recycling

### 4.2.1 Data collection

The data collection process began by searching existing sources of data to get familiar with what kind of online content was available. I utilized one of the most common Web 2.0 platforms, Google, to locate data by using 'Salpakierto' as the primary keyword. As a result, Salpakierto was found to operate among four main online channels, which included company website, Facebook, Instagram, and YouTube. Company websites had direct linkable sources leading to its three social media platforms. However, Salpakierto's company website did lack time-specific content since the website was structured to provide a general overview and awareness of Salpakierto. Facebook, Instagram, and YouTube, on the other hand, provided traceable content and included each prerequisite. Hence, the decision to focus on these three latter platforms as the main sources to collect the online data was made.

Each three social media platforms have appeared in the top four of the list of the world's most-used social platforms (We are social, 2021), and they were also found to be used in promotion of Salpakierto's fundamental agenda and principles as a waste management service provider. Facebook channel was mostly focused on providing awareness through a combination of pictures and text, which were often complemented with links to appropriate websites for more detailed content. Instagram was found to deliver similar output with main attention on pictural, textual, and video content which were also combined with linkages to other websites. YouTube was offering video content on the same topics as Instagram and Facebook, however, in a longer form with a more profound overview of the topic. In the context of Finland, social

media usage frequencies were 93 % for YouTube, 80 % for Facebook, and 59 % for Instagram in 2021 (Clausnitzer, 2021).

According to Ballew et al. (2015) and data from 2021 (We are social, 2021), Facebook was the most widely used SNS due to its high level of functional capacity it offers considering informational, relational, experiential functionalities. Instagram and YouTube also have relatively high functional capacities with few exceptions: Instagram is claimed to have low informational capacity, whereas YouTube is associated with low relational capacity (Table 3). This creates an overview of what functional areas could be utilized to bring out diverse topics on different platforms.

Table 3. Online technologies and the level of their functional capacity. The table is an edited version from Ballew et al. (2015).

|  | Informational | Relational | Experiential |
|---:|---|---|---|
| Facebook | High | High | High |
| Instagram | Low | High | High |
| YouTube | High | Low | High |

The data collection process continued by deciding how to store the data appropriately. Since the observed data included many forms of content, several storing methods were used. The main method was to use screen captures, downloading images, and copying textual content. All documents were stored in separate folders by the source in linear order by publishing date to keep track of the timeline. If material included several forms of content, e.g., picture and text, it was stored as an entity to ensure that the context of each individual unit remains coherent. All of the observed content appeared in Finnish, and materials were stored in Finnish. Therefore, the data presented in this study is translated by the author.

The data collection process took place in March 2022, and it was two-folded. First, data was collected from each online platform by following the above-described criteria for relevant data. The first part would thus give full insight into recycling appearance on each platform. This part yielded 142 stored units, including 84 (59 %) sources of content from Instagram, 53 (37 %) from Facebook, and 6 (4 %) from YouTube. The second part was conducted to execute other irrelevant materials from the collected data that were considered unnecessary in terms

of further data analysis. These included repetitive content that appeared similar or exactly the same on two or more platforms. Removing excess materials was done by comparing each source-specific document and marking which individual contents existed in more than one platform. Multiply appearing contents were thus marked as '*identical*' and chosen to be analyzed as one, since they gave exactly the same output in each media. After having this done, there were 96 stored units for the data analysis: 49 (51%) *identical* content, 7 (7 %) *source-specifi*c materials from Facebook, 36 (38 %) from Instagram, and 4 from YouTube (4 %) (Table 4).

Table 4. Monthly distribution of collected online materials divided by platform and presented by the number and form of content.

|  | *Facebook posts* | *Instagram posts* | *YouTube videos* | *Identical content* | *Content per month* |
|---|---|---|---|---|---|
| *January* | 3 pictures | 2 pictures<br>1 video |  | 2 pictures<br>1 video | 9 |
| *February* |  | 1 picture |  | 1 picture | 2 |
| *March* | 1 picture | 1 picture |  | 4 pictures | 6 |
| *April* |  | 3 videos<br>1 picture |  | 3 pictures | 7 |
| *May* |  | 2 pictures |  | 7 pictures | 9 |
| *June* |  | 2 pictures<br>1 video | 1 video | 5 pictures | 9 |
| *July* |  | 3 pictures | 1 video | 1 picture | 5 |
| *August* |  | 2 videos |  | 4 pictures | 6 |
| *September* | 1 picture | 2 videos<br>1 picture |  | 5 pictures | 9 |
| *October* | 1 picture | 3 videos<br>2 pictures | 2 videos | 2 pictures<br>1 video | 11 |
| *November* | 1 picture | 3 pictures<br>2 video |  | 5 pictures<br>1 video | 12 |
| *December* |  | 3 videos<br>1 picture |  | 7 pictures | 11 |
|  | **7 (7 %)** | **36 (38 %)** | **4 (4 %)** | **49 (51 %)** | **96** |

## 4.3 Data analysis

A qualitative content analysis was conducted to achieve an understanding of the research objective and questions. The qualitative approach enables the analysis of multidimensional social media content that was compiled within authentic online circumstances by utilizing the IMR approach in this study.

### 4.3.1 Qualitative content analysis

Qualitative content analysis is a method of analyzing the meanings, purposes, and effects of communication content by classifying documents into categories, which represent associations with the research objectives of a study (Neuendorf, 2017; Sarajärvi & Tuomi, 2017). Content analysis can be applied to analyze several forms of documents ranging from written texts to visual content and verbal interactions with the aim to form a meaningful, clear, and coherent understanding of the phenomenon under examination. Content analysis can be conducted by analyzing the manifest content, meaning evidence that is directly visible, as well as by latent content that refers to the underlying meanings of the content, which often originate from interpretations of the author (Sarajärvi & Tuomi, 2017).

