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SEP

Explaining consumer waste separation behaviour

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Abstract

Currently consumers do not separate their waste carefully, causing a loss of valuable materials. It is unclear what causes this behaviour, despite many researchers having attempted to tackle this issue. This exploratory research tries to fill this gap by determining what can be a potential explanation of current waste separation behaviour by consumers. This qualitative study consisting of interviews with 9 experts from different fields provides a base for further research on this topic. Communication was found to be a new additional variable to current consumer behaviour models important in determining the explanation of waste separation behaviour. Therefore, nudging was recommended as a possible solution. However, further research is necessary to determine causal relationships between the variables.

Key words: Waste separation; Circular economy; Consumer behaviour; Communication

INTRODUCTION

On 10 February 2020 a news article was published in the Netherlands stating that 85 million recyclable coffee cups used by the Dutch government were burned instead of recycled (NOS, 2020). This was caused by the careless separation of the cups from other types of waste, which made it impossible for the recycling firm to save the materials. This article exemplifies the importance and relevance of careful waste separation. For organisations that are striving towards circularity, waste separation and recycling are especially important steps. In a circular economy the end-of-life concept is replaced by reducing, reusing, recycling and recovering of materials in production, consumption and distribution processes (Kirchherr, Reike & Hekkert, 2017). The concept of a circular economy has been gaining increasing attention and is often displayed as one of the main solutions to reduce climate change (Geissdoerfer, Savaget, Bocken & Hultink, 2017).

This study will focus on waste separation by consumers, because consumers are at the source of waste separation. For the purpose of this study I will co-operate with Omrin, a waste processing firm in the Netherlands that has circularity as one of its top priorities. Currently, the firm faces difficulties with recycling the waste they collect, because it is often not carefully separated. This results in a by now familiar problem: the waste that is not properly separated must be burned and valuable recyclable materials are lost. In addition, burning waste is an important source of emissions of several toxic compounds, emphasizing the importance for it to be reduced to minimal levels (Maasikmets et al., 2016).

Currently, consumers do not separate their waste carefully enough to ensure proper recycling, despite an increased concern for the environment (Scott & Willits, 1994). Therefore, for waste processing firms such as Omrin to increase their circular performance, consumer behaviour has to change. It is known that it is possible to ‘nudge’ consumer behaviour regarding environmental issues (Nielsen et al., 2017). However, before one can change such behaviour, it has to be known what is the explanation for the current waste separation behaviour. If you want to successfully target the causes of poor waste separation, first the target should be clear. Possible explanations can be lack of knowledge, lack of experience, attitude towards sustainability or lack of local recycling conditions (Tonglet, Phillips & Bates, 2004; Tonglet, Phillips & Read, 2004). However, unclarity still exists on what is the full explanation.

Therefore, in this study, I will aim to discover the full explanation of current waste separation behaviour by consumers.

The goal of this research is to determine the explanation of consumer waste separation behaviour and provide recommendations for practitioners as well as opportunities for further research to address the problem of poor waste separation. I will aim to provide an answer to the following research question: *How can current consumer waste separation behaviour be explained?*

This research aims to provide insights into a very relevant topic. The results can be of use to waste processing firms to help them increase their circularity with the use of increased awareness of the root of the problem, creating a clear aim for future interventions. Furthermore, if waste processing firms can decrease the amount of resources being burned, they can increase the amount of useful recyclable resources, which can be used to increase profit. A research gap exists in existing literature, which is currently unable to explain large parts of the variance in recycling behaviour (Lee & Holden, 1999). Therefore, I will address this research gap by further exploring the explanation of poor waste separation to diminish environmental degradation. In addition, a demand exists for research that combines academic and practical knowledge (Cash et al., 2003; Raymond et al., 2010). Therefore, this research will be done by exploring multiple stakeholder perspectives with the use of interviews. This will provide clarification to the waste separation and recycling literature and provide opportunities for further research.

This report is structured as follows: Firstly, I will provide a theory section including a literature review, concepts and definitions, and the theoretical framework. This is followed by the methodology section, after which the results are reported. Lastly, I will end with a discussion, recommendations, limitations and opportunities for further research.

THEORY

In the following section I will first give a brief overview of the relevant literature, wherein I will first explain the concept of environmental concern, followed by some clarification on the concept of waste separation and ending with an overview of previous research concerning waste separation behaviour. Behavioural and contextual factors are combined to provide a comprehensive overview of what drives consumer waste separation behaviour.

Due to increasing environmental problems and the prevalence of environmental issues in the media, the global public at large is becoming more and more environmentally concerned (Tadesse, 2009; Berger & Corbin, 1992; Lord, 1994). It is becoming increasingly clear that there are limits to growth and that resources are not endless (Meadows et al., 1972; Meadows, Randers & Meadows, 2004; P+, 2020). Therefore, our current system is not sustainable. We are facing multiple environmental issues, such as resource depletion, excessive land use, biodiversity loss and soil, air and water pollution, which are all threatening the life-support systems on earth (Rockström et al., 2009; Jackson, 2009; Meadows et al., 2004). Therefore, a shift to a more circular economy is essential. The concept of a circular economy is not entirely new as in 1972 Meadows already published a book on the concept as we know it today. However, the urgency for implementation has been increasing over time. Geissdoerfer, Savaget, Bocken and Hultink (2017) provide the following definition of a circular economy: 'a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.'. As can be derived from this definition, recycling is a large part of this movement to reduce the use of virgin materials.

Waste separation

Careful waste separation is of great importance to the environment as well as the circular economy. The separate collection of waste maximizes the quantity and the quality of the recycled materials (Calabrò, 2009). Besides that, waste separation also reduces the impact of municipal solid waste by removing dangerous substances from the general waste, such as batteries and waste from electronic devices (Petts, 2000; Calabrò, 2009). Therefore, it is especially important to separate electronic and electric household waste. The incineration of waste should only be done when energy recovery is not possible or not viable (Calabrò, 2009).

Multiple sources of literature report that increased recycling reduces greenhouse gas emissions and allows the production of new raw materials (e.g. Petts, 2000; Choate & Ferland, 2005; USEPA, 2002). Therefore, proper separation of waste leads to benefits for the environment as well as for waste handling firms.

The importance of waste separation can also be seen in the European Waste Hierarchy (EWH) (European Commission, 2010)[1]. The EWH is a list ranking different types of waste management approaches based on their desirability. The least desirable is landfill, followed by energy recovery. In energy recovery the waste is not fully wasted, since first energy is recovered from the materials. This is followed by recycling, followed by re-using products. The most desirable is prevention, where no waste is produced at all. By increasing proper waste separation, the amount of waste that goes to landfill or is burned reduces and more materials can be recycled. Thereby, this waste moves up the ladder and a more environmentally desirable waste management approach can be used. The EWH gives a clear goal for improving waste separation behaviour, where the main target is to avoid the lowest two steps of the ladder, landfill and energy recovery. This reduces emissions and the use of scarce resources, creating a more sustainable and circular economy (Petts, 2000; Choate & Ferland, 2005; USEPA, 2002).

