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Increasing High Recycling Rates

Socio-demographics as an additional layer of information to improve waste management

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"Rather than trying to change us, brands have worked out what makes us tick"

Hawksworth (2014), British Sustainability Brand Communicator

What makes us[1] recycle?

According to practitioners in Sweden recycling has to be convenient and practical. There ought to be sufficient space for recyclables at home and information shall ideally be adjusted to different socio-demographic groups.

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[1] Us stands for people living in Sweden, representing the Swedish population

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.. all the friends of mine that spend time listening to my interest in the topic of household waste recycling. You inspired me with your personal experiences and perceptions and allowed me to understand and take your perspective.

Abstract

In Sweden, household waste is separated at the source, making the success of the recycling system largely depending on the active participation of households. In a well-established recycling system with functioning recycling infrastructure and information, the conditions for 'recyclers' and 'non-recyclers' are akin, indicating the external conditions, recycling infrastructure and information, not to be the solely determinants for households' participation in recycling activities. The research aims thus to examine the relevance of the characteristics approximated by socio-demographic parameters and hence, gathers research on implications of socio-demographics on recycling behaviour. The findings are validated on their practical applicability with the help of practitioners and researchers in the context of waste management in Sweden. The research conducted, indicates that the engagement with external factors is mainly affected by the parameters income and age, whereas the formulation of attitude is influenced by a wider range of socio-demographics such as level of education, age, financial stability, political allegiance, type of dwelling, unemployment, gender but also cultural aspects. The development of habits showed the least correlation to socio-demographic parameters. These insights allow drawing the following conclusions: Income could be related to the type of dwelling and with that which collection mode is used, giving indications on the transparency of households' activities; Cultural aspects can influence recycling behaviour but it was recognised a need to distinguish between characteristics of different cultures to determine the relevance of this factor; Age influences physical capabilities but can also provide hints on which media is used to acquire information; Children in particular were seen to have potential as future recyclers, calling for an adjustment of the recycling infrastructure in order to meet higher safety demands.

Keywords: recycling, social marketing, user perspective of recycling, waste separation at the source.

Executive summary

In Sweden, household waste is separated at the source, making the success of the recycling system largely depending on the active participation of households. This system, hence, appears to particularly benefit from a better understanding of how households engage with the recycling system in order to promote recycling activities. An abundance of academic research is available on determinants of recycling behaviour, stating convenience, concern for the environment, moral norms and information to be of highest relevance in contributing to recycling behaviour. Theories within the social and behaviour sciences explain recycling behaviour to be a function of external conditions, personal capabilities, attitudes and habits (Stern, 2000).

Waste management organisations make use of these findings and translate them into system solutions appropriate for the local context. Information is partly adjusted to different socio-demographic groups such as students or immigrant whereas recycling infrastructure is rather adapting characteristics of the spatial scope, resulting in households using different recycling collection modes (private kerbside collection of different fractions, close-by recycling station or central recycling station). Non-recyclers habituate the same environment as recyclers but behave different despite the similar external conditions, pinpointing to a need to understand what makes people behave differently. Progressively, also socio-demographic differences and the characteristics of the users of a recycling system are taken into account by waste management organisations. Academic research, however, rarely examines the implications of householders' characteristics of users. Socio-demographic variables are a rewarding approximation of users' characteristics as this data is readily available at municipal statistical agencies. The aim of this research was therefore to gather knowledge on socio-demographics and derive practical recommendations on how to engage with different socio-demographic groups.

Method

Literature within the waste management and social science domain provided with the framework used in this research and structured the desktop research on correlations between socio-demographics and behavioural factors. This first step resulted in a list of socio-demographics showing effects on attitude towards recycling, establishment of recycling habits and the interaction with recycling infrastructure and information. In a second step, these findings were confronted with practical experiences from Swedish practitioners, representing observations of local waste management organisations as well as practitioners of a Scania-based pilot project on waste reduction and recycling strategies for different socio-demographic groups, as well as reports published by the Swedish waste association Avfall Sverige. Additionally, interviews with a range of recycling experts, conducting research on recycling behaviour, but also representatives from immigrant associations as well as local housing companies pinpointed to important issues and supported the formulation of recommendations for different socio-demographic groups.

Results

Summarising the results from the first step, it was seen that income and age showed effects on the interaction with external conditions, whereas attitude could be related to a range of socio-demographic factors: level of education, age, financial stability, political allegiance, type of dwelling, unemployment, gender as well as cultural aspects. Habits seemed to be related the least to socio-demographics, but were seen to be influenced by age, type of housing,

gender and cultural aspects. It was observed that there is a lack of knowledge on particularly cultural aspects and their implications on recycling behaviour, whereas the factors such as age, gender and income were well examined and outlined in academic research.

Recommendations

Income was seen to function as a good approximate for the type of dwelling which in turn can indicate which infrastructure is available. So do higher income households more likely possess a car, allowing for rides to further located recycling stations. This group is also generally better educated and thus more prone to make use of information located in the 'think' realm. Well-educated expats that immigrated to Sweden for a certain job position are likely to be reached via language schools for Swedish language or their employers. Lower-income households have more pressing financial issues, assigning recycling activities a lower priority. This group is also seen to generate more plastic packaging waste in relation to higher-income households. With that, education on plastic packaging recycling seems to be an important measure for this group. This group also accounts for students that live in student accommodation: here measures should focus on maintaining a high recycling moral and introducing the students on the how to recycle. Competitions with financial rewards appear to be effective for the low-income group with strong social cohesion and high transparency of individuals' activities. Recycling ambassadors that are located within strong social groups can have a wide scope of influence, making them particularly effective for this group. Higher income households that live in (detached) houses have kerbside collection with the waste collector 'controlling' their activities, whereas multi-occupancy buildings share recycling collection houses with others, making it less transparent to control the actions of the individual. Control mechanisms seem therefore rather important for these households sharing facilities.

Regarding age, it could be seen that particularly education of children on recycling activities has far-reaching effects: they can act as ambassadors on recycling issues in their own homes, educating and pushing the parents to behave in the way they learnt to behave, and with that reaching families that have children; furthermore, early education helps to establish a recycling habit and internalises the norm to recycle for their later life. Potential seems to lie in the design of recycling infrastructure. It was seen that safety, hygiene and accessibility of recycling stations could be improved, to integrate children better into this kind of household activity. Elderly people seem to be especially deterred from distance, but they usually present a pro-environmental attitude and have well-established habits. They can be reached via traditional written media but are less open-minded to constant changes in the recycling system, such as changing collection systems and separation modes. A fruitful group seems to be the group around 30 with a 'green' mindset, willing to decrease their impact and might therefore be an interesting target group for pilot project on for example new collection modes.

When it comes to gender it was noted that the explaining force of gender is rather limited. Men were seen to have a less strongly developed pro-environmental attitude, which can constitute a problem for a single living male whose actions are rather invisible to others. Applying some form of control or activating this group in competitions where recycling activities are visible to others seems to be a sound strategy for this group.

When it comes to the relevance of cultural aspects in explaining recycling behaviour it was seen that this issue was rather sparsely investigated. Recent research had been investigating the behaviour of immigrants and detected an initial low participation, which shortly after

increased to rates of a Swedish citizen. There is however a need expressed to adjust information to immigrants, which is in most cases in Sweden done. A further analysis resulted on the other hand into other cultural differences which could have implications on behaviour: these are religious-related hygiene-requirements that might deter individuals from collecting recyclables at home as waste is associated with dirt and disease. Another issue mentioned is that in some countries, waste collection is conducted by the poorer among the society, assigning the activity a value with which these individuals do not want to identify with. Here it seems important to raise the reputation of this activity. Furthermore, do some cultures assign food an important social value, hospitality is shown through great amounts of food, which in turn can result in higher amounts of food waste created. Food waste recycling seems to be especially important to this group. Then, it could be seen that some cultures have less democratic societal systems with their citizens either obeying government without questioning imposed rules or such that do not trust their corruptive governments. It was noted that these citizens that derive from countries with corruptive governments perceive impersonal information, such as brochures, as untrustworthy. Here local ambassadors might be the better communication strategy for recycling issues. Lastly, it was noted that some cultures make use of gender roles and assign household activities to the female part. Here these females should be targeted when it comes to information material on how and why to recycle.