Furthermore, content analysis can be divided into three approaches which are based on a relation between data and theory: inductive, deductive, and abductive (Graneheim et al., 2017). In general terms, inductive approach refers to 'data-driven' analysis of the content (from specific to general), and deductive approach presents 'theory-driven' analysis path (from general to specific). Abductive approach, on the other hand, can be seen as a combination of inductive and deductive approaches meaning that it is led neither by the theory nor the data (Graneheim et al., 2017; Sarajärvi & Tuomi, 2017). Particularly, the units for analysis are formed from the data, and the process is guided by previous knowledge and theories to assist the further analysis. For instance, the main categories for data analysis can be based on prior knowledge and theories, by which data-driven sub-categories can be organized (Sarajärvi & Tuomi, 2017).

This study utilized both content analysis methods: analyzing what was directly visible in the collected data (manifest analysis) and searching for meaningful messages behind the actual content (latent analysis). Furthermore, research questions were approached abductively for two following reasons: firstly, basing the analysis solely on the two theoretical frameworks and prior studies might lead to the possibility that significant topics that may arise from the materials could not be taken into account, and second, the presence of the theoretical approach would not suit to the fundamental nature of conducting purely inductive research. Hence, abductive approach implies a movement back and forth between deductive and inductive approaches (Graneheim et al., 2017; Sarajärvi & Tuomi, 2017), enabling the coherent use of theory as a guiding base for the study.

### 4.3.2 Analysis process

The analysis process began by operationalizing the theory to guide the coding system. According to Sarajärvi & Tuomi (2017), an abductive content analysis proceeds on the terms of the collected data, as does the data-driven analysis, with the difference in how empirical data is applied to theoretical concepts. In this study, main categories were formed by theoretical background (capability, opportunity, and motivation) and applied to the analysis process as 'already known' factors.

The analysis was firstly conducted through manifest analysis with the aim to reduce the data by tracking relevant and obviously visible expressions that were in relation to research questions. This was done by highlighting, color-coding, and writing down keywords from stored units. After this, the data was clustered by forming found expressions into appropriate data-driven sub-categories which were named by a descriptive term. Each sub-category was then divided by already existing main categories. After having this done, the latent approach was applied to uncover hidden meanings that can be found in the data by following the same steps described above.

As noted by Sarajärvi & Tuomi (2017), qualitative content analysis often comprises situations in which several areas of interest emerge from the analyzed material, which is not to be included in the frames of an individual study. Therefore, a decision to focus strictly on the

research objective and questions was applied and followed throughout the analysis process to ensure achieving the most relevant results.

## 4.4 Research ethics

This study included broad responsiveness of the author at all stages of the research process, and the study followed fundamental principles of responsible conduct of research. According to Sarajärvi & Tuomi (2017), the more open and loose the qualitative research design is, the more difficult it becomes to weigh potential ethical challenges in advance. Therefore, verification process was conducted throughout the research journey, meaning that several mechanisms, such as checking, confirming, making sure, and being certain, were used to incrementally contribute to ensuring credibility, reliability, validity, and the rigor of the study (Morse et al., 2002).

Although qualitative content analysis can be evaluated through several approaches and standards, the internal consistency has a major role in assessing the quality of qualitative research (Sarajärvi & Tuomi, 2017). The implementation of IMR-research raises different ethical challenges compared to the most conventional ethical principles of conducting a qualitative content analysis (Hewson, 2014). In this research context, the study design and analysis were fully based on traceable and public online materials, and the study did not require considering sensitive information of any kind. By following the prerequisites for data collection, the fundamental nature of chosen materials remained official. All materials involved in this study belong to their respective owner, and the purpose of this thesis is not to modify of the contents, or cause any harm by conducting this study. Collected data was purely utilized for the purpose of this study, and stored materials will be appropriately removed after the completion of the study.

The data design and analysis were made as objectively as possible by the author. Despite the coding scheme for this study was partially conducted on the basis of theory, conducting this type of research exposes the author for possibilities to making subjective interpretations. Since there was no external coders or standard against which the coded materials would have

been tested, it was assured that materials were coded multiple times to ensure validity and reliability of the research.

# 5 Results

This study was conducted by reviewing actions taken in waste management during the European Green Capital year of 2021, which set an interesting starting point to look at how recycling as a part of the waste management system was promoted to make cities more sustainable. However, the award was hardly visible in the analyzed contents. The relation to the ECGA award was noticed mostly via latent analysis rather than manifest analysis: the most clearly visible and observable notions of EGCA were usually in the form of 'hashtag' or a logo included in a few number of contents. Latent analysis revealed that Salpakierto focused on producing content that was in line with three of the four main principles for waste management (municipal waste, biodegradable waste, and electrical waste), which were set out in the EGCA application. This demonstrates Salpakierto's commitment to operating in line with the EGCA waste management strategies, however, the reader should have had a more detailed preliminary awareness of the set EGCA strategies to associate them with the themes highlighted in social media content.

The main objective of this study was to explore whether responses to common recycling barriers were addressed in social media content and if municipal service provider Salpakierto's online communication was conveying means to overcome these barriers. Under these objectives, it can be generally stated that, as was assumed, Salpakierto utilized online communication to achieve improvements primarily in capability and motivation, and that information provision was used as the primary means to create change in recycling behavior.

This chapter will address the results in relation to research questions in the three following sub-chapters. Chapter 5.1 focuses on RQ1 and presents how Salpakierto has responded barriers of recycling through its social media. RQ 2 will be elaborated in two parts: through chapter 5.2 by demonstrating how Salpakierto has utilized the functionalities of online

platforms, and finally, by chapter 5.3 that aims to evaluate the possibilities of Salpakierto's online responses in overcoming barriers of recycling.