Theory of planned behaviour

To increase waste separation by consumers, it is very likely that consumer behaviour needs to change. It is important to know what the explanation is of poor waste separation, so the causes can be more specifically targeted. The theory of planned behaviour (TPB) links belief and behaviour and can therefore shed light on the explanation of waste separation behaviour. This theory has originated in 1985 by Ajzen and is based on the theory of reasoned action. An updated version of the theory was published in 1991 (Ajzen, 1991). Figure 1 provides a graphical display of TPB, where three predictors of behavioural intention can be seen. Firstly, the attitude toward the behaviour influences the behavioural intention. This refers to the level of favourable or unfavourable perception of the behaviour by the individual (Ajzen, 1991). For example, if the person in question perceives proper waste separation as a favourable behaviour, it is more likely that this person will indeed properly separate their waste. The second predictor is called subjective norm, which refers to the pressure of the environment whether or not to perform a certain behaviour (Ajzen, 1991). This is based on the idea that humans are social

[1] Which is constructed on the foundations of Lansink's Ladder (Lansink, 1979).

creatures and care about the opinions of others. In the case of waste separation this would imply that if someone's environment perceives waste separation as favourable, this person is more likely to separate their waste. Lastly, perceived behavioural control is one of the predictors. This refers to the perceived level of difficulty associated with performing the behaviour, reflecting both past experience as well as anticipation of difficulty (Ajzen, 1991). With regards to waste separation this could mean that if a person perceives the separation of waste as too complex, this person does not see himself as able enough and is therefore less likely to perform the behaviour.

As can be seen in Figure 1, these three predictors do not immediately link to behaviour, but instead influence 'Intention'. A person's intention to perform a behaviour is an indicator of how much effort he or she is willing to put in and how hard they are willing to try (Ajzen, 1991). A stronger intention leads in general to a higher chance that the person will engage in the behaviour. In TPB it is assumed that these intentions capture the motivational factors influencing the behaviour. What adds to the complexity of the model, is the fact that the weight of the three different predictors varies across behaviours and situations (Ajzen, 1991). This means that sometimes, for example, attitude toward the behaviour weighs stronger than subjective norms, but in other cases it can be the other way around.

Botetzagias, Dima and Malesios (2015) have researched which predictor is the strongest with regards to a person's 'Recycling intention'. They found perceived behavioural control to be the most important predictor of recycling intention, followed by attitude toward the behaviour. Interestingly, they found no significant effect of subjective norms on the recycling intention. In a similar study by Ioannou, Zampetakis and Lasaridi (2013) subjective norms was also found to be non-significant. Botetzagias, Dima and Malesios (2015) provide an explanation for this phenomenon based on Schwartz (1977), who stated that social norms can be internalized turning them into personal social norms in the form of personal convictions of what good behaviour is and how one should act. If this is the case a person would not perform the behaviour because other people think it is the right thing to do, but because he himself thinks it is right to do so.

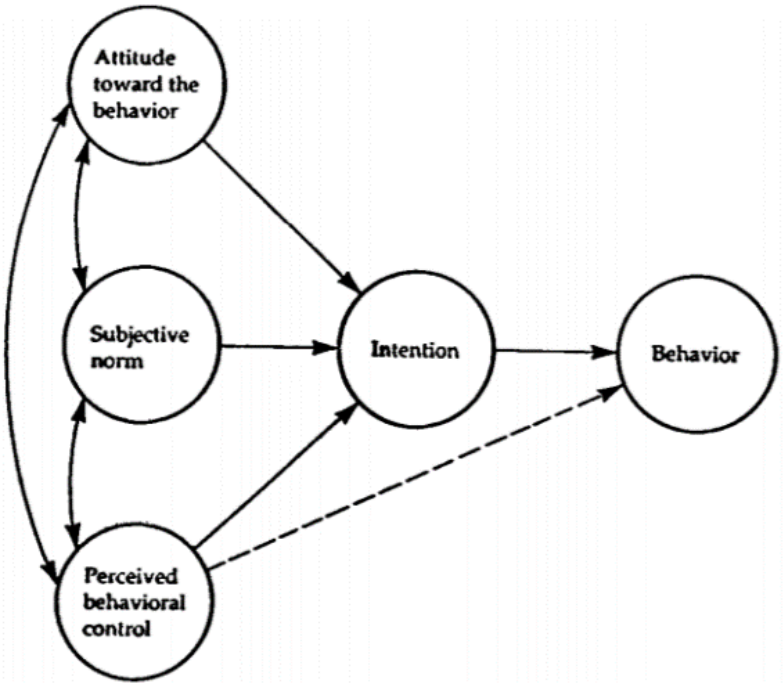

Figure 1 Theory of planned behaviour (Ajzen, 1991)

Norm activation model

Another relevant model is the norm activation model, first introduced in 1977 by Schwartz. This model aims to describe the factors contributing to altruistic behaviour, such as volunteering. Waste separation can be seen as altruistic, since it is performed for the collective benefit and individual effort has minimal impact (Lee & Holden, 1999). In addition, pro-environmental behaviours are often done for intrinsic rather than extrinsic reasons (Ebreo, Vining & Christancho, 2003). This kind of behaviour where there is little to no personal gain is central to the norm activation model. Two conditions are associated with this model's explanatory value: (1) people need to be aware of the consequences of their behaviour and (2) they attribute the responsibility of these consequences to themselves. If both of these conditions are met, a person is more likely to behave altruistically. An example can be found in a study by Van Liere and Dunlap (1978), where people who were aware of the negative consequences of burning waste in their yard and also took responsibility for those consequences were less likely to burn waste in their yards. Ebreo, Vining and Christancho (2003) suggest that people's motivation to recycle might be increased if they are motivated by personal or social norms in addition to being aware of the consequences of their actions. Therefore, the lack of proper waste separation might be caused by a lack of knowledge on the consequences or a lack of personal and social norms. Since some studies using TPB to explain recycling behaviour found a non-significant effect with social norms, it might be possible for personal norms to have a more

reliable effect. Figure 2 provides a display of the norm activation model. The norm activation model focuses more on a person's beliefs of what is right or wrong, while TPB aims to explain behaviour from a viewpoint of personal expectancy and benefits (Shin, Im, Jung & Severt, 2018)

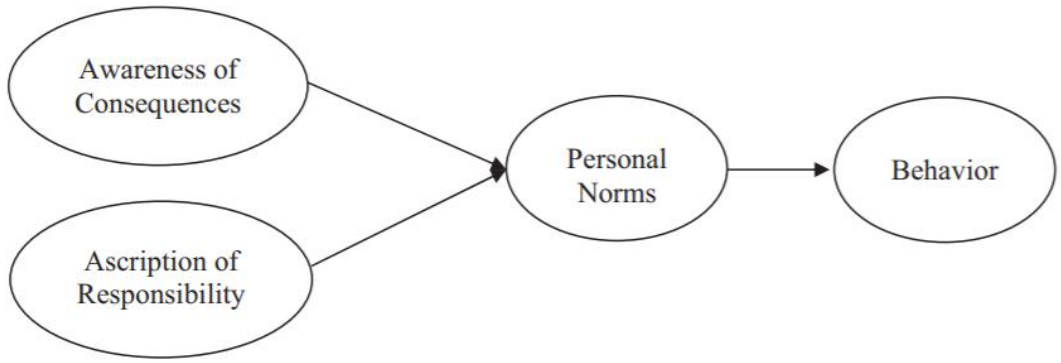

Figure 2 Norm activation model (Schwartz, 1977)

Combining the models

The TPB and the norm activation model are complementary and have interacting variables. For example, if the subjective norm is very negative, meaning the social environment does not support the behaviour at all, it is likely to influence the personal norm as well. In fact, Park and Ha (2014) explored several psychological variables relevant to the intention to recycle by combining the two models. Their research resulted in the model displayed in figure 3. The TPB focuses more on a person's behaviour stemming from personal expectancy and benefits, while the norm activation model concentrates on a person's behaviour stemming from moral and altruistic beliefs. However, a case can be made for the influence of both models on a person's intention to recycle (Park & Ha, 2014). As can be seen in figure 3, the variables are split up in either external or internal. Awareness of consequences and subjective norms are both seen as external variables, since these are determined mostly by the environment. Attitude, personal norms and perceived behavioural control are all internal factors influencing the recycling intention.