To conclude, the research harnessed the existing knowledge on the relevance of different socio-demographic parameters, scattered in different domains of social science and waste management. The theoretical knowledge presented indications of socio-demographic factors on recycling behaviour, which served as foundation for the practical recommendations addressing different socio-demographic groups. The suggestions predominantly concern with adjusted information and involve to a lesser extent a tailoring of recycling infrastructure. Analysing the socio-demographics of the administrative scope of a waste management organisations is deemed of high relevance in order to, in a second step, decide which socio-demographic groups to prioritise and address. This research would have furthermore benefitted from greater depth in knowledge on which socio-demographics have implications on factors of recycling behaviour such as attitudes, habits and external conditions, encouraging academic research to explore this issue further. At the same token, there is a need to understand better whether the results from this research apply to all recyclables or if there are differences in behaviour for different fractions by different socio-demographic groups.

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1 Introduction

With a growing world population and more unsustainable consumption patterns, more waste is generated and more resources are used. The variety of materials compounded in products has increased, complicating material recycling. Different urban waste management systems have emerged, ranging from centralised collection to decentralised, locally organised material recycling with scavengers collecting and separating valuable recyclable within household waste.

In Sweden, household waste is separated at the source. The fractions are either collected at the kerbside, accounting for 9% of the single-family dwellings and approximately half of the multi-occupancy buildings[2] (Fråne et al., 2014: 79), or brought to unmanned recycling points and/or central recycling stations. A different model would be to collect household waste as a mix of different materials and subsequent separation at material recovery facilities (MRF) (see Figure 1).

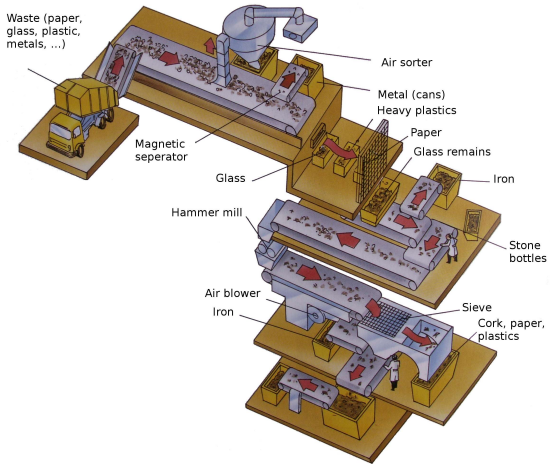

Figure 1 - Material Recovery Facility. "Non-selective domestic waste sorting machine" by KVDP - Own work. Licensed under Public domain via Wikimedia Commons.

The Swedish waste management system entails different actors such as, for instance, operators collecting domestic waste, waste treatment facilities that incinerate collected waste and material recycling facilities that prepare collected materials for subsequent reuse. Real equity companies are often involved in achieving goals, opting for new measures (for example the introduction of food waste collection) or adjusting the recycling infrastructure.

Contextual differences among municipalities and different regional strategies have resulted in differences in recycling infrastructure, information provided, economic incentives but also recycling rates achieved. For the year 2010 Sweden reached a recycling rate of 49% and with that almost reaching the year 2020 target of 50%[3] as stated in the European Framework Directive on Waste (EEA & ETC/SCP, 2013). Sweden thus belongs to the forerunners in Europe in that respect (Söderholm, 2010). Notwithstanding the maturity of the Swedish recycling system, the importance of an appealing recycling system that enhances material recycling is being acknowledged in the national 'Sweden's Waste Plan 2012-2017' (Naturvårdsverket, 2012:65).

Historically, waste management in Sweden has been supported by national legislation on recycling: in 1994, the *extended producer responsibility* was introduced, charging newly formed Producer Responsibility Organisations (PRO) with the task to set up collection infrastructure for packaging materials and newspapers. Nowadays *extended producer responsibility* legislation in Sweden covers not only packaging and paper, but also cars, tyres, batteries, pharmaceuticals, as well as electrical and electronic products (EEA & ETC/SCP, 2013). With the introduction of the Landfill Directive in 1999 landfilling was no longer a viable option. The Directive

[2] Numbers presented apply to the collection of packaging materials and newsprint.

[3] The European Framework Directive on Waste requires a recycling quota of at least 50% by weight for all materials including food waste for 2020.

resulted in a dramatic decrease in the total waste being landfilled (1% of the total waste was landfilled in 2010) and an increase of waste being incinerated (with energy recovery) and recycled (Naturvårdsverket, 2012).

1.1 Problem definition

As noted above, Sweden does present a high recycling rate, indicating the established recycling system to comprise of well-functioning components (e.g. infrastructure, extended producer responsibility) allowing almost half of the household waste to be recycled. Even though individuals inhabiting the same environment have access to the same recycling infrastructure and information on how to recycle, the behaviour of the pertinent households can strongly differ. The mere presence of contextual factors such as infrastructure and information does not seem to be sufficient in explaining occurring differences in household's participation in recycling activities.

In a well set-up waste management system the essential facilitating measures are already exploited, thus calling for measures that go beyond good infrastructure and information for raising participation rates. Increasing the understanding on other factors, besides contextual factors, that do influence and affect behaviour and promote recycling activities, constitutes a promising option for further improvement and adjustment of the waste management system.

However, in order to take into account the differences in behaviour of households, the step of analysing the individual's attitude towards recycling in the administrative scope of a waste management organisation presents a cost- and time-intensive undertaking. The aim of this research is hence to gather knowledge on the behavioural implications of different characteristics of users and with that approximate behavioural implications that can build the basis for strategies of practitioners that aim to increase participation rates.

1.2 Research question

In this thesis, socio-demographic factors and their ability of explaining a person's attitude and interaction with recycling infrastructure is examined. Therefore the following research questions were used to guide the research and organise the research process.

1. What is the knowledge on determinants of recycling behaviour and how overarching factors contribute to carry out recycling activities?

2. How do socio-demographic factors perform in predicting recycling behaviour and what role do they play in helping to understand differences between recyclers and non-recyclers?

3. How can knowledge on the behavioural implications of belonging to specific socio-demographic groups help to adjust a well-established recycling system such as the one in place in Sweden and what are the practical implications for practitioners?

Answering the research questions aims at contributing to the elevation of participation rates of advanced recycling systems. Question #1 aims at shedding light on recycling behaviour in general and summarises theoretical knowledge within the recycling realm. Question #2 aims at determining the applicability of user-related factors that can be approximated by socio-demographic factors. Question #3 focuses on the translation of the theoretical knowledge gathered in this research into applicable solutions for practitioners.

1.3 Method

The research is formally led by the research questions described in the former subchapter. In order to approach the formulated aim, four consecutive research steps were carried out.

First, an initial literature review provided with background information. The reviewed literature consists of predominantly academicly peer-reviewed literature that covers determinants of recycling behaviour from the domains waste management research and social science, as well as theories on behaviour in general and more in detail recycling behaviour. The identified determinants were furthermore discussed with experts, that is, professionals in the subject of waste management but also researchers and practitioners. The rationale of the discussion was to understand whether the interviewees agree upon theoretical findings from literature. As this first research step served to provide with a basic understanding of the issue of recycling behaviour and thus does not play a particular role for the analysis of socio-demographics, the results from the interviews is assigned a minor role. Secondly, the direct correlation between socio-demographic parameters and recycling behaviour is investigated. The review of theories resulted in the choice of a framework, which describes human behaviour as the interplay of attitude towards the behaviour and habits, as well as the effect of contextual factors that either motivate or deter behaviour. The results from the first step are described in chapter 2, literature review.