## 5.1 Salpakierto's online responses to barriers of recycling

To answer the first research question (RQ1), this chapter will elaborate how Salpakierto's social media platforms have responded to common barriers of recycling. I will demonstrate what type of means were used to communicate possibilities to overcome recycling barriers via social media. Table 5 introduces a summary of means to influence recycling behavior which are divided by the three sources of behavior (Michie et al., 2011) and four main categories influencing the formation of pro-environmental behavior (Kollmuss & Agyeman, 2010). According to the analysis, Salpakierto's most used online communication means were focused on influencing *capability* through knowledge and awareness creation, and *motivation* by convincing the role of individual and purpose of recycling. This chapter proceeds by addressing responses to capability, opportunity, and motivation separately, of which each aims to provide more detailed insights into the appearance of means that were visible in social media platforms aiming to communicate ways to overcome common recycling barriers.

Table 5. Salpakierto's communicated responses to overcome recycling barriers demonstrating to which extent Salpakierto has considered capability, opportunity, and motivation (Michie et al., 2011), and how they appear in relation with internal, external, and situational factors (Kollmuss & Agyeman, 2010).

| | *Internal factors* | *External factors* | *Situational factors* | *Demographic factors* |
|---|---|---|---|---|
| *Capability: physical* | **Recycling skills** *Perceptions about skills were enhanced by relatable and easily applicable content for skill development* | **Economic incentives** *Overcoming economic obstacles by increasing affordability of services* | **Concrete infrastructural additions** *Overcome difficulties regarding travel distance, location of services, and sorting/storing waste at home* | **Featuring elements** *Convincing reader that recycling is possible despite of e.g., income level (free events) or age (children performing recycling practices)* |
| *Capability: psychological* | **Knowledge creation and awareness** *Five themes offering variety of information and guidance (see. Table 6)* | **Feedback** *Increasing cooperation by inquiring feedback from customers (customer experience) and delivering it to customers (waste composition survey results)* | | |
| *Opportunity: physical* | **Overcome difficulties and disgust** *Convincing that recycling is not difficult by visual illustrations of "how-to" and why recycling is important in our current consumption-centered lifestyles* | **Relation to Finnish lifestyle and culture** *Connecting reader with typical consumption culture and how it is easy to recycle daily with little effort* <br><br> **Economic incentives** *Offering free events, recycling services, and by-products that lower the threshold to apply recycling into lifestyles* | **Participatory events** *Concrete and tangible recycling opportunities* <br> • *General theme days and weeks* <br> • *Educational events (sorting master coaching, recycling coaching, webinars)* <br> • *Mobilized events (Roinaralli, Serristoppi)* | |

| | | | Travel distance and lack of space<br>*Opportunities provided by external services Serristoppi and Roinaralli*<br><br>Inconveniency<br>*Opportunities provided by external services Serristoppi and Roinaralli as well as different forms of biowaste recycling* |
|---|---|---|---|
| *Opportunity: social* | | **Community values**<br>*Creating feelings of support and communality between service provider and customers*<br><br>**Company efforts**<br>*Encouraging residents into recycling via different means (free events, recycling services, and by-products) and presenting itself rather as close team member than distant operator* | |
| *Motivation: reflective* | **Individual responsibility**<br>*Evoking to individual responsibility by offering daily level targeted content with loose connection to moral and value factors – "doing the right thing."* | **Relation with common environmental themed events**<br>*Creating connections between residents' lifestyles, recycling efforts, and environmental effects to evoke values and encouraging to apply them into own lifestyle* | |

| | | | |
|---|---|---|---|
| | **Purposefulness**<br>*Highlighting the purpose of recycling by motivating arguments and justified reasoning*<br><br>**Trust and understanding**<br>*Demonstrating company openness in different ways*<br><br>**False imaginaries**<br>*Changing mindset and beliefs by correcting common recycling assumptions and generalized imaginaries*<br><br>**Individual benefits**<br>*Benefits from composting* | **Justifying benefits for public good**<br>*Creating municipal service efficiency and evoking to cultural responsibility to think differently: "From waste to resource" -ideology as a part of more sustainable future* | |
| *Motivation: automatic* | **Resources to develop unconscious recycling habits**<br>*Providing easy to apply and relatable content with loose moral undertone in a neutral and appropriate form* | | |

### 5.1.1 Capability

The prevailing means of influencing recycling behavior was to provide information through which residents could develop their capability of performing recycling practices. These means were largely focused on creating knowledge and awareness through different forms of information provision. The findings also go in line with previous knowledge that has indicated that information provision is still considered one of the most significant means in behavior change strategies (Dai et al., 2016; Kollmuss & Agyeman, 2010).

Results from this study indicated five main areas of means through which Salpakierto aimed to communicate about recycling: *basic and applied guidance, basic information, formal information, feedback, and participatory events*. Table 6 presents each means together with which source of behavior it was mainly aiming to influence, the typical content of the means, and concrete examples of the content.

Table 6. Salpakierto's five main areas of means to enhance recycling behavior together with the target source of behavior to which the means aim to have an influence, and examples of the content through which and how the means were conveyed.

| Means of influence | Target source of behavior | Content of the means | Examples of the content |
|---|---|---|---|
| *Basic and applied guidance* | Capability Motivation | Basic and upgraded "how-to" guidance | *What, how, and where to recycle? Seasonal recycling Specialty materials* |
| *Basic information* | Capability | Opening hours Location Functionality of services Knowledge sharing | *Recycling facts Recycling quizzes Cancellations due to pandemic* |
| *Formal information* | Capability Motivation | Company news Ongoing company operations | *Company name change Environmental review 2020 Municipal waste composition survey* |
| *Feedback* | Capability Opportunity Motivation | Invitation to give feedback about services Convey feedback from occurred recycling behavior | *Customer experience and satisfaction of services Results from the municipal waste composition survey* |

| Participatory events | Capability Opportunity Motivation | Recycling-related campaigns Educative events Recurring recycling events | Environment week Food waste week Composting course Recycling coaching Roinaralli & Serristoppi |
| --- | --- | --- | --- |

Salpakierto's means to enhance *psychological capability* appeared diverse and creative, ranging from providing basic recycling information to associating the reader with recycling facts through quizzes. Basic and applied guidance were usually focused on providing guidelines for how to perform recycling practices in terms of different waste types. Recycling guidance was following a seasonal flow by providing topical know-how information in relation to the appropriate time of the year, e.g., how to recycle wastes originating from holidays (first of May, Christmas, New Year) and how to treat seasonal wastes, such as twigs, leaves, and apple yield in the spring and autumn. Non-seasonal information was found to focus merely on biowaste and electrical waste, which were also set as two of the four main principles for waste management in the EGCA application, providing information on how they are to be discharged in an efficient way.