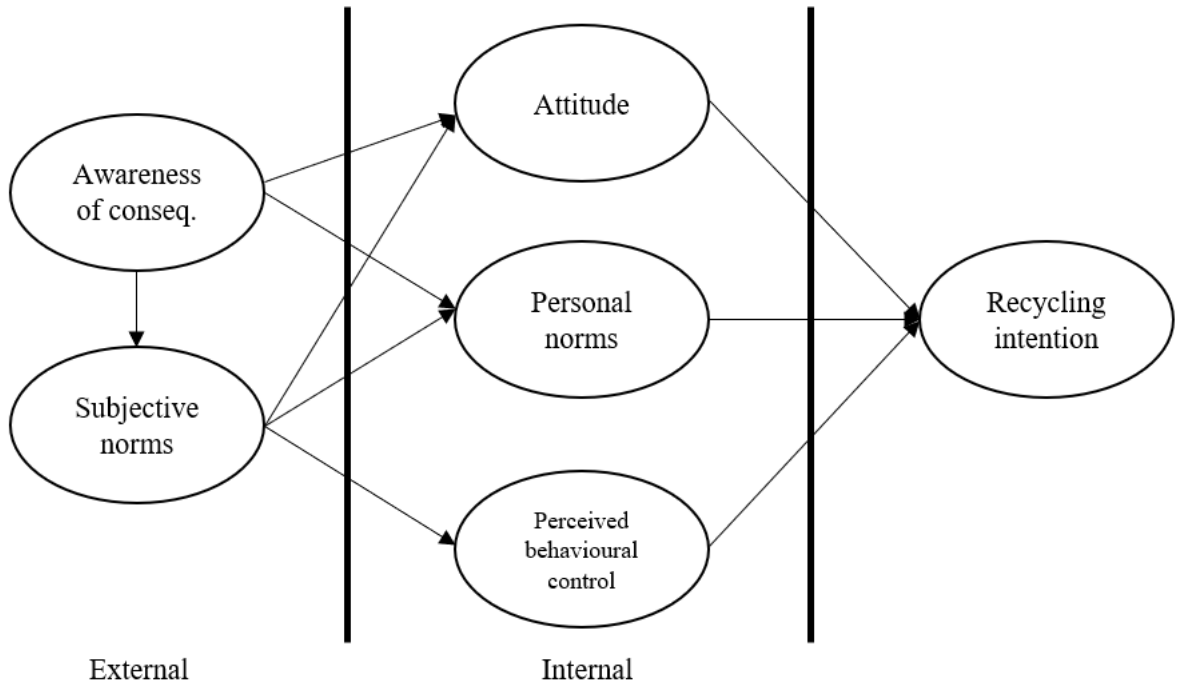

Figure 3 TPB + NAM

Consumer recycling behaviour

Due to the increasingly pressing issue of climate change, many researchers have already attempted to tackle the problem of careless waste separation. This has led to a solid base of previous research on consumer recycling behaviour. In the following section, I will provide a brief overview of the potential explanations of poor waste separation based on previous research. It is often believed that environmental concern or attitude towards the environment is a good predictor of pro-environmental behaviour. Environmental concern entails the care for the environment as well as its resources (Göksen, Adaman, Zenginobuz, 2002). Therefore, the level of environmental concern a person experiences, can influence their awareness of and care for recycling programs and waste separation. However, early research has discovered that environmental concern is actually a poor predictor of pro-environmental behaviour (Heslop, Moran, & Cousineau, 1981; Ritchie, McDougall, & Claxton, 1981; Verhallen & Van Raaij, 1981; Webster, 1975). This implies that environmental concern plays at most a small role in explaining pro-environmental behaviour. However, to fully understand the effect of environmental concern on waste separation behaviour, it is important to study waste separation behaviour in particular instead of pro-environmental behaviour in general.

A case study by Martin, Williams and Clark (2006) on the social, cultural and structural influences on household waste recycling in an English neighbourhood with surprisingly low recycling rates found several causes of poor recycling. Interestingly, they found that despite a high willingness to recycle (80%) inhabitants still struggled with the current recycling facilities. Therefore, the poor recycling must have a different cause. Situational factors, such as convenience and reliability of local recycling seemed to play a large role. However, since this concerns a small study, generalizability of the results might be low. Their results also showed that older people recycle more, which may be due to higher availability of time and storage space increasing convenience.

A study by Thomas and Sharp (2013) also seems to place emphasis on situational factors. They name access to recycling facilities and ability to act as important factors influencing recycling behaviour. If access increases, convenience of recycling increases as well, due to smaller effort associated with waste separation, in line with the study by Martin, Williams and Clark (2006). Another interesting claim by Thomas and Sharp is that people's motivation might be caused by a willingness to compensate for less sustainable behaviours, such as flying. However, this might also work the other way around, where people decide not to recycle because they already perform other environmental friendly behaviours and do not feel the need to do more.

Another potential explanatory factor of poor waste separation behaviour is resistance to change and a tendency to stick to the current situation. Resistance to change is 'the tendency for a system to continue its current behaviour, despite the application of force to change that behaviour' (Harich, 2010, p. 37). In the case of waste separation, this would mean that even if you try to change people's behaviour for the benefit of the planet, they might still be unwilling to change their current behaviour. This phenomenon also arises in something called the status quo bias, where people are found to have a tendency to stick to the status quo (Samuelson & Zeckhauser, 1988; Thaler & Sunstein, 2008). Marshall (2014) explains the origin of the status quo bias. He claims that it is a leftover of a very old natural system where animals have to be suspicious of novelty to survive, since the greatest risks for survival are found in novelty. This has caused that nowadays, in general, we still are sceptical of anything new and are very protective of our status quo. According to Harich (2010) resistance to change is even at the heart of sustainability problems. However, it is unclear if this plays such a large role in the waste separation problem as well.

Lastly, knowledge of and experience with recycling is said to be a significant explanatory factor (Thomas & Sharp, 2013; Gamba & Oskamp, 1994; Thomas, 2001). The current recycling process is very complex and not always straightforward (Moisander, 2007), which may affect the ability to act mentioned before. Therefore, it is reasonable to expect this to be a significantly influencing factor of recycling behaviour. However, despite many common findings, a considerable amount of contradictory findings exists on recycling behaviour and local variables might play an important role (Thomas & Sharp, 2006).