The second research step (see Figure 2 top) investigates the role of socio-demographics more in detail by further investigating their relation to the three behavioural factors, that is, contextual factors, attitude and habits. Therefore, research and literature, that establishes a link between any socio-demographic parameter and one of the behavioural factors, was consulted. The sources comprise of foremostly academic literature covering an international context. The spatial scope of the literature is not yet confined as this step aims at gathering scattered findings on socio-demographics in order to understand their effects on the identified factors contributing to behaviour. This step is presented in chapter 3.

In a third step, the findings on behavioral factors of step two are reorganized according to socio-demographics.
Furthermore, only these socio-demographics are uptaken that presented most abundant results on the single behavioural factors in the precedent research step and showed effects on all behavioural factors. The selected socio-demographic parameters are: age, gender and income. Following, the newly arranged literature findings are being discussed and verified by experts, which are active within the waste management realm in Sweden. As knowledge on this detailed level appeared to be rather rare, findings from reports that have been published in Sweden for the Swedish context complement the evaluation of the applicability of the theoretical findings in real context. The Swedish context is again chosen in order to evaluate

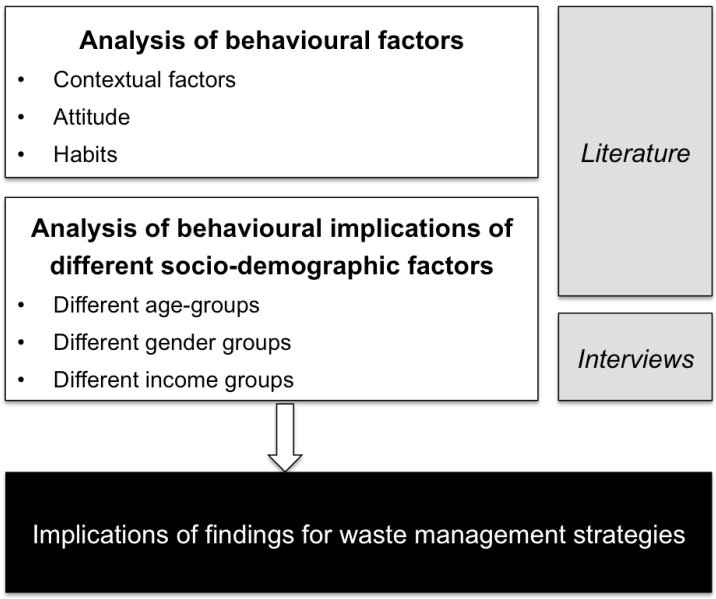

Figure 2 – Research steps applied within this research.

the applicability of the gathered findings for an advanced recycling system as can be found in Sweden. This step is presented in the analysis chapter 4.1-4.2.

Consequently, the results from the precedent analysis are being used to pinpoint to possible fields of improvement and practical recommendations of how to use the information that socio-demographics contain. This last step aims at translating the abundant theoretical knowledge that can be found in academic and grey literature and can be found in the last part of the analysis chapter 4.3.

1.4 Limitations and scope

Firstly, the research builds predominantly on academic literature complemented with opinions from experts operating in the field of recycling management in Sweden. The findings thus base primariliy on literature from social and behaviour science, market research and environmental science.

This research relates to recycling behaviour that covers all fractions of waste and does not differ between recyclables that have been covered by collection schemes since several years and newer schemes collecting fractions such as food waste. Whether there are differences between households' attitudes towards certain fractions, resulting in different behaviour for this particular fraction could not be covered by this research.

In order to analyse the correlation of socio-demographic variables with the factors of recycling behaviour, studies with a focus on the link between any type of socio-demographic parameters and the recycling factors attitude, habits and external conditions were consulted. The studies were chosen based on their ability to establish a link between socio-demographics and behavioural factors and not on spatial relevance. The sources were not exclusively located within the recycling domain but also in the greater environmental and sustainability realm. Furthermore, the findings should not be considered as extensive but rather as the result of an intense literature review. If a socio-demographic variable is not described under the findings section, it does not mean that no influences of this socio-demographic variable on recycling behaviour exists, but rather that it has not been described by academic and grey literature.

In order to validate the findings, practitioners were searched that have detailed knowledge on practical implications of socio-demographic theoretical knowledge. The fact that only one practitioner showed profound knowledge on this issue, implies a low significance of this validation step. This could however validate the initial problem definition, that the theoretical knowledge of academic research is not well applied or confirmed in praxis.

1.5 Ethical considerations

As the thesis aims at examining the relevance of socio-demographics in explaining the interaction of individuals with a local recycling system, it is made use of variables such as gender, cultural background and political attitude. The thesis uses these characteristics to understand how a recycling infrastructure and information can be better designed and adjusted to the needs that arise from the characteristics of an individual. The application of socio-demographics serves therefore solely to support the waste management planners to understand which measures appeal to the different socio-demographic groups.

Furthermore it needs to be mentioned that a person can be described by various socio-demographic variables and the research undertaken here aims at identifying the variables that

were shown to have the most relevant interaction with recycling infrastructure and information. The results therefore do not pinpoint to certain persons but rather variables that describe the personal ability to contribute with time, physical effort and space to the sorting of materials. Unfortunately, there are studies that correlate skin colour with recycling behaviour, which appears to be a questionable approach.

The findings from literature are being used to facilitate the interaction of individuals living within the Swedish context with the structures of a recycling system.

Interviews were conducted voluntarily and the interviewees were informed about the content of the research conducted. The interviewees are quoted and referred as to their names and permission was obtained before the thesis was submitted.

1.6 Audience

The outcome of the research is intended to serve professionals designing waste management solutions in contexts that have basic to advanced recycling structures in place. The findings however also help to design the structure of a new recycling system.

The author hopes furthermore that researchers that conduct field research on recycling behaviour will add another layer of analysis of their data by correlating the determinants relevant for their system to socio-demographic variables.

1.7 Disposition

In Chapter 1, the reader is introduced to recycling in the urban context of Sweden and the concept of anticipating the different characteristics of users of a recycling system presented. The need to investigate the effects of addressing differing socio-demographic groups in order to increase recycling rates is expressed. Limitations are acknowledged and the intended audience is indicated.

In Chapter 2, driving forces and determinants of participation in recycling schemes are outlined. Based on a literature review, a theory on recycling behaviour is derived.

Chapter 3 takes up the knowledge from the literature review conducted and relates it to socio-demographic characteristics. The socio-demographics which showed most abundant corelations with behavioural factors are outlined.

In Chapter 4, the relevant identified socio-demographics from Chapter 3 are validated by practical experiences from practitioners but also grey literature reports applicable in the Swedish context. Anecdotes and comments gathered support the formulation of practical recommendations for different socio-demographic groups.

Chapter 5 reflects on the results and takes a critical look at the analysis undertaken and the method chosen. Furthermore, the author reflects upon the applicability of the presented findings and complements it with opinions from practitioners on the potential of addressing particular groups.

Chapter 6 summarises the main findings and suggests areas, which were deemed to require further research.

2 Literature review on recycling behaviour

The literature review conducted in this chapter is guided by particularly research question #1 and reviews academic and grey literature within the recycling behaviour domain. The literature review in this chapter reflects upon three thematic subchapters:

1. Determinants of recycling behaviour; (chapter 2.1)
2. Relevance of socio-demographics; (chapter 2.2) and
3. Theories of recycling behaviour. (chapter 2.3)

The chapter 2 culminates in the presentation of the adapted theoretical framework used for the following research steps (see chapter 2.4)

2.1 Determinants of recycling behaviour

The aim of the first step of the literature review is to draw upon knowledge on determinants of recycling behaviour, in order to understand better what determines efforts undertaken by households. The factors described in this subchapter are extracted from a wide range of individuals in order to understand which socio-demographics affect recycling behaviour.