Basic and formal information provision was focused on the functionalities and structures of Salpakierto's operatives. Information about recycling station, location, opening hours, and company operations also followed a seasonal flow, e.g., by providing topical information on the opening hours of Finnish public holidays. Contents offered topical information throughout the year, and Salpakierto also communicated about cancellations of events due to the Covid-19 pandemic. Furthermore, Salpakierto utilized its online platforms for communicating about official company releases, such as the environmental review of 2020, structural changes within the company, and occurring operations, such as the municipal waste composition survey.

In addition to one-way influence, Salpakierto was found to have created informative cooperation in its online materials. For instance, Salpakierto utilized both collecting customer feedback from company activities and providing feedback for residents about their occurred recycling behavior. Also, different participatory events aimed to encourage participants to

learn more and implement skills in concrete circumstances. Salpakierto utilized global environment-related days (World Environment Day), nationwide events (food waste week), and city-level events (Environmental week) to create participatory events through which to inform residents about recycling themes.

Furthermore, Salpakierto organized two monthly events for residents to recycle their discharge more conveniently. Waste collection point 'Serristoppi' was receiving residents' daily waste in connection with monthly organized markets in a central location of Lahti. Waste collection vehicles of 'Roinaralli' services drove around the city and received residents' hazardous waste at several collection points. Both services were invented especially considering customers without cars and thus, increasing *physical capability* to recycle.

The main strategy in Salpakierto's online platforms to influence recycling behavior was constructing strong and diverse informative foundations and thus ensuring a sufficient level of psychological capability through which other sources of behavior could be influenced further. Ensuring capability played the most important role in overcoming barriers of recycling and was seen as an important means of conveying tangible possibilities to recycling.


### 5.1.2 Opportunity

Since higher opportunities to perform a practice can be achieved through some form of change in the environment, it became evident that concrete change in the environment could not be delivered through online communication. However, Salpakierto's communication was conveying information about different means through which barriers related to *physical* and *social opportunity* could be exceeded. While online communication sought to promote capability it also aimed to convey information about factors that would enhance opportunity.

Communicating about *physical opportunities* by which people could implement, improve, or try out recycling practices was conveyed through different pictural and video formats, enabling people to visualize themselves with how to perform different recycling practices concretely. These means of influence were focused on, e.g., how to recycle biowaste in a paper bag with less disgust, how to treat electric waste properly, and how different waste types could be recycled in more convenient ways. Also, communicating about concrete

participatory recycling events conveyed information about opportunities to learn more and gain experiences about the content presented on social media.

Online content aimed to provide solutions to long travel distances to waste stations and enable the disposal of recyclable materials out of people's houses through continuous communication about Serristoppi and Roinaralli services. However, both of the additional waste collection points were canceled in certain months due to the pandemic, which then reduced physical opportunities. As a result, people were found to leave recyclables at Roinaralli's collection points even if such action was prohibited. This demonstrated that appropriate recycling occurs to a greater extent if recycling facilities, such as Roinaralli service, make recycling more convenient for the recycler. In terms of inconveniency elements, online communication was not targeted to any particular inconvenience-related barrier, however, these were addressed by aims to convince people about the easiness of recycling that does not require a lot of effort from a recycler.

According to Salpakierto's online content, one of the highest thresholds regarding recycling considered the sorting of biowaste since it was usually perceived as difficult and unappealing to perform. Especially from the point of view of small residential property owners who are obligated to organize waste collection and transportation only for mixed and energy waste, Salpakierto's online communication demonstrated that additional biowaste collection systems were seen as inconvenient because the bins appeared too large, and demanded too much effort and economic resources. To overcome biowaste-related challenges, Salpakierto conveyed information about three physical opportunities. First, joint collection of waste (*suom. jätekimppa*) to decrease economic costs and the number of half-empty biowaste bins. Second, a separate collection service for biowaste (*suom. Bioneeri*) was piloted by Salpakierto, involving 224 small residential buildings to test a service model that could be utilized when the upcoming obligation to organize a separate collection of biowaste comes into effect in 2024. Third, Salpakierto presented composting as an easily manageable and practical means to treat not only biowaste but also other organic matters with additional information on how to maintain a composter easily and achieve the best benefits from it.

Responding to barriers related to *social opportunity*, Salpakierto seemed to intend to appear as a supportive community member that values residents' recycling efforts. This was made by

invoking communality in phrases such as "You sort, we recycle the materials into new components!", thus creating the atmosphere of a socially supportive and present service provider managing different discharges of everyday life. In other words, Salpakierto aimed to increase understanding of the already existing supportive social environment that enables different opportunities for recycling. Furthermore, a more collaborative waste management system was pursued by inquiring and delivering feedback through which residents could be seen and heard. Social and community support was also offered through content that informed about the distribution of annual recycling themed calendar and newspaper, which were provided free of charge by Salpakierto as a part of statutory recycling training for every household. All of the educative events, such as 'sorting master' coaching, recycling coaching, and recycling webinars, as well as general participatory events were free of charge, offering a lower economic threshold to participate in such events.