In sum, both the TPB and the norm activation model are well known models for explaining consumer behaviour and are also relevant in the environmental field. However, in their current form, these models have not proven to be capable of fully explaining waste separation behaviour. This likely stems from the fact that several other relevant variables are not captured by the models. Some of these variables have been found in supporting literature, others remain unknown. To further explore these other, related concepts that can supplant the existing models this thesis adopts a qualitative, exploratory approach. Therefore, with this research I aim to provide clear insights on the explanations of recycling behaviour, to reduce the current ambiguity in the field.

METHOD

In the following section I will explain the method used to find an answer to the research question: *How can current consumer waste separation behaviour be explained?* Data will be obtained through the use of 9 semi-structured interviews.

Since this research is exploratory in nature, a qualitative approach suits best. Semi-structured interviews are very suitable due to the ability to address specific issues, while maintaining some level of flexibility (Galletta, 2013). In contrast to quantitative research, interviews can provide direct insights into real-world practices (Bryman, 2008). The topic-based interview guide containing both main questions and corresponding sub-questions can be found in the appendix. To select interviewees purposeful sampling was used, which is a widely used technique in qualitative research which helps to select information-rich cases to cope with limited resources (Patton, 2014). The aim of this research is to explain current consumer waste separation behaviour. Therefore, a selection of 9 experts in the field of waste separation has been made. Waste separation is a complex environmental issue and thus it is important to take into account different types of knowledge (Olsson and Folke, 2001; Cash et al., 2003; Fabricius et al., 2006; Raymond et al., 2010). Therefore, special attention was put into creating a diverse sample of people in different types of organizations as well as on different levels within the organizations.

The sample consists of people from a non-profit organization, three waste processing firms, a university, and a municipality. In table 1 the descriptions of each participant can be found according to their participant number. To maintain a level of generalizability all organizations are (partly) located in the Netherlands and all interviewees were Dutch, hence the interviews were held in Dutch as well. This reduces complexity due to all organizations facing the same regulations and national culture regarding waste separation. The contact with the interviewees was established via e-mail and the interviews

#	Expertise	Organisation
1	Marketing/communication	Non-profit
2	Manager	Waste processor
3	Marketing/communication	Waste processor
4	Manager transport	Waste processor
5	Waste collection employee	Waste processor
6	Manager waste collection site	Waste processor
7	Waste policy employee	Municipality
8	Marketing/communication	Waste processor
9	Researcher/teacher	University

Table 1 Participant descriptions

were held in April and May of 2020 in the Netherlands. Due to the current corona crisis all interviews had to be done online. 7 of the interviews were done through either online video calling or online voice calling and 2 of the interviews were done via e-mail. The main advantage of online video calling is the ability to use social cues such as intonation and body language, giving the interviewer more information (Opdenakker, 2006). However in this case, the interviewee is an expert about topics and people that do not necessarily have anything to do with the expert himself, assuming the expert does separate their waste carefully, making the influence of social cues less important (Emans, 1986). Therefore, the lack of social cues during the email interviews is a less significant problem and has a low impact of the results (Opdenakker, 2006). However, with the use of email interviews, probing is much more difficult compared to online video calling, which can result in less elaborate and spontaneous answers by the interviewees (Opdenakker, 2006).

All interviews were held and coded by the researcher, a master student at the University of Groningen. Prior to the study no relationship existed between the researcher and the participants. All interviewees signed a consent form, of which an example is presented in the appendix. In these consent forms the participants gave consent to being recorded during the interview and it contains a brief introduction of the research and the purpose of the interview. The interview guide containing the interview questions can be found in the appendix. The interview questions were not available to the participants beforehand, to ensure spontaneous answers and to make sure the answers were original. If the participant has access to the questions beforehand, he or she has more time to reflect on the questions, reducing the chance of a spontaneous answer (Opdenakker, 2006). Each interview lasted approximately 30 minutes. After each interview these recordings were transcribed and coded to help establish proper results. The transcripts were send to the participants via e-mail to enable them to comment or correct them. This research builds on the methods of grounded theory, where data is collected with the aim of generating a theory (Maruster & Gijsenberg, 2013). This theory is then compared to existing theory to discover the extent to which they corroborate. Coding was done through Atlas.ti with the use of both open coding and list coding. The data collection and analysis followed an iterative process. First 5 interviews were held, transcribed, coded after which the codes were collected into groups to check the saturation level of the data. After this, the rest of the interviews were held until a reasonable level of saturation was achieved. The results of all 9 interviews were combined and will be presented in the next chapter.

RESULTS

In the following the chapter I will discuss the results of the data, after which I will compare this to the existing theory. The coding of the 9 interviews resulted in a total of 93 codes, of which an overview is available in the appendix. The top 10 most frequently used codes are presented in table 2. All 93 codes were grouped into 6 different code groups. Figure 5 displays the data structure, where for each group the two most frequent codes are displayed, as well as an example of a quote for each code. The groups and the number of codes per group are as follows: advantages (8), issues (30), losses if done poorly (9), motivation (23), solutions (26), awareness of consequences (5). A visualisation of these groups related to waste separation can be found in figure 4. The relatively low amount of codes in the groups advantages, losses if done poorly and awareness of consequences can be explained by the lower complexity of the issues addressed in these code groups. For example, the answers to the question concerning the advantages of waste separation got very similar answers from all interviewees, where they mostly mention circularity as the main advantage. The same goes for the category losses if done poorly, where most people mentioned the loss of materials as the main loss in the case of careless separation next to the increased expenses associated with it.

Code	Freq.
Communication	25
Knowing how to separate	19
Knowing where to separate	18
Complex	18
Circularity	18
Environmental awareness	18
Knowing why to separate	17
Improve behaviour	12
Loss of materials	12
Easy to dispose	10

Table 2 Code frequency

Figure 4 Code groups

The category awareness of consequences contains mixed answers. However, the number of possible answers to this question is limited by the relatively few answer options; being either a few, some or most people being said to be aware of the consequences of good or bad waste separation.

As can be seen in Table 2, the most frequently used code is 'communication'. All interviewees mentioned this code, either as an issue or as solution (or both, see figure 5). Interviewee

number 7, a waste policy employee at a municipality, names communication as the main issue regarding problems at the consumer side of waste separation: '*the most important things are still lack of information'.* Or as interviewee number 6, a waste collection site manager, said: *'It can also be a problem to get it between the ears of the citizens.*', meaning that it can be a problem to let the citizens know and think of the importance of waste separation and especially how to do it. Interviewee number 6 also mentions communication as being (part of) the solution to change current waste separation behaviour: '*I think communication of information plays a major role in this, not only for adults, but also especially for children, through projects at schools, activities of (sport) associations etc.'*. Based on the obtained data, communication issues can be a significant cause of poor waste separation behaviour by consumers. It often seems to be the case that information is not communicated clearly or not at all to the consumer. This can for at least a part be explained by the numerous groups the information has to be communicated to: *'[..] various age groups, various home types, different levels of knowledge of people with regards to waste separation.'*

As the aforementioned quote shows, not only communication is important. Knowledge, and in particular knowing how, where and why to separate is often mentioned as an important factor in waste separation behaviour by the interviewees. Communication can be used as a tool to increase knowledge on the subject of waste separation, creating an indirect link between communication and waste separation behaviour. One of the interviewees said he expects that at least part of the current poor waste separation behaviour can be explained by a lack of knowledge. A waste collection site employee even acknowledged that in her experience people have no idea what types of waste they bring to the waste collection site and therefore have no idea how to separate it. Interviewee number 9 gives a good example of this issue: '*For example teabags, that those contain plastic, which no one knows and that you cannot throw those in your compost bin'*. A question that comes to mind with this issue is, however, whose responsibility this is. Should the consumer's knowledge increase or should the waste separation of products be simplified?