As has been outlined earlier, the active participation of individuals in recycling schemes is essential to achieve high recycling rates. Focus has thus been put on how to nudge individuals to recycle (more), what the deterring factors are and what effects different measures have on the participation rate. As it shows, different factors contribute to the active participation of individuals. There is, however, no factor that on its own determines recycling efforts but more it is the presence of a set of different factors contributing to recycling behaviour.

A great amount of studies could be found in academic research on the topic of recycling behaviour and determinants of recycling behaviour. Articles and dissertations have been written in the past two decades and cover an international scope. Researchers categorise determinants of recycling behaviour into, for example, internal and external factors, or *environmental values* (describing the individual's orientation), *situational factors* (describing the individual's situation affecting the individual) and *psychological variables* (describing personality and perception traits of the individual). The Swedish researchers Söderholm et al. (2010) describe four categories of variables that influence environmentally significant behaviour. These are: *contextual factors*, *personal capabilities, attitudinal factors* and *habitual factors*. A more recent meta-analysis by Miafodzyeva & Brandt (2013) pointed out three categories of variables that had been used to study recycling behaviour. These are namely variables describing *technical-organisational conditions* (external factors), *socio-demographic* (age, gender, income, etc.) and *socio-psychological variables* (attitude, motivation, etc.). Hence, it becomes apparent that different categories seem to present factors affecting recycling behaviour. Most determinants can be accounted for among the above-presented categories and some of them seem to have an especially relevant role in explaining recycling behaviour. Consulting a meta-analysis on determinants of recycling behaviour, the following determinants were particularly important:

- *convenience,*
- *information,*
- *moral norms and*
- *environmental concern.*

These determinants derive from the study by Miafodzyeva & Brandt (2013), covering 64 studies on recycling behaviour determinants with spatial scope Europe and the US. The following paragraphs outline the meaning of the above-mentioned determinants more in detail.

2.1.1 Convenience

Convenience is mentioned within the domain of organisational structures that are to a great extent provided by the local waste management organisation but can also be influenced by the household itself. These are proximity to the next recycling station, information on how and when/where to recycle, economic incentives, etc. As 'convenient' was a sorting system mostly referred to when the structures present make it easy for the individual to understand and use the sorting system (Miafodzyeva & Brandt, 2013). Convenience is however a very individual feeling, leading the researcher De Young (1988) to the conclusion that only the perception of convenience distinguishes the non-recycler from the recycler. Perception is by its nature individual, indicating that the usability and convenience of a recycling infrastructure is perceived differently by different individuals.

High convenience can be described by the presence of a high frequency of collection, short distance and strategic location of collection points for recyclables, appropriate storage space at the household and positive appearance of the collection points. Other factors such as the presence of economic incentives, the design of collection vehicles and the number of materials collected, were shown to have a less significant impact on promoting recycling behaviour.

2.1.2 Information

As well as convenience to some extent, information belongs to the determinants that can be controlled by the waste management organisation. The possibilities of promoting recycling schemes by communicating to the individuals are vast and have different outcomes as well as reaching different individuals. The performance of different information media used to inform the households about the rationale and practicalities of recycling is frequently evaluated. It could be shown that educational programmes influence the "relationship between people's attitude and their recycling motives" (Miafodzyeva & Brandt, 2013:9). Information on recycling needs to be concrete in the sense that information should contain practical instructions on, for instance, where to find collection points and what and what not to recycle (Miafodzyeva & Brandt, 2013; Young, 1986). Practically it could be seen though, that the capacity of individuals to take up information is limited and that social cues are used to guide individuals in their decisions (John et al., 2013). The social environment functions in that sense as an information source on its own.

2.1.3 Moral norms

Moral norms are self-enforced norms, that reflect the individuals ascription of responsibility for a certain activity. This responsibility can be reasoned by a feeling of greater self-sufficiency and problem-awareness (Corral-Verdugo, 1997). Feeling responsible for waste separation appears to be a strong driving force for individuals to conduct recycling activities (Miafodzyeva & Brandt, 2013). It is also mentioned that if the feeling of being responsible is present within the individual, the 'costs' (time, effort) of the action are perceived lower than for someone that does not feel responsible for doing so (Berglund, 2006).

2.1.4 Environmental concern

Increased awareness for the environment and a resulting concern when using and

subsequently disposing off resources seems to be an important determinant of successful participation in recycling schemes. However, research showed that the mere presence of environmental concern is no predictor for action as structural circumstances such as the lack of space can have a deterring effect on the individual (Barr et al., 2013). Taking this into account, a pro-environmental attitude nonetheless is conducive in case of a 'convenient' recycling system.

Determinants with less clear correlation to recycling efforts

As outlined above the variables *convenience, moral norms, information and environmental concern* are found to be the most important in explaining individual's efforts in recycling schemes.

Many variables studied appear to show differing results in different studies. Within the category of socio-demographic variables, the weakest correlation could be seen between the variable *gender* and recycling participation (Miafodzyeva & Brandt, 2013). Within the technical-organisational category *unit pricing* (weight-/volume-based fees for mixed waste) appears to generate *inconsistent results* when examining the relevance of the variable in explaining recycling efforts (Miafodzyeva & Brandt, 2013).

Ambiguous statements can be made for the socio-demographic variables age, income, and educational level (Miafodzyeva & Brandt, 2013). Some studies could identify a correlation between for example age and habits and intention (Knussen & Yule, 2008) whereas age could not directly be correlated to recycling outcome (Hage, Söderholm, & Berglund, 2009). For the technical-organisational category, the variables *number of fractions collected* and *storage space at home* resulted in inconsistent results (Miafodzyeva & Brandt, 2013). Socio-psychological variables such as *moral norms* are determined based on self-expressed opinions by the study participants. It was however seen that self-expressed statements do not reflect actual behaviour, making this method less meaningful for contributing to a comprehensive picture (Miafodzyeva & Brandt, 2013). *Social norms* are strongly dependent on the context and culture in which the individual lives. This type of norms offers guidance to residents and serve as rules for appropriate behaviour in this particular context (John et al., 2013).

It appears as if recycling behaviour is a highly context-related issue with no general consensus on how to design the perfect recycling system that will be effective in promoting waste separation at the source.

Another issue that is often mentioned is that the respondents to the surveys, the participants of studies, are mostly motivated recyclers whereas the non-recyclers that refuse to recycle keep themselves quiet (Tonglet, Phillips, & Read, 2004). The nature and motives of non-recyclers are thus hidden and there is a risk that motives of non-recyclers are not discovered by the experiments undertaken.

2.2 Socio-demographics and their role in explaining recycling behaviour

In the second step it is aimed for understanding the relevance of parameters that describe individuals' characteristics, that is socio-demographic parameters.

As indicated earlier, socio-demographics serve mostly to portray the study environment of recycling behaviour studies. They are also of relevance when depicting profiles of recyclers and non-recyclers. They have, however, been shown to be less relevant in explaining recycling behaviour than techno-organisational and socio-psychological variables such as

convenience, information, moral norms and environmental concern. The following subchapters outline the role of socio-demographics as single variables and as descriptive parameters for profiles of individuals.

2.2.1 Single socio-demographic factors

Two common methods are used to determine the relevance of socio-demographic factors for recycling behaviour: either single socio-demographic variables are analysed in their implications on recycling rates or effects of socio-demographics on factors that contribute to recycling behaviour (such as norms, habits, external factors and attitude) are analysed. A direct correlation appears to result in more ambiguous statements than when socio-demographic variables are correlated to factors that indirectly shape recycling behaviour. Table 1 gives an overview of studied socio-demographics and their results on either recycling activities or factors of recycling behaviour.