### 5.1.3 Motivation

The prevailing means to influence *reflective* and *automatic motivation* was to increase knowledge and awareness through information provision about the importance of individual responsibility as a vital part of the waste management scheme. For instance, materials included encouraging phrases for individual participation. However, due to the fundamental nature of Salpakierto as an official municipal service provider, encouraging efforts did lack of sentimental and strongly morally invoking tone in the content. Online materials appeared neutral and emphasized individual responsibility with propriety rather than provocatively, and thus, individuals were given the opportunity to apply the received information to their own living situations without pressure.

Each of the five themes described in Table 6 included motivational features to enhance and implement more comprehensive recycling behavior. The most obvious means to influence *reflective motivation* were included in the materials by explaining and convincing about the purposefulness of recycling. These means offered, for instance, numerical information on how much waste was sorted according to the waste composition survey, information about the life

cycle and faith of recyclable items, and content emphasizing the great importance of a little effort that nearly everyone can do to make the system more efficient.

Furthermore, Salpakierto aimed to create an easily approachable impression of the company by offering official information about company operations, visual illustrations of company premises, and opportunities for customers to get their views seen and heard which all might partially increase trust and understanding towards Salpakierto as a service provider and recycling practices in general. Results also indicated that Salpakierto aimed to change typical false imaginaries attached to recycling by offering evoking information of specific topics, such as highlighting the importance of sorting small electric waste (e.g., headphones) appropriately to correct bin, even if headphones might not be perceived hazardous enough, perhaps due to their small size and the sense of safety it conveys, and for the same reasons are easily disposed of incorrectly with mixed waste.

Salpakierto's efforts to influence *automatic motivation* were the most challenging to observe and evaluate. This might have been because of the above described Salpakierto's appearance as more official than an emotional service provider. Therefore, materials probably had an influence on values, moral obligations, and feelings in superficial manners without driving the focus further to the personal level. The influence of means would thus depend on an individual's attributes according to which people form perspectives and apply the received information to the further associative learning processes. Therefore, according to the results that originated mainly from latent analysis of the materials, Salpakierto's means of online communication could potentially serve as resources for gradually developing more in-depth semiautomatic responses of performing recycling practices.

## 5.2 Utilization of online platforms

Since Instagram, Facebook, and YouTube have been stated as the most used online channels worldwide (We Are Social, 2021), it was rather unsurprising that Salpakierto was also utilizing these platforms as its main channels for online communication. According to findings, Salpakierto utilized Instagram as the main social media channel to publish recycling-related content (58,5 %) which was followed by Facebook (37,3 %) and YouTube (4,2 %). The order

remained the same after conducting the exclusion of repetitive content, demonstrating 37,5% of specific recycling content originating from Instagram, 7,3 % from Facebook, and 4,2 % from YouTube. Furthermore, 51% of materials were assessed as identical content originating from two or more social media platforms. Therefore, Salpakierto communicated mostly about identical and also specific content via Instagram, whereas Facebook was mainly utilized as a channel to share identical content. YouTube was the least utilized social media platform, but videos there offered more profound insights into topics considered in other forms on Instagram and Facebook.

Finnish statistics of 2021 have, however, demonstrated highest social media usage frequency for YouTube (93 %), followed by Facebook (80 %), and Instagram (59 %) (Clausnitzer, 2021), which appear different in comparison to Salpakierto's utilization of these platforms. The reasoning for Salpakierto's decisions in utilizing YouTube and Instagram to the occurred extent can only be speculated. However, statistics did not specify social media usage frequencies further, e.g., by explaining for what purpose they were used and by which demographic groups. Therefore, frequencies are utilized only by illustrative means to give a general overview of the Finnish context.

The overall online appearance of Salpakierto varied from 2 to 12 shared content per month (Table 4). The difference in the number of publications in a month is relatively high, and no definitive explanations for such distribution of materials can be found without further knowledge of the process of producing media content. On average, however, Salpakierto was offering content fostering recycling behavior throughout the year, and the number of publications increased towards the end of the year.

Functional capacities of social media platforms are assessed here by utilizing their literal definitions made by Ballew et al. (2015): if online materials showed responses that enhanced the development of social networks, communality, or identity, communication was considered to have utilized relational functionalities. Similarly, if online materials involved encouragement in gaining online experiences through interactive means, the content was considered to represent experiential functionalities. Results indicate that while Salpakierto was mostly clearly influencing recycling behavior via utilization of the informational functions of social media platforms, the company had also noted social media platforms' other

capacities, although to a lower degree, in creating relational and experiential content to strive for recycling. Experiential functions were mostly utilized in the form of information about external possibilities for interaction, but no visible interactivity was found to occur in the online content itself. Experiential means of influence were visible in, for instance, content encouraging to attend live and online participatory events. Relational functionalities were visible in Salpakierto's aims of appearing as a close member of the community to enhance feelings of togetherness and thus create social communality between service producer and customers.

## 5.3 Assisting in overcoming recycling barriers

Considering Salpakierto's highlighted goal to achieve higher recycling rates, it was assumed that overcoming recycling barriers as a part of recycling promotion was included in its goals or strategies. The aim of this sub-chapter is to combine results presented in chapters 5.1 and 5.2, and thus, demonstrate Salpakierto's possibilities to assist in overcoming barriers to recycling behavior.

A number of means were found to introduce solutions to common barriers to recycling that were found in the literature (Chapter 2.2.1). In line with prior studies highlighting the importance of considering a variety of factors that might be involved in the formation of behavior (Michie et al., 2011), results from this specific study demonstrate Salpakierto's efforts to present itself not only as a source of information but also service provider conveying an array of functional possibilities to develop and engage people into recycling.

Salpakierto's online content was noted to be organized in a way that generally aimed to similarly influence two or more sources of behavior. Only content that was purely formed to steer informational purposes (e.g., environmental review of 2020, opening hours of recycling station)  did have a clear connection to one source of behavior, which usually was psychological capability. Each three sources of behavior were noted to have a robust interlinked relationship in which psychological capability factors were supporting the implementation and development of opportunity and motivation. The interaction also worked in the opposite direction when, for instance, increased opportunity factors (e.g., participating

in recycling webinar) would generate more space for the development of a deeper level of psychological capability (increasing recycling knowledge).