After all, complexity was mentioned 18 times. The focus here was mostly on the complexity of the waste separation itself on the consumer side. The interviewees referred to, among other aspects, the complexity and lacking transparency of the materials. The products we use today are made of many complex materials which can be difficult to identify. If these materials are identified incorrectly, they will be separated wrong. This has also led to the mentioning of

producer responsibility 8 times: *'I mainly think something should change in the supply of products and the processing thereof.*' Complexity not only exists due to the lacking transparency of the materials, it is also increased by the many waste streams that currently exist in the Netherlands. Especially in the areas where municipalities apply separation at the source (e.g. the consumer), consumers are faced with an incredible amount of waste streams. For recycling purposes it is better to have as many materials separated as possible, but for the consumer it can be a challenge to discover which materials they collected and how to dispose of them.

It is not strange for municipalities and waste processors to focus on improving recycling, since circularity was often mentioned as the main advantage of waste separation: '*If you separate carefully, you can make new products out of it in the end.*' Unsurprisingly, the most often mentioned disadvantage of poor waste separation is loss of materials. Oftentimes it is even the mission of waste processors to create a circular economy, which makes sense since it is not only good for the planet, it also reduces their costs if they are able to sell the recycled materials. However, if the materials are not separated carefully, costs will increase. As a waste collection site employee explained, if a container contains mixed waste, the employees will have to separate it to avoid that the entire contents of the container have to be burned. This is of course more costly than if the consumer separated the waste carefully in the first place. Therefore, it seems a balance exists between the number of waste streams and what you can ask of consumers. Too many waste streams increase complexity and therefore reduce careful waste separation, but too few waste streams reduce circularity.

A certain level of consensus does seem to exist on the fact that current waste separation behaviour should be improved, as this code came across 12 times. However, these do not seem to be desperate cries for help, since the current level of waste separation behaviour is already quite satisfactory in the Netherlands: *'Yes, in principle it goes very well, but there's always room for improvement.*' A key aspect in improving waste separation behaviour seems to be easiness of waste disposal. Most interviewees mentioned easiness in one way or another. As a response to the question of what motivates people to separate their waste, interviewee number 1 answered as follows: '*A small part out of faith, but by far the most do it when it's easy.'* This links back to the complexity of the numerous waste streams and the wish of the consumer to not put any effort into the separation of their waste.

Generally speaking, consumers can be split up into two groups. According to the data a minority exists, consisting of people who are more environmentally aware and separate their waste carefully and a majority who do not invest as much time in waste separation and focus mainly on easiness and financial stimulus. As interviewee number 6 said: *'There are people who are very aware of their waste [..]. Another category does it because of the financial stimulus of DIFTAR.*' Within the first group not much direction is needed. The second group, however, still has room for improvement regarding their waste separation behaviour. This is where communication is often presented as a solution, where the second group is the main target. One of the main challenges here is to target the entire second group, which consists of many very different subgroups, with differing knowledge levels and differing housing situations. These subgroups can be caused by culture, but also by geographical distinctions. Currently, Dutch waste policy is determined on a municipality level, causing multiple policies to exist within the country separated by municipality borders. This can cause confusion at the consumer level: *'There are quite a lot of different ways, which makes it simply confusing for the consumers.*' The question arises on how to improve this situation. Should we create a national waste separation policy or stick to the local approach? No consensus seems to exist between the interviewees. Therefore, this is a good opening for further research. All in all, the circle seems to lead back to communication, which will be discussed further in the discussion and recommendations section.