Table 1 - Literature review of studies on the effects of socio-demographic variables on recycling rates (left columns) and on factors contributing to recycling behaviour.

Authors	Influence of socio-demographics on recycling rates	Effects of socio-demographics on factors of recycling behaviour
No significant correlation	**Gender** (Hage & Söderholm, 2008), (Schultz, Oskamp, & Mainieri, 1995), (Vencatasawmy, Öhman, & Brännström, 2000), (Miafodzyeva, Brandt, & Andersson, 2013) **Income** (Hage & Söderholm, 2008), (Vencatasawmy, Öhman, & Brännström, 2000), (Miafodzyeva, Brandt, & Andersson, 2013) **Age** (Hage & Söderholm, 2008), (Miafodzyeva, Brandt, & Andersson, 2013) **Education, and time lived in Sweden** (Miafodzyeva, Brandt, & Andersson, 2013) **Marital status, number of children, type of house, house ownership, location, employment** (Vencatasawmy, Öhman, & Brännström, 2000)	**Gender and social norms** (Hage, Söderholm, & Berglund, 2009) **Education and environmental awareness** (De Feo & De Gisi, 2010) **Income and education in correlation to willingness to pay for others conducting their recycling** (Berglund, 2006) **Type of house and environmental awareness** (Valle, Reis, Menezes, & Rebelo, 2004) **Correlation between income or political affiliation and willingness to drop off e-waste at the recycling station** (Saphores, Nixon, Ogunseitan, & Shapiro, 2006)
Correlation	**Gender** (Williams & Kelly, 2003) **Income** (Afroz, Hanaki, Tuddin, & Ayup, 2010), (Belton, Crowe, Matthews, & Scott, 1994), (Domina & Koch, 2002), (Owens, Dickerson, & Macintosh, 2000), (Kurz, Linden, & Sheehy, 2007) **Age** (Afroz, Hanaki, Tuddin, & Ayup, 2010), (De Feo & De Gisi, 2010) (McDonald & Ball, 1998), (Belton, Crowe, Matthews, & Scott, 1994), (Williams & Kelly, 2003), (Domina & Koch, 2002) **Education** (Schultz, Oskamp, & Mainieri,	**Correlation between gender and education for the willingness to drop off e-waste** (Saphores, Nixon, Ogunseitan, & Shapiro, 2006) **Correlation between age and habits as well as intention** (Knussen & Yule, 2008) **Age and environmental awareness** (De Feo & De Gisi, 2010) **Gender and willingness to pay for letting others handle their recycling activities** (Berglund, 2006) **Immigrants and willingness to recycle** (Martin,

	1995), (Owens, Dickerson, & Macintosh, 2000) **Unemployment** (Hage & Söderholm, 2008) **Share of private house** (Hage & Söderholm, 2008) **Immigrants** (Hage & Söderholm, 2008), (Coggins, 2001) **Family size and shopping behaviour** (Domina & Koch, 2002)	Williams, & Clark, 2006) **Gender or education correlates with roles taken within recycling activities: initiator, decision maker, persuader, enforcer, rejecter and influencer** (Meneses & Palacio, 2005) **Age and role taken within recycling activities** (Meneses & Palacio, 2005) **Age and responsibility for environmental impacts** (De Feo & De Gisi, 2010) **Type of house and attitude** (Valle, Reis, Menezes, & Rebelo, 2004)

Looking at the left column, it can be seen that studies on the relevance of socio-demographic factors on recycling behaviour show *contrasting* results. Some studies found correlations between socio-demographics and recycling participation whereas others do not. A less ambiguous picture is presented when socio-demographic factors are related to factors of recycling behaviour, whereas the method of directly correlating socio-demographics to recycling outcomes seems not to be appropriate. A bivariate or multivariate analysis of recycling behaviour with one variable presenting a socio-demographic variable appears a sound method. This insight will guide the search for the framework used within this thesis.

2.2.2 Socio-demographics as descriptive parameters of behavioural profiles

The past paragraph concerned the effects of single socio-demographics whereas the following paragraphs analyse more the effects of sets of socio-demographic variables. Particularly marketing and business administration research make use of socio-demographics to study behaviour. Individuals with similar characteristics are grouped in the assumption that these individuals classified in the same group have a similar behaviour, allowing researchers to study their profiles' behaviour. Different grouping systems have emerged, so for example the British ACORN[4] structure that classifies consumers into categories according to their socio-demographic characteristics such as type of housing, financial situation and to some extent location of housing and cultural background. Other researchers such as Barr et al. (2013) have a similar grouping approach but divide the British population into segments according to the extent the individual reuses, recycles and reduces waste.

The UK-located waste and resources action programme (WRAP) makes use of the ACORN structure in order to generate knowledge on the socio-demographic profile of recyclers and non-recyclers. The results show the following: The fewest non-recyclers (1% within the category) could be found within the category of 'affluent achievers' that comprise of financially comfortable families, settled suburbia, retired and empty nesters, exclusive enclaves and wealthy countryside commuters, to name only some of the referred category (WRAP, n.d.). A very low percentage (3%) of non-recyclers could also be seen in the category of 'comfortable communities', including larger families in rural areas, comfortably-off families in modern housing, older people in neat and tidy neighbourhoods but also educated families with young children. Both categories indicate stable lives and consist of people that are not in transition phases of their life, in need of more money or more stable

[4] A user guide can be found on http://acorn.caci.co.uk/ (retrieved on the 15th of August, 2014)

lifestyles. The categories 'financially stretched' and 'rising prosperity' show the highest percentage of non-recyclers with each around 14% within the pertinent category. To 'financially stretched' people belong for example students, poorer pensioners and striving families with modest financial means. The category 'rising prosperity' that has also a greater group of non-recyclers consists of younger professionals in smaller flats, career driven young families, first time buyers in small, modern houses. The Britain-based researchers Barr et al. (2013) who divide the British population into segments according to their behaviour in relation to waste, find that there exist six different clusters of people: The re-users, normative wasters, hidden waste managers, refusenics, conscious consumers and disposers and eco-angels. To the non-recyclers (called refusenics) belonged individuals within different age groups, living by themselves and renting out flats and maisonettes. The strong recyclers were not clearly distinguishable in their characteristics.

It seems as if a certain financial stability but also stability in lifestyle and location increases the capacity of individuals to develop recycling habits.

2.3 Theories and frameworks used to explain (recycling) behaviour

The third step of the literature review circles around the theories and frameworks that are used to conduct studies on recycling behaviour.

Theory of Planned Behaviour by Ajzen (1991)

The Theory of Planned Behaviour (TPB) by Ajzen (1991) is frequently mentioned in the domain of recycling behaviour science and is located within social science and psychology, describing the causal relation between the presence of factors and actual behaviour. The theory bases on the former theory on attitude and behaviour by Ajzen and Fishbein (1975) and represents the idea that *behavioural intentions are the function of perceived behavioural control, a positive attitude towards the behaviour and a subjective norm* of the individual to perform the behaviour. In order to collect data on behavioural intentions, surveys are conducted with respondents self-expressing their perception of control to contribute to the behaviour, their attitude towards the examined beahviour and their perceived norm towards the behaviour.

Recycling: a function of internal and external factors

Even though Ajzens work belongs to one of the most applied theories in recycling behaviour, it has been criticised as confined to internal factors (Tonglet, Phillips, & Read, 2004). Recycling has been acknowledged by authors within the social, economic and environmental sciences as a behaviour that is *motivated by both internal and external factors* (Miafodzyeva & Brandt, 2013; Hage, 2008). Internal factors include norms, attitudes and habits and in general motives that are personal and have been studied predominantly by psychologists and sociologists. The external factors include for example information on recycling issues communicated by the municipal waste management organisation (what and how to recycle, where) or the presence and designs of recycling stations, collection vehicles, containers available for the collection of different fractions of waste at home). External factors have been rather the object of interest of economists (Guagnano, Stern, & Dietz, 1995; Hage, 2008).