Salpakierto's online communication conveyed informative ways to strengthen internal factors influencing behavior, and shared information about external and situational factors that would support and enable recycling participation. The fourth category, demographic factors (age, income level) has been argued to have a low but also complex impact on recycling behavior which might be why these factors appeared only in a few studies during the literature review. The lack of demographic factors was also visible in Salpakierto's online communication since the content was not straightly directed at people representing different demographic goups. Instead, demographic factors featured online content as hidden elements, such as in the promotion of free of charge events that were suitable for everyone regardless of the income level, and in pictures that involved children performing recycling and thus conveying a feeling of the easiness of recycling despite age. In general, Salpakierto succeeded in involving all four categories influencing behavior formation as targets of its online communication.

When viewing the overall appearance of Salpakierto on its social media platforms, the content was presenting relatable and topical themes which would appear useful to the individual by e.g., offering information on how to manage waste consisting of autumn leaves. The communication was focused to a basic level which was usually fulfilled with additional sources of information in the form of links and textual phrases, such as "*Read more on our website…!*". As noted earlier in the thesis, Salpakierto seemed to establish its communication on a strong informational basis which would act as the primary means of encouraging people to take steps to overcome obstacles and assist the gradual development of recycling behavior by offering other opportunity and motivation -related possibilities through which people may stimulate their recycling level further. By bringing recycling communication close to people's everyday lives with easily understandable and accessible content, recycling activities may have appeared more positive and easier to conduct, which partially plays a role in assisting in overcoming different recycling barriers.

Social media platforms appeared as informational channels to share and communicate about the company's agenda and provide detailed material on chosen recycling topics. The nature of social media platforms as people's daily 'ever present' tools was utilized in providing topical

content for people to easily find and utilize. This would also require less effort from the reader to seek additional information since basic knowledge was usually offered in the content and fulfilled with optional clickable sources. Demonstrating support towards easily searchable and performable recycling activities, Salpakierto was found to facilitate more thorough basic level recycling behavior via its online communication contents.

In general, when viewing the multidimensionality of means through which social media platforms communicated about possibilities to overcome barriers (Table 5), occurred level of utilization of social media functionalities, and conditions that social media was able to create to promote recycling behavior in the online world, Salpakierto's online communication addressed general barriers of recycling quite extensively and thus, created appropriate basic level information-centered assistance for overcoming different inhibiting factors of behavior. However, these results also show that approaching the behavior through multidimensional model or models could create even more insightful overview of the behavior to be changed and assist in creating beneficial outcomes for overcoming barriers of recycling more broadly.

# 6 Discussion

Considering the history of varying attempts to influence recycling behavior, the possibilities that online communication channels offer in enhancing recycling behavior are extremely appealing in digitally organized contemporary societies. Service providers, as in the case of Salpakierto, can migrate close to people's everyday lives through social media platforms and bring even distant recycling topics easily available, accessible, and understandable for people to utilize further (Sujata et al., 2019). Since 60 % of Finnish people have already utilized social media channels as 'ever-present' communication tools in their everyday life and the trend seems to be increasing (Clausnitzer, 2021), the digital approach could lower the threshold for individuals to involve themselves with recycling-related themes and practices.

What was specifically interesting in this study was the use of an applied approach to review recycling behavior from a recycling barriers perspective and see whether a vital municipal service provider Salpakierto was promoting recycling to a broad extent by addressing these

real-life recycling challenges. Since Salpakierto's objectives included enhancing an ideological change in which waste that is usually perceived as dirty and valueless would rather be seen as valuable resources, a vital part of this change in mindsets was to pursue higher recycling participation and generate a more resource-efficient city. In the light of this goal, it was noted that Salpakierto's social media content was, indeed, predominantly focusing on communicating about recycling and addressing a wide array of barriers that were commonly associated with recycling behavior. With a strong emphasis on information provision as the most used means to generate change in different sources of behavior, Salpakierto aimed to convey a wide range of information on overcoming recycling barriers in support of the ideological change. However, since information provision as the primary means may not be sufficient enough when pursuing more comprehensive change in behavior (Dai et al., 2016; Kollmuss & Agyeman, 2010), there is a vital need for future research to consider how other means of influence could enrich online communication.

Salpakierto fostered recycling behavior within its respective spheres of competence, meaning means that it was able to convey within limits set by both the digital world, and what it had the authority to offer. As a result of the former, Salpakierto was able to only communicate about the existence of different possibilities to overcome recycling by illustrative and informative content rather than concretely offering these means – residents were left with responsibility for the further application of these means. Hence, it is beyond the scope of this study to evaluate the actual effectiveness of means in changing behavior thus sets it as an interesting topic for future research. For the latter, online communication was only able to highlight different possibilities for recycling that the existing environment was already offering, such as services, operations, and future events, while being a source for recycling information. Therefore, changes in the environment, that would perhaps have a higher influence on recycling barriers related to opportunity (e.g., lack of space), should also be addressed by other parties of society that have the authority to alter environmental and social structures. The role of different societal actors in promoting comprehensive recycling behavior is another remarkable area of interest for future studies.

As has been demonstrated, Salpakierto's online communication focused on conveying means that could especially increase *psychological capability* through knowledge creation, and *motivation* by convincing the purposefulness of individual-level recycling. Since both lack of

knowledge and purposefulness were also raised in the top three most common barriers of recycling in prior literature, Salpakierto's online content indicated that its communication was targeted to areas where recycling promotion efforts could potentially have a real impact on these sources behind behavior formation. Furthermore, both of these sources of behavior were assumed to be most likely influenced by online communication, which is why these results appeared rather unsurprising. According to these observations, Salpakierto seemed to value the role of knowledge and awareness in the context of recycling behavior and that strengthening these factors would serve as a basis for further recycling behavior development.