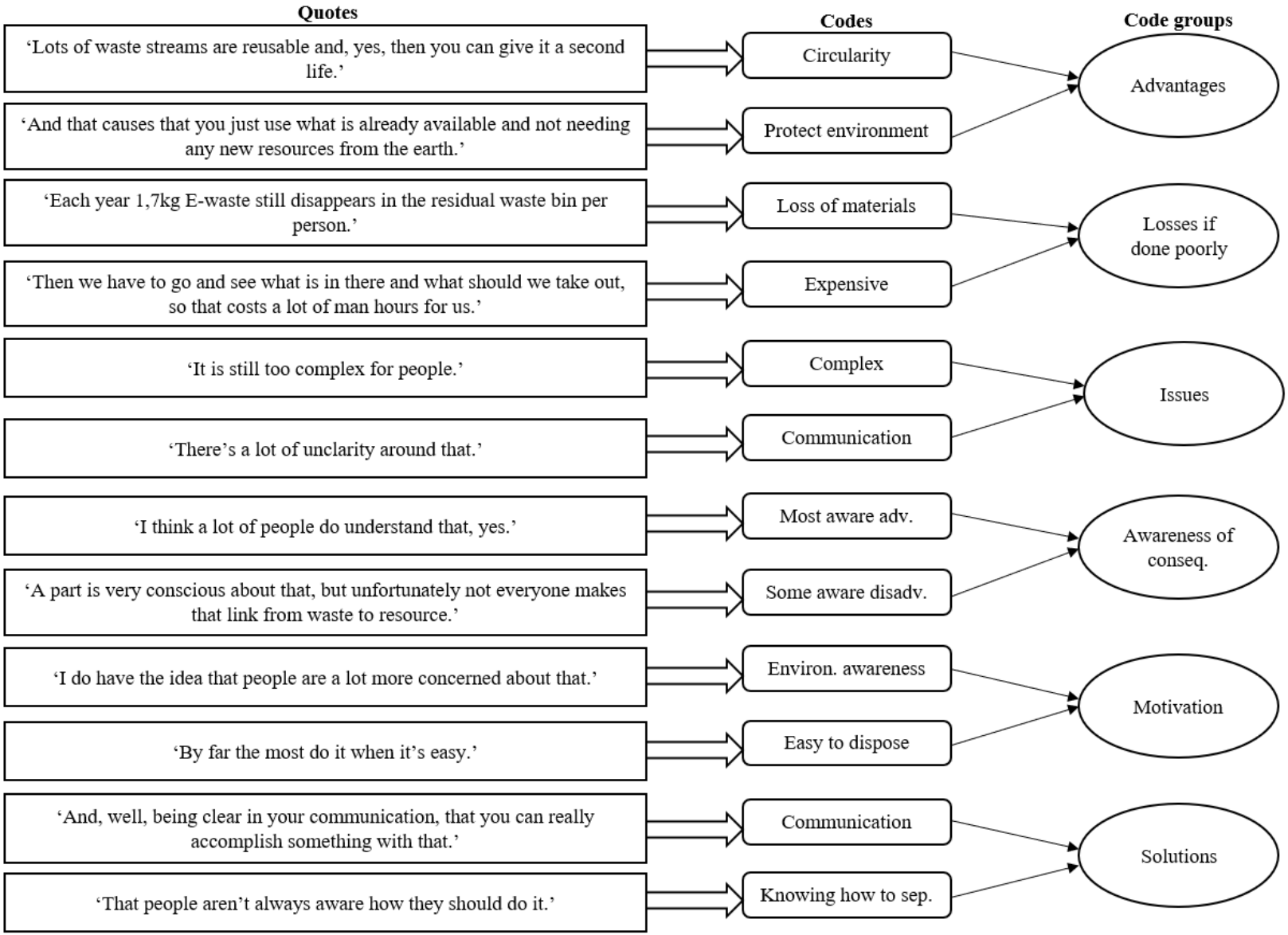

Figure 5 Data structure

DISCUSSION & RECOMMENDATIONS

In the following chapter I will discuss the results in relation to the existing theory to check if they align and if there are any unexpected findings. After this discussion I will present some recommendations on how to improve consumer waste separation behaviour. Lastly, I will briefly discuss the limitations of the research.

Theory of planned behaviour

According to the theory of planned behaviour the intention to perform a certain behaviour is influenced by the attitude towards the behaviour, the social norm and perceived behavioural control. Based on the interviews the attitude of consumers towards waste separation is quite positive. However, there do seem to be other issues preventing many people to properly separate their waste. With regards to the social norm, it is difficult to shape a sound conclusion. In general it seems to be either neutral or positive, but it also depends on the target group. However, further research is necessary to make stronger statements on this. As mentioned in the theory section, perceived behavioural control refers to the perceived level of difficulty of the behaviour. The presentation of the results showed that easiness is a significant factor in determining whether people separate their waste or not. This could mean that people often perceive waste separation as too difficult and therefore do not, or at least not very well, separate their waste. In sum, the theory of planned behaviour covers some of the explanations that were raised by the interviewees. However, it did not cover all of them; other factors are involved as well. In addition, the difficulty of explaining the behaviour increases by the existence of many subgroups in the Netherlands having different approaches to waste separation. Thus, in order to find the full explanation for current waste separation behaviour, it is important to look at the other relevant variables apart from the theory of planned behaviour.

Norm activation model

A model that possibly captures these other factors is the norm activation model, since waste separation is beneficial for the collective and not necessarily for the individual. As mentioned before the model is based on two conditions: (1) people need to be aware of the consequences of their behaviour and (2) they attribute the responsibility of these consequences to themselves. The interviewees gave mixed answers to the questions concerning the awareness of the consequences of good and poor waste separation. Thus, it is difficult to make a statement on

this and further research is necessary. This applies to the attribution of the consequences as well. It remains unclear whether people feel responsible for their waste. In addition, some debate arose on the topic of who is responsible for the current waste separation issues, the consumer or the producer? Therefore, this is an interesting topic for further research, where a larger sample and perhaps a quantitative analysis might be a good addition. The norm activation model also seems to have higher explanatory power for subgroups of the population and is more difficult to fit to the entire population. This can be a possible explanation for the mixed results on the factors of the norm activation model. All in all, this model does not seem to capture the entire explanation of waste separation behaviour.

Environmental concern, knowledge and complexity

The matter of environmental concern does seem to have a positive effect on consumer recycling behaviour. The experts interviewed in this research seem to be in agreement on environmental concern playing a role in explaining recycling behaviour. Environmental concern might also be captured by the attitude toward the behaviour in the TPB, since an environmentally concerned person probably has a positive attitude toward waste separation. Multiple interviewees talked about a small group of people being very environmentally concerned and therefore take great care in separating their waste, while this is still lacking with most other people. On the other hand, the intention to recycle is, according to the experts, quite high. This could mean that the other group is also environmentally aware, but they have other priorities. This would be in line with the research of Martin, Williams and Clark (2006), where they found that despite a high willingness to recycle, people did not often actually do it.

These barriers might have something to do with the facilitation of waste separation, since this was mentioned quite a few times during the interviews. The facilitation of waste separation can possibly be improved by better and more frequent communication, since it seems unclarity is often a problem. This could mean that the facilitation itself is not poor, but the communication is. Interestingly, resistance to change was not mentioned as often as expected. It might still be true that people are resistant to change, but the interviewees gave the indication that clear communication can overcome this resistance. Lastly, the findings agree with the previous research on the relevance of knowledge and complexity. Both were mentioned many times during the interviews, where again communication seems to be the solution. To conclude, the TPB seems to capture the largest part of the explanation of current waste separation behaviour. The norm activation model and TPB can be supplanted by recent research into environmental

concern, knowledge and complexity. However, an overarching variable relating to multiple factors remains missing: communication. Communication relates to all factors of both TPB and the norm activation model, but by excluding it from the models it can easily be overlooked. By focusing on improving communication, it might be possible to improve the other relevant factors too, creating a chain reaction. Further research into waste separation behaviour should include communication as an important variable in their models.

A question that comes to mind in this case, is if all we have to do is communicate better, why has not anyone done so yet? How can such a significant problem be solved so easily? The communication in question is the communication between experts and citizens. According to Christiano (2012) a division of labour exists between these two parties, where a few experts have the necessary knowledge instead of every single citizen. It would be impossible to manage a country if every single person had to know everything about everything. Christiano even claims that such a division of labour is necessary for policy-making.[2] This communication can become problematic if the two parties do not understand each other. Scott (1998) argues that communication between the parties may be inherently problematic. Experts think and communicate in epistemic knowledge, which is strictly rational and general. By contrast, citizens tend to rely on what he calls 'metis', a local, specific type of knowledge based on long-standing traditions and encoded rituals that is very similar to tacit knowledge[3]. This can cause miscommunications to arise, since the experts and the citizens do not always speak the same language. Therefore, it might be useful to find a solution to bridge this language barrier.

Recommendations

In this section I will give some recommendations on how to improve communication between those who want to improve waste separation behaviour and the consumer. As mentioned before, it is possible that the current communication lacks clarity and understandability. In the end, the goal is to change consumer behaviour and go up on the steps of the waste hierarchy, the question is how to achieve this. Waste separation involves several issues making it a difficult problem to address. Firstly, waste separation is often perceived as complex, making decisions difficult. Thus, a simple list with instructions probably will not be enough to achieve significant change.

[2] Note that both Christiano and Scott conduct their analysis in the context of Western, industrialised societies where such divisions of labour occur naturally.

[3] Similar communication issues arise within companies, for instance between tacit and explicit knowledge and the introduction of foreign knowledge during the innovation process (Faber & Jorna, 2005)

Secondly, people encounter a lot of materials very occasionally, making the waste separation decisions for these materials rare. This means that even if you provide instructions for these materials, citizens are likely to have forgotten them by the time they need them. Thirdly, consumers usually do not get feedback or only very late, because the influence of one person separating poorly is very small. Meaning that if one person separates incorrectly, it is unlikely to have a large influence on the whole. Lastly, the complexity of waste separation makes it difficult to translate all necessary information into understandable terms relevant to the waste separation decision. Therefore, even if it would be helpful to provide a simple list with instructions, it would be very hard to create such a list.