The presence of internal and external factors within the individual and the environment interact hereby with each other, resulting in actual behaviour. Especially external factors appear to affect internal factors as can be seen in the example of recycling opportunities provided affecting the individual's attitude towards recycling (Tonglet, Phillips, & Read,

2004). In the British study the authors Tonglet et al. (2004) used the Theory of Planned Behaviour (TPB) by Ajzen (1991) and correlated recycling intention and attitude to situational factors and recognised the effect of external conditions on internal factors. The opposite effect has been described earlier in the chapter, that internal moral norms decrease the recycling-related 'costs' such as time and effort, diminishing the importance of a convenient collection infrastructure (Hage, Söderholm, & Berglund, 2009).

Attitude-Behaviour-Context (ABC) Theory by Guagnano et al. (1995) & Stern (2000)

During the same time period Ajzen formed his theory on behavioural intention, Stern & Oskamp (1987) established their theory on internal and external factors in environmental behaviour. Guagnano et al. (1995) later adapted Stern's and Oskamp's theory, describing behaviour as a function of attitude towards the behaviour and external conditions (see Figure 3). Attitudinal factors include norms, beliefs and values; Contextual factors include government regulations, monetary incentives, built environment, advertising and information. Exemplified does that mean that a pro-recycling behaviour is performed in case an individual holds a positive attitude towards recycling while the external factors also favour the behaviour (for example a close collection point increasing convenience). The so-called ABC-theory incorporates different approaches of social science, psychology and economics in a new context.

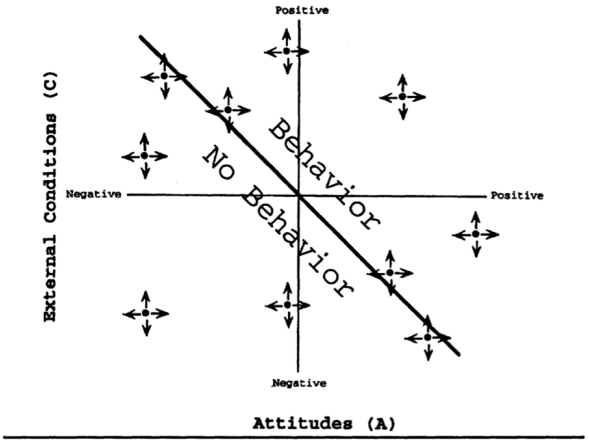

Figure 3 - ABC model. Attitudes (A) and External Conditions (C) determine Behaviour (B) Source: (Guagnano, Stern, & Dietz, 1995)

ABC-theory by Stern (2000)

Stern, the author to the ABC-theory altered their original theory later, by adding the factors habits and personal capabilities. The more recent ABC-theory by Stern (2000) presents itself as follows:

Behaviour **(B)** = Contextual factors **(C)** x Attitudes **(A)** *x habits x personal capabilities*

The two new factors contributing to behaviour, personal capabilities and habits, include for the former knowledge and skills required for the behaviour such as time, literacy, money, social status and power, while the latter describes recurring behaviour. Stern (2000) claims that socio-demographic factors serve well to describe the factor of personal capabilities.

2.4 Framework used in this research

In the precedent chapter, theories, on how recycling behaviour is established, have been presented. Different theories claim different factors to be relevant in explaining recycling behaviour. Some focus more on internal factors such as attitude and norms, whereas others have a stronger focus on external factors of a recycling system.

Behaviour **(B)** = Contextual factors **(C)** x Attitudes **(A)** x habits x personal capabilities

In order for a municipality to increase recycling rates, promoting recycling behaviour needs to be achieved. According to the behavioural theory by Stern (2000), behaviour depends on contextual factors. The performance of contextual factors, which includes recycling infrastructure and information, can easily be assessed by the organisation managing the waste as it establishes the local recycling system (sometimes in cooperation with other organisations). Thus, the waste management organisation is in control of this factor and can improve infrastructure and information when insufficiencies are identified. The other factors attitudes, habits and personal capabilities are, however, more difficult to determine. As these refer to personal characteristics of users and non-users of the recycling system in place, this research aims at understanding whether socio-demographic parameters are able to explain differences in attitude, habits and personal capabilities. Hence, the theoretical framework by Stern (2000) is adapted to the below presented Figure 4.

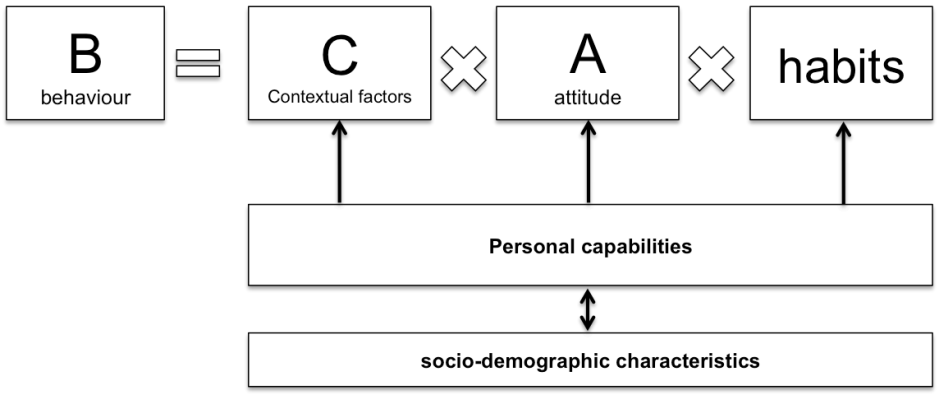

Figure 4 – Adapted ABC theory by Stern (2000), presenting the framework used to analyse the relevance of socio-demographic parameters as a source of information on a person's attitude towards recycling activities and recycling habits.

3 Findings on socio-demographic factors

The following paragraphs present the reader to the literature findings on the relevance of socio-demographic factors on attitude, habits and external conditions. Herefore the ABC-theory of Stern (2000) guided the author in the desktop-search. The findings are arranged in the following order:

i. Influence of socio-demographics on external factors (chapter 3.1)
ii. Influence of socio-demographics on internal factors (chapter 3.2)
    a. Attitude
    b. Habits

3.1 Socio-demographics and external factors

In this chapter the influence of socio-demographic parameters on the interaction with external factors is investigated (see Figure 5).

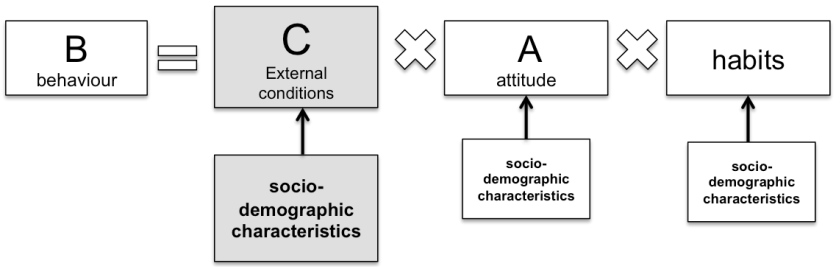

Figure 5 – This step focuses on the relevance of socio-demographic factors in explaining interaction with external conditions of the recycling system. Adapted from ABC theory by Stern (2000).