When considering why the third most common barrier of recycling that arose in the literature review, a variety of opportunity-related inconvenience elements (e.g., lack of time, space, or effort), was addressed by Salpakierto only to a low extent, the explanation is most likely to be found when considering the role and social status of the company: it had no formal obligation to offer solutions to typical inconvenience elements, such as lack of time, as a recycling service provider. However, despite of this notion, Salpakierto's online communication was noted to be addressing these inconveniency issues somewhat indirectly, similarly with the context of providing information on recycling opportunities – utilization of Serristoppi service would similarly decrease travel distance, enable to regularly get rid of waste stored at home and thus, offer a solution to lack of time and space challenges. The convenience of recycling was brought up via highlighting the existing recycling-friendly environment of which utilization was vigorously and continuously recommended in online communication. Therefore, by introducing a broad array of services and recycling support, Salpakierto presented itself as an external recycling partner with whom people can easily overcome different recycling challenges and operate towards higher recycling levels.

Salpakierto did make the most use of the informative functions of social media, perhaps because the three social media platforms (Facebook, Instagram, YouTube) are generally associated with high informational capacities (Ballew et al., 2015), and also, because it is the most common way to communicate in social media. This proves that social media platforms were utilized as strategic channels to promote behavior change, however, the utilization of social media functionalities differed considerably.

Following the literal definition of social media functionalities (Ballew et al., 2015), results demonstrated that online communication was utilizing relational functionality the second most with the aim of promoting communality and establishing connections between the service provider and residents. However, it cannot be generalized that the same impression of the materials would be conveyed to all readers. Hence, aims to create relational outcomes can be perceived in different ways, for instance, by assuming that communication about services was rather advertisements to achieve economic benefits for the company than to create social support and enhance sustainable community values. When considering the least utilized experiential functionalities, it remained open to interpretation whether online materials were conveying experientiality in its literal sense: the content did not create interactivity in the material, but was rather communicating about possibilities for interaction in another context, such as in online webinars. Since the study was not conducted in real-time, it remains uncertain whether interactivity was exploited in communication to a higher extent during the year of 2021 by using other features of social media, e.g., Instagram stories, but which have perhaps been removed afterward. Since social media functionalities can be interpreted in many ways and research about the role of social media as a tool to enhance pro-environmental behaviors is still limited (Senbel et al., 2014), more research is needed to explore how different social media functionalities could more effectively assist the implementation of recycling practices.

The means to overcome recycling barriers were distributed quite widely across internal, external, and situational categories that influence the formation of pro-environmental behaviors (Table 5), also including demographic factors that were claimed to have the vaguest impact on behavior (Kollmuss & Agyeman, 2010). Thus, it seemed that online communication aimed to influence a wide range of underlying factors, which indicated that it was not the company's intention to favor any particular category behind behavior formation, e.g., external factors. Preferences were rather seen in the conveyed means of influence, i.e., information provision, and consequently, which sources of behavior were influenced the most as a result of the utilization of this means. Although information provision alone has been argued to be insufficient in creating effective behavior change strategies (Ballew et al., 2015; Sujata et al., 2019), results from this study indicate that information provision can nevertheless provide a broad range of resources to develop factors in vital categories that influence behavior

formation. However, this argument does not eliminate the need to, which is also identified in previous studies, find alternative ways to encourage and stimulate recycling behavior (Michie et al., 2011; Wilson et al., 2012).

The observations that Salpakierto was able to include such a wide range of responses to overcome recycling barriers may have partially been originating from its fundamental nature as official waste management operator – recycling was an integral part of the company's strategy making it natural to address recycling barriers broadly. By focusing on conveying easily approachable basic level information with a neutral tone, the atmosphere of social media platforms appeared friendly. This may have supported an idea that the application of recycling practices did not require a certain level of preliminary expertise. Salpakierto's conveyed means were generally applicable to any individual living situation, allowing people to construct a stable recycling basis according to their initial situation, develop it further, and preferably lead towards more optimistic and in-depth implementation of permanent recycling behavior. Salpakierto's approach to behavior change was thus in line with previous studies claiming that the most effective outcomes are achieved when both the means for behavior change strategies and utilization of social media functionalities are formed considering the audience's needs (Czajkowski et al., 2014; Sujata et al., 2019), which in this case was assumed to be the need for basic level assistance. However, it remains uncertain whether broader utilization of other social media functionalities could have yielded more fruitful outcomes to influence behavior formation as well.

As a result of relatable, applicable, and cooperative online communication, both parties Salpakierto and residents, could reinforce their position in a community where certain conditions for recycling occur, and thus gradually develop even more functional context-specific recycling scheme in cooperation. However, as also noted by and Ordonez et al. (2015) and Wilson et al. (2012), a different set of collaborative information, motivation, and engagement elements in a waste management system could encourage and engage residents to implement more profound recycling practices. It will be interesting to see the role of social media in supporting this cooperation and higher recycling behavior in the future. How could social media assist the promotion of recycling behavior that includes a range of processes that are difficult to perform unconsciously in the first place? With these notions in mind, if the first steps towards higher recycling participation are pursued by making conscious recycling easier

mainly via information provision, we shall see if it is enough to, firstly, create the conditions in which people feel able to overcome barriers of recycling and lead towards higher consciously conducted recycling practices, and secondly, evoke more in-depth thinking about the importance of individual recycling in current wasteful societies.

## 6.1 Limitations of the research design and results

The research design and findings of this study are subjected to two main undeniable areas of following limitations.

Since the illustrative literature review was not comprehensive due to limitations related to sample size and scope of the studies, it cannot serve as the most reliable way to review context-specific behavior, and the results can be interpreted only at a general level. More specific results could be achieved when an appropriate number of context-relevant studies are available for the purpose of this type of study.