However, a popular method for changing consumer behaviour is based on nudge theory. According to Thaler and Sunstein (2008) nudges are useful when decisions are difficult and rare, for which prompt feedback is lacking, and for situations where people have trouble translating all aspects into terms they can understand. This is exactly the case in waste separation. Therefore, it is a possibility that with the use of nudging the group of people that currently separates their waste poorly can be reached. Nudges are based on the distinction between the automatic and the reflective systems in our brains (Thaler & Sunstein, 2008). These are two ways of thinking, where the automatic system is uncontrolled, fast and unconscious, and the reflective system is controlled, slow and self-aware. In short, it is the difference between a reflex and a well-thought out action. The goal of nudges is to increase the activity of the automatic system, so people can rely more on this reflexive system.

Nudge theory has been defined and popularized by Thaler and Sunstein in 2008 in their book ‘Nudge: Improving Decisions About Health, Wealth, and Happiness’. However, nudge theory has found its origins for a large part in prospect theory, which was first defined and presented by Kahneman and Tversky in an article in 1979. Kahneman and Tversky present prospect theory as a behavioural economic theory describing the decision-making process when someone has to decide between probabilistic outcomes involving risk of which the probability is known. In their article the authors claim that the decision depends not on the final outcome, but rather on the potential gains and losses. Nudge theory builds on this concept by explaining how prospect theory can be used to guide decision-making behaviour. Thaler and Sunstein in their book define a nudge as: ´Any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives’ (Thaler & Sunstein, 2008, p. 6). The most notable element of this

definition is that a nudge should not forbid any options. Therefore, a law forbidding a certain choice is not a nudge. An example of a nudge that might be useful to change waste separation behaviour is the use of signs at waste separation sites clarifying the risks or benefits associated with waste separation.

Implementation on a larger scale raises an important follow-up question that was already touched upon by some interviewees. Should nudges be standardised and implemented on the national level, or will they be more effective if they are left to the discretion of the municipality so they can be adapted to local circumstances? A national approach would involve epistemic knowledge, which is easier to transmit. However, this leaves little room for local adaptions and can therefore have a limited effect. A local approach fits with metis, which will likely be more effective. However, this is much more difficult to implement, due to the complexity and low transferability of metis. Therefore, more research is needed into the national and local approach with regards to the implementation of nudges in waste separation.

Limitations

The most significant limitation of this research is the relatively small sample of 9 interviewees. For some topics saturation has been achieved, however, for other topics a larger sample would have been more appropriate. This was unfortunately not possible due to time constraints. The smaller sample will likely have an effect on the generalizability of the results and thus further research would be beneficial. In addition, all interviews were with Dutch people and applied to Dutch culture and standards. Therefore, the results are likely not generalizable across borders. Besides that, due to the current circumstances concerning COVID-19, all interviews were held online. This may have created a barrier between the interviewer and the interviewee, which in turn may have impacted the results. Lastly, the interviews were coded by a single researcher. This might have caused an influence of any personal judgements, sentiments or ideas of the interviewer on the results and created a small bias (Polonsky, 1988).

Further research

This exploratory qualitative research is a starting point for further research. It forms a basis from which additional research can start off with regards to waste separation behaviour. A good option would be to perform additional quantitative research, which can, for example, be done with the use of survey data. The current qualitative analysis cannot make any claims on

causality between the variables. This gap can be filled with a quantitative analysis based on the results of this study. Another option for further research is to increase the sample of this study, making the results more generalizable. Additionally, performing in-person interviews might enhance the results too. However, the options for this are currently very limited.

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APPENDIX A

Consent form

Toestemmingsformulier

Uw toestemming en begrip om deel te nemen aan een kwalitatief onderzoek betreffende oorzaken achter het gedrag van consumenten rondom het scheiden van afval

Beste deelnemer,

U bent uitgenodigd om deel te nemen aan een interview als onderdeel van een master scriptie binnen het masterprogramma Sustainable Entrepreneurship op Campus Fryslân, Rijksuniversiteit Groningen.

Het interview heeft als doel een onderzoek uit te voeren dat gericht is op het identificeren van de oorzaken achter het huidige gedrag van consumenten rondom het scheiden van afval.

Door in te stemmen met dit interview, erkent u en gaat u akkoord met het volgende:

- Ik heb voldoende informatie gekregen over dit onderzoek en snap mijn rol hierin. Het doel van mijn deelname als geïnterviewde in dit project en het toekomstige verwerken van mijn persoonlijke data zijn aan mij uitgelegd en zijn duidelijk.

- Mijn deelname aan dit interview is volledig vrijwillig. Er is geen expliciete of impliciete dwang om deel te nemen.

- Deelname omvat het geïnterviewd worden door een student van de Rijksuniversiteit Groningen. Ik geef de interviewer toestemming om aantekeningen te maken tijdens het interview. Ik sta ook toe dat het interview opgenomen wordt door middel van een audio of video opname. Het is voor mij duidelijk dat in het geval dat ik niet wil dat het interview wordt opgenomen, ik het recht heb om mij terug te trekken uit deelname aan het onderzoek.

- Opname en transcriptie worden niet voor andere doeleinden gebruikt dan het uitvoeren van het onderzoek en het voorbereiden van een artikel over dit onderwerp. De data zal enkel beschikbaar zijn voor de onderzoeker, de scriptie begeleider en de tweede beoordelaar. Het definitieve onderzoeksrapport zal worden gepubliceerd binnen de scriptie database van de Rijksuniversiteit Groningen en zal daardoor beschikbaar zijn binnen deze academische omgeving. Hierbij zal extra aandacht worden besteed aan het anonimiseren van de data.

- Ik heb het recht om vragen niet te beantwoorden. Ik mag op elk moment stoppen met het interview, waarbij de eerder verzamelde data tijdens het interview op aanvraag verwijderd zullen worden.

- Mijn gegevens zullen volledig worden geanonimiseerd, waarbij zorgvuldig aandacht wordt besteedt aan het niet-traceerbaar maken van de deelnemers. De data zullen worden behandeld volgens de richtlijnen van de Rijksuniversiteit Groningen.

- Ik heb dit toestemmingsformulier zorgvuldig gelezen en begrijp de inhoud volledig.

Dit interview wordt ondersteund door de begeleider van de student:

Dr. ir. N.R. Faber
n.r.faber@rug.nl
Rijksuniversiteit Groningen, Campus Fryslân

Geïnterviewde:

Datum: _____

Handtekening: _____

Interviewer:

Datum:_____

Handtekening:_____

APPENDIX B

Interview guide - Dutch

Beste deelnemer,

Allereerst bedankt dat u wilt deelnemen aan dit interview. Mijn naam is Miriam en ik studeer op het moment de master Sustainable Entrepreneurship aan de rijksuniversiteit Groningen. Voor die opleiding ben ik nu bezig met het schrijven van mijn master scriptie, welke gaat over het scheiden van afval door consumenten. Hierbij ligt de focus vooral op de reden van de keuze om wel of niet afval te scheiden. Hiervoor zal ik meerdere mensen interviewen met kennis op het gebied van afvalscheiding. Dit interview zal naar verwachting ongeveer 30 minuten in beslag nemen. Om de resultaten van het interview zo goed mogelijk te verwerken, wordt het interview opgenomen en later uitgeschreven. De resultaten zullen volledig anoniem blijven en alleen ikzelf, mijn begeleider en eventueel de tweede beoordelaar zullen toegang hebben tot de ruwe data.