As external conditions comprise of a variety of variables, the influence of socio-demographic variables on only the most important variables among the external conditions are examined. Therefore, the results of the meta-analysis on more than 60 studies on recycling behaviour by Miafodzyeva & Brandt (2013) are used to group the most relevant external factors in explaining recycling behaviour. These are as follows:

- *High frequency of collection,*
- *Short distance and strategic location of collection points for recyclables,*
- *Appropriate storage space at the household,*
- *Positive appearance of the collection points and design,*
- *(Information)*[5].

These variables are examined on their correlation of socio-demographic variables. The socio-demographic variables age, income and gender were found to interact with external factors such as physical infrastructure and information. The list is however limited as only very few studies directly correlated socio-demographics to external factors. Other factors such as the relevance of cultural aspects were not explained by literature. The lack of description of a relation between external factor and socio-demographic variable indicates that no direct or indirect effect of the socio-demographic variables could be found in literature.

[5] Information does not belong to the determinants that were shown to be relevant in explaining recycling efforts by the authors Miafodzyeva & Brandt (2013). As socio-demographic variables however interact with the type of information provided, information is added to the analysis.

Income.

Income could be related to the type of housing and size of household and is therefore taken into account in the following paragraph (WRAP, 2009).

- *High frequency of collection.* Studies showed that affluence correlates positively with the generation of waste (food waste and other materials) (WRAP, 2009; Pham Hien, 2011). This could mean that more affluent households have a greater need to dispose of waste, favouring a more frequent waste collection or bigger bins. Multi-occupancy houses were shown to collect substantially less food waste than single-dwelling housing (WRAP, 2009). Unemployed individuals in Sweden were collecting more plastic waste than employed individuals (Söderholm & Hage, 2006)
- *Short distance and strategic location of collection points for recyclables.* Individuals who have distant collection points (out of a convenient walking distance) are more dependent on other transport possibilities. It is assumed that with higher affluence, individuals hold an increasing capability to buy their own car, making them less dependent on close-by collection points for recyclables. It could be showed that individuals living in flats perceived the distance to the next recycling station too long, deterring them from recycling (Avfall Sverige, 2011). Villas in Sweden have in almost every case private waste bins, allowing for collection of recyclables at their house. Distance seems therefore to be particularly relevant for individuals living in a flat without a close-by recycling collection point, requiring the households to take the recyclables to a central recycling collection point.
- *Appropriate storage space at the household.* The income can be related to the size of the rent/owned housing space (WRAP, 2009), and therefore the availability of space that can be used to store recyclables (Timlett & Williams, 2011; Avfall Sverige, 2011). In the Swedish context, the ones living in a flat most often (compared to other housing situations) state that they have not sufficient space to store recyclables, making it too complicated for them to start recycling (Avfall Sverige, 2011). In a study with focus on UK households, multi-occupancy households collected less food than other types of housing, with the possible explanation that there is not enough space available for hygienic storage (WRAP, 2009).
- *Positive appearance of the collection points and design.* The housing situation determines which system individuals join to dispose off their waste and recyclables: Both, houses/villas and multi-occupancy households have access to central recycling points, whereas houses/villas can have private collection systems (private container with space for different waste fractions). Multi-occupancy houses comprising of flats have in Sweden in 50% of the cases access to close-by recycling stations belonging to their multi-occupancy residency. Private households that use their own recycling system, and potentially a central recycling station, will be more interested in the tidiness and function of these two systems than a household that shares recycling facilities with several other households (for example a miljöhus[6], a nearby or a central recycling collection point).
- *Information.* It was recognised that the television is more frequently used in deprived households, making them more perceptive to information provided via this media (WRAP, n.d.)

[6] Swedish term for a collection point that is located closeby offering disposal of different household waste fractions.

Age.

- *Short distance and strategic location of collection points for recyclables.* Younger, older and disabled individuals might be deterred from the distances they have to overcome to reach the collection point. Heavy glass and metal waste or wet biodegradable waste might constitute an obstacle for these individuals that are less physically fit or have a reduced functionality of their bodies. Parents might feel deterred to send their children to the recycling point when it is too far located or when the children have problems reaching up to container lids. Older individuals that are confined by their physical abilities experience longer distances to the next collection point as a hindrance (Avfall Sverige, 2011). Individuals at age 15-29 are, according to a Swedish study, also perceive distance as an issue, however most probably due to other than physical reasons (Avfall Sverige, 2011).
- *Positive appearance of the collection points and design.* Younger and disabled individuals might have problems to use the provided recycling infrastructure as the design of the containers fit well a normal individual that is able to lift lids and waste and reach up to higher located refusal chutes.
- *Information.* Studies from market research acknowledge the difference in media consumed depending on age. Age has been shown to be the most influential variable among others when it comes to the type of media used to source information (Rosenstiel, 2011). Above 40, newspaper is the main source for news on politics, community events, government activities etc. The TV stations are used for information on the weather, breaking news, traffic politics and crime. The Internet is used for local businesses and restaurants (Rosenstiel, 2011). For people under 40, the Internet is the predominant source for information on weather, politics, community events, and local government. The newspaper is used for news on crime, arts/cultural events, community events etc. TV stations is use for weather and breaking news, politics and crime, local government and social services, whereas Radio is mostly used for traffic information. Word of mouth is used for spreading information on community events. (Rosenstiel, 2011). From another point of view, it could be seen that younger people are more easily confused by instructions and recycling schedules than their older individuals (Pocock & Jesson, 2008). Even though young children might be underprivileged by not being able to read, research showed that young individuals show great potential in developing pro-recycling attitudes (Klineberg, Mckeever, & Rothenbach, 1998; Liefländer & Bogner, 2014), which motivates initiatives to target particularly this group.

Gender.

- *Short distance and strategic location of collection points for recyclables.* Studies show that women felt more easily hindered to recycle by longer distance than men (Avfall Sverige, 2011).
- *Positive appearance of the collection points and design.* A study in the Swedish context revealed that women do more likely express discomfort with the appearance of collection points than their male colleagues (Avfall Sverige, 2011).

Cultural background

- *Information.* The fact that some cultures inherent a clear gender role division, it was noticed that in some cases women are not allowed to "tell" the men to recycle.

Identifying the person that is responsible to conduct recycling activities but also functions as an informant for other people within the household or community can be an effective way of communicating recycling (WRAP, n.d.).

3.2 Socio-demographics and internal factors

Internal factors of recycling behaviour describe attitude and habits. A positive attitude towards recycling can, according to a study by the waste and resources action programme in the UK, outweigh the influence of habits (WRAP, n.d.). In this study, individuals ascribed less importance to the power of habits and 50% stated that they recycle because they believe in it, whereas only 30% of the respondants claimed habits to be the reason.

3.2.1 Attitude

The term attitude within this research is used to describe the position an individual takes towards recycling. The researchers Egmond & Bruel (2007), analyse the different models and theories on drivers of behaviour, describe attitude as a set of "opinions of oneself about the behaviour". Examples of attitudes are: 'storing recyclables at home is unsafe' or 'recycling conserves natural resources'. Early work on recycling behaviour by Guagnano, Stern, & Dietz (1995), the authors of the theory chosen for this research, showed that the position an individual takes towards recycling depends on four determinants:

- their *personal norms* on recycling[7],
- the feeling of *responsibility* for undertaking recycling,
- the *perceived personal costs* (e.g. time) associated with recycling, and
- the awareness of *consequences* of the own behaviour. *Consequences* of the own behaviour are then further divided into:
    - *beliefs about the outcome*, and
    - *evaluation of outcome*.

Recycling activitities characterise normative behaviour activated by problem awareness. Research on more than 600 British residents lead to this conclusion (Barr, 2007), confirming earlier work describing recycling as altruistic behaviour (Hopper & Nielsen, 1991), as opposed to reduction and reuse activities that are rather explained by the presence of underlying environmental values, knowledge and concern (Barr, 2007). In order to activate norms, the individual (1) needs to have an awareness of consequences and (2) must feel the ascription of responsibility for the activity (Abrahamse & Steg, 2009).