Another limitation of this study results from the decision to perform a purely observational media analysis of social media contents. As the study was conducted by analyzing the published contents in 2021, it was left uncertain whether the contents had remained the same to this day or whether they were edited or removed, which is rather easy to implement on social media. Hence, there was no certainty whether the analyzed contents included deficiencies that could change the obtained results in one way or another. To achieve more accurate view, further research could involve interviews with company representatives to gain a more in-depth understanding of the production process of social media content, its purpose, and objectives. Since time and external trends can alter the ways in which social media content is produced and presented, this study can only provide a time-bound view of the topic and differ significantly from the results of both past and future research.

# 7 Conclusions

The purpose of this thesis was to examine whether online communication on social media platforms was responding to real-life barriers of recycling by conveying means to overcome them and, thus, whether the communication was assisting in taking steps towards a more sustainable future in the city of Lahti. I analyzed the promotion of recycling behavior by drawing on the previous literature and two theoretical frameworks that enabled to reveal which underlying factors of behavior were targeted to overcome recycling barriers via means of online communication. Referring to the need for behavior change strategies that could similarly have an influence on several underlying factors of behavior, another aim of this study was to examine whether social media could serve as a channel for promoting recycling behavior comprehensively.

Results of the study demonstrate that the online communication of a recycling service provider Salpakierto addressed a wide range of common barriers of recycling in its social media communication. Furthermore, the responses to these barriers aimed to consider broadly different underlying factors of behavior. Responses were mainly conveyed via information provision, which was the most utilized means to foster recycling behavior in general. This result is also in line with previous statements according to which information provision is still considered and utilized as the main means in behavior change strategies (Kollmuss & Agyeman, 2010). Information provision aimed to increase knowledge, understanding, and awareness which indicated a clear intention to influence specifically factors related to psychological capability and motivation, that, when reinforced, could serve as a basis for further behavior development. In addition, as social media platforms are typically utilized due to the informational capacities they offer (Ballew et al., 2015), it was unsurprising that Salpakierto's online communication was heavily based on information provision.

The general atmosphere in Salpakierto's online communication seemed to emphasize the vital role of the induvial recycler as a part of the broader waste management scheme, which has also been highlighted in previous studies (Bruvoll et al., 2002; Pedersen & Manhice, 2020). This was mainly done by associating recycling with easy and convenient everyday life practice that requires only a little effort to be incorporated into daily chores regardless of the ongoing

living situation. All this would be possible by enhancing the formation of a stable knowledge base that could be gradually developed further and preferably result in a more in-depth implementation of recycling practice. In this way, Salpakierto's online communication approached recycling from an individual perspective, and integrated individuals into broader social and cultural structures (e.g., by creating links with consumer culture and the role of recycling in it), and was thus able to highlight the role of individuals in achieving higher recycling rates and pursuing broader ideological change.

Referring to results, means to overcome recycling barriers were conveyed within the boundaries set by both the company's competencies and social media environment. Due to these limitations, Salpakierto's social media served mainly as information platforms through which possibilities to overcome recycling barriers could be exceeded when applied to individual living situations. Salpakierto sought to present solutions to barriers of recycling by bringing them close to consumer's daily life. Furthermore, the company seemed to have succeeded in positioning itself into the social environment known by the residents and thus conveying information about means to overcome barriers by taking into account context-specific individual-level characteristics and presenting itself as a member of the group in the battle against waste challenges.

In the light of findings originating from this study, I argue that online communication has the potential to serve as a channel to foster the overcoming of recycling barriers, especially when aiming to influence behavior via information provision. However, if online communication continues to focus on the most typical and familiar means of influence, which is knowledge creation through the utilization of informational functionalities of social media platforms, many of the capacities through which social media could generate change in behavior remains unused. In addition to information elements, involving other motivational and engaging elements in behavior change strategies might perhaps lead to even more effective outcomes. Hence, results from this study support the notions made by earlier studies: considering multiple factors behind behavior formation through a multidimensional model of behavior could more likely offer comprehensive premises to form behavior change strategies that can assist people with different behavioral challenges. How to involve multidimensional means of influence to behavior change strategies and how they are conveyed to people will remain the task for future research.

Therefore, what this research has brought out is an applied approach through which a broad range of inhibiting factors of behavior can be connected to different underlying factors of behavior and thus point out areas in which these barriers of behavior occur. Utilization of this approach enables to examine if means to change behavior are targeting areas where change is needed and perhaps, serve as a guide to develop even more efficient behavior change strategies through which people in different living situations could alter their behavior – some benefit more from increased motivation and other from the increase in concrete opportunities.

For future research on this topic, I have constructed suggestions based on the findings of this study. Firstly, future work in this field should focus on examining barriers of recycling in a specific framework in order to target behavior change strategies to appropriate areas of behavior and thus provide more efficient means of influence. Second, the Behavior Change Wheel could guide further research by involving other layers in the study design, which would enable to review, for instance, which intervention functions could be feasible to be included in behavior change strategies. Third, since this study was able only to examine how social media platforms were used as a channel to provide information, it would be interesting to address more in-depth the actual effectiveness of online communication – to what extent online communication is able to have an impact on recycling behavior. This would require conducting research with social media users and thus study who is or is not reached by online communication, how social media users perceive content, and how communication could be developed further by considering, e.g., utilization of different social media functionalities.

This specific study does not aim to claim or guarantee that this is the best way to generate change in behavior, however, it can serve as an example of an alternative way to form behavior change strategies that, as has been presented in previous research, consider a varying range of factors participating in behavior formation. Therefore, this study has yielded an insightful overview of the role of social media platforms in overcoming barriers of recycling behavior; how different means have already been utilized to influence capability, opportunity, and motivation as a source of behavior, together with proposals for future research to form a deeper understanding of the topic and to develop more fruitful strategies for overcoming recycling barriers and promoting more profound recycling behavior.

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