Algemeen

1. Kunt u zich kort voorstellen?
    a. Wat doet u in het dagelijks leven?
    b. Wat houdt deze functie in?

Afvalscheiding

2.Wat zijn volgens u de grootste voordelen van afval scheiden?
    a. Denkt u dat de meeste mensen hier van op de hoogte zijn?
3. Wat zijn volgens u de grootste nadelen van afval incorrect scheiden?
    a. Denkt u dat mensen op de hoogte zijn van deze consequenties?
4. Wat is uw mening over de manier waarop mensen in Nederland omgaan met afval scheiden?
    a. Denkt u dat mensen hun afval beter zouden moeten scheiden?
    b. Hoe komt u bij deze mening?
5. Welke knelpunten zijn er volgens u bij afvalscheiding?
    a. Welke heeft prioriteit?
    b. Kunt u een voorbeeld noemen?
6. Welke problemen omtrent afvalscheiding ziet u als gevolg van wet- en regelgeving?
    a. Kunt u een voorbeeld noemen?

7. Welke problemen omtrent afvalscheiding ziet u als gevolg van huidige recycling technologie?

    a. Ziet u dat veranderen in de nabije toekomst?

    b. Kunt u een voorbeeld noemen?

8. Ziet u het scheiden van afval als complex, en zo ja op welke manier?

    a. Zo ja, kunt u een voorbeeld noemen?

    b. Bent u zelf bekend met de exacte regels rondom afvalscheiding?

Consumentengedrag

9. Welke problemen omtrent afvalscheiding ziet u bij de consument?

10. Waarom scheiden mensen, volgens u, hun afval? (intrinsiek/extrinsiek)

    a. Op welke manier komt u dit tegen in de praktijk?

    b. Denkt u dat mensen zich verantwoordelijk voelen voor hun afval?

11. Wat is, volgens u, de houding van anderen tegenover afvalscheiding?

    a. Wat is, volgens u, de huidige sociale norm rondom afvalscheiding?

12. Zou het huidige gedrag rondom afvalscheiding moeten veranderen?

    a. Hoe zou het moeten veranderen?

13. Denkt u dat het moeilijk is om het gedrag van mensen rondom afvalscheiding te veranderen en waarom?

    a. Wat moet er worden gedaan om het te veranderen?

Nogmaals hartelijk dank voor uw deelname. Ter herhaling: het interview is opgenomen en deze zal ik nu gaan transcriberen. Zodra dat klaar is zal ik de tekst naar u sturen, zodat u de mogelijkheid heeft om opmerkingen te maken. Indien u opmerkingen heeft, hoor ik die graag en zal ik ze verwerken. Zo niet, dan ga ik ervan uit dat u akkoord bent.

APPENDIX C

Interview guide – English

Dear participant,

First of all, thank you for taking part in this interview. My name is Miriam and I am currently studying the master Sustainable Entrepreneurship at the University of Groningen. For this program I am currently writing my master's thesis, which is about the separation of waste by consumers. The focus is mainly on the explanation of the choice whether or not to separate waste. For this I will interview several people with knowledge in the field of waste separation. This interview is expected to take approximately 30 minutes. In order to process the results of the interview as well as possible, the interview is recorded and later transcribed. The results will remain completely anonymous and only myself, my supervisor and possibly the second assessor will have access to the raw data.

General

1. Can you briefly introduce yourself?
    a. What do you do in daily life?
    b. What does this function entail?

Waste separation

2. What do you think are the greatest benefits of separating waste?
    a. Do you think most people are aware of this?
3. What do you think are the biggest drawbacks of waste separation?
    a. Do you think people are aware of these consequences?
4. What is your opinion on the way in which people in the Netherlands deal with waste separation?
    a. Do you think people should better separate their waste?
    b. How did you get this opinion?
5. What bottlenecks do you think there are with waste separation?
    a. Which has priority?
    b. Can you give an example?
6. What problems regarding waste separation do you see as a result of laws and regulations?
    a. Can you give an example?
7. What problems regarding waste separation do you see as a result of current recycling technology?

a. Do you see that changing in the near future?

b. Can you give an example?

8. Do you see the separation of waste as complex, and if so, how?

a. If yes, can you give an example?

b. Are you familiar with the exact rules regarding waste separation?

Consumer behaviour

9. What problems with waste separation do you see with the consumer?

10. Why do you think people separate their waste? (intrinsic / extrinsic)

a. How do you come across this in practice?

b. Do you think people feel responsible for their waste?

11. What do you think is the attitude of others towards waste separation?

a. What do you think is the current social standard for waste separation?

12. Should the current behaviour surrounding waste separation change?

a. How should it change?

13. Do you think it is difficult to change people's behaviour concering waste separation and why?

a. What needs to be done to change it?

Thank you again for your participation. To repeat: the interview has been recorded and I will now transcribe it. As soon as that is done I will send the text to you so that you have the opportunity to comment. If you have any comments, please let me know and I will process them. If not, I will assume that you agree.

APPENDIX D

Transcripts

To ensure anonymity of the participants, the transcripts are excluded from this paper. Transcripts of the interviews are available upon request from the researcher.

APPENDIX E

List of codes

Ability of citizen	Job creation
Age	Knowing how to separate
Bigger role employee	Knowing where to separate
Biogas	Knowing why separate
Careless separation	Lack of responsibility
Characteristics of recycled material	Lack of space
Cheap way to dispose	Lack of time
Circularity	Lack of urgency
Clear policy	Lacking regulation
Collective action	Large amount of waste
Communication	Laziness
Complex	Less work for waste processor
Consumer responsibility	Littering
Consumerism	Local policy
Convincing story	Location of people
Cost reduction consumer	Long-term perspective
Cost reduction municipality	Loss of materials
Disposal of separated waste	Low effort
Downcycling	Low individual impact
Easy to dispose	Make cheap
Energy intensive	Make easy
Environmental awareness	Many target audiences
Environmental reasons	Marketing
Expensive	Mixed waste
Facilitating waste separation	Most aware advantages
Fear of missing out	No central knowledge
Feeling of responsibility	No short term profit
Feels good	Not common yet
Few aware advantages	Political pressure
Few aware disadvantages	Positive social norm
Fire hazard	Prioritize hazardous waste
Future generations	Producer responsibility
Government should pay attention	Protect environment
Greenwashing	Recycling complex
Growth based	Resistance to change
Habit	Reward good behaviour
Harmful for the environment	Single national policy
Hesitant to ask for help	Snowball effect
High innovation	Some aware advantages
High intention	Some aware disadvantages
Home/work behaviour differs	Supply chain communication
Improve behaviour	Time consuming change
Improve well-being	Transparency
Inconsistent policy	Virgin is cheaper
Increased effort waste processor	Visibility
Increasing difficulty	Welfare
Internal motivation	