Recycling attitudes in the Swedish context. In Sweden, recycling is considered as an easy way to contribute to a sustainable society and in general Swedish citizens do hold a positive attitude towards recycling. Furthermore, the strong presence of social norms on recycling in the Swedish context is stressed (Avfall Sverige, 2008). A study on 1,400 Swedish residents showed that problem awareness is the determining factor activating personal norms and pro-environmental attitude (Nordlund & Garvill, 2002). The recycling of paper, wallpaper and glass is considered as uncomplicated whereas sorting out food waste or different types of plastic constitutes more of an issue, according to the authors of the Swedish project on sustainable waste management (Hållbar Avfallshantering, 2012). It is further noted that a positive attitude is not the only contributing factor to actual behaviour, resonating with what the researchers of the chosen framework by Stern (2000) find. In order to have an impact, a positive attitude needs to be accompanied by a certain convenience (easy to do), motivation by the individual to do so, an awareness of the negative consequences when the activity is

[7] Describes how the individual thinks he should behave within his social environment.

not carried out, an understanding for the importance of the activity and that the others in the direct environment do so as well. For activities that are considered as difficult, a positive attitude is less relevant than when the activity is considered to be easy doable. Lack of knowledge seems to be the determining factor hindering these individuals with a positive attitude towards recycling (Hållbar Avfallshantering, 2012).

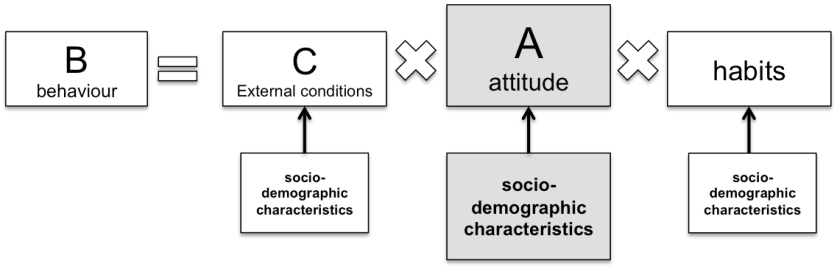

Figure 6 - This step focuses on the relevance of socio-demographic factors in explaining interaction with the attitudes towards recycling. Adapted from ABC theory by Stern (2000).

Recycling attitudes. Applying the framework of Figure 6**,** the following paragraphs outline the findings from research, showing that *level of education, age, financial stability, political allegiance, type of dwelling and unemployment* influence the attitude towards recycling:

- *Level of education.* According to the meta-analysis on determinants of recycling behaviour by Miafodzyeva, Brandt, & Olsson (2010), individuals with a higher level of education have a higher likelihood to express a positive attitude towards recycling.
- *Age.* The variable age was shown to correlate negatively to the initial formulation of environmental attitudes (Klineberg, Mckeever, & Rothenbach, 1998). Moreover, Liefländer & Bogner (2014) could show that younger students were more likely to develop a pro-environmental attitude than older students. Older individuals, however, are more likely to hold a pro-environmental attitude than younger individuals (Miafodzyeva, Brandt, & Olsson, 2010; Coffey & Joseph, 2012). A study on Swedish individuals shows that particularly the individuals between age 15-29 and 50-64 express that they fail to recycle because of laziness (Avfall Sverige, 2011).
- *Financial stability.* Income has been identified as influencing the perceived importance of pro-environmental behaviour; with higher income leading to higher engagement in environmental actions (Lubell, Zahran, & Vedlitz, 2007). With increasing income however, it was seen that the opportunity costs for time increases, turning recycling into a time-costly undertaking (Hage & Söderholm, 2008). On the other hand, more affluent individuals are able to assign more financial resources to recycling (Söderholm & Hage, 2006). Individuals that drive their own business were shown to be motivated by economic reasons, namely that recycling reduces the amount that ends up in the bag for mixed waste (Avfall Sverige, 2011).
- *Political allegiance/ideology.* Individuals with a conservative attitude and stronger self-concern than (personal) environmental concern have weaker pro-environmental attitudes. A study from the US could show that political affiliation is even a stronger predictor for pro-environmental attitude than the level of education. Hereby, Democrats (uneducated and educated) recycle more often than the average participant in the survey, consisting of Democrats, Republicans and Independents. The latter are more likely to negate climate change. Moreover, Republicans are reported to hold the weakest feeling of responsibility for the environment (Coffey & Joseph, 2012).

- *Type of dwelling.* According to a study on Swedes and their attitudes towards recycling, it was found that the ones living in a house or villa with garden claimed that they are too lazy to recycle (Avfall Sverige, 2011). This seems to be opposing to what Valle, Reis, Menezes, & Rebelo (2004) found, more in detail that individuals living in adherent households tend to hold a strong positive attitude towards recycling. Subtenants stated that they do not recycle because they think that burning the waste is the better option (Avfall Sverige, 2011). An experiment on the influence of the length of the street on the recycling attitude in the UK showed that the shorter the street was the higher the participation in recycling schemes, maybe an effect of sense of community or that the actions are more observable to neighbours (John et al., 2013).
- *Unemployment.* A study with focus on the Swedish context evaluated whether unemployed individuals do understand recycling as something that everybody else is doing as well, which could be confirmed. Furthermore it was stated that unemployed individuals are aware what the local government expects them to recycle and what fractions to collect where, presenting a good knowledge on recycling issues in this group of individuals (Avfall Sverige, 2011).
- *Gender.* Various studies could show that women express a stronger environmental belief or environmental concern than their male colleagues (Schahn & Holzer, 1990; Stern, Dietz, & Kalof, 1993), especially when risk to health and well being can be related to the activity involved (Bord and O'Connor 1997).
- *Cultural background.* Martin et al. (2006) claim that second-generation immigrants have a weaker recycling attitude than first-generation immigrants. An individual originating from another country with a less prominent recycling culture might have negative associations with handling waste and even look upon it as an activity of the poor (Avfall Sverige, 2008). Furthermore it was noted that in some countries nature is perceived as dirty and unhealthy (for example through strong pollution) and the pro-environmental attitudes are due to these circumstances not so strongly developed (Avfall Sverige, 2008). In some countries recycling is an activity that is strongly supported by society, with an effective non-governmental control-mechanism by members of the society: In Germany it was noted that the one not 'behaving' (not recycling) will be reprimanded by others in their direct environment (Steponavičiūtė, 2013).

3.2.2 Habits

Habits can be characterised by 'the periodic repetition of acts', 'started without planning, conducted with little attention paid to them and completed without any need to evaluate them afterwards' (Henriksson, Åkesson, & Ewert, 2010:2808). Wagenaar (1992) claims that the majority of behaviour is of habitual nature.

Strength of habits. Depending on the activity frequency. According to the 'Theory of Interpersonal Behaviour' by Triandis (1977) and Egmond and Bruel (2007), the strength of habits is determined by the frequency of past behaviour.

Recycling, a habitual behaviour. As recycling is an activity that does not only get carried out sporadically or once a year but rather occurs as a daily activity, recycling occurs as a habitual action. The Swedish Professor of Economics and bookwriter Patrik Söderholm (2010) states that most of the environmentally significant behaviour is habitual behaviour. Transportation mode, shopping patterns and as well as use of water and electricity in the household can be named. It is noted that the majority of people are reluctant to change

habits unless they really have to, showing the importance of recurring activity for habitual behaviour such as recycling (John et al., 2013).

Studies on habitual recycling behaviour showed that individuals who lack (past) recycling habits, express lower intentions to recycle in the future and feel a weaker normative pressure to recycle (Knussen & Yule, 2008). Committed recyclers on the contrary express active interest in recycling as well as integrated recycling practices in their daily lives and hence developed recycling as a habit (WRAP, n.d.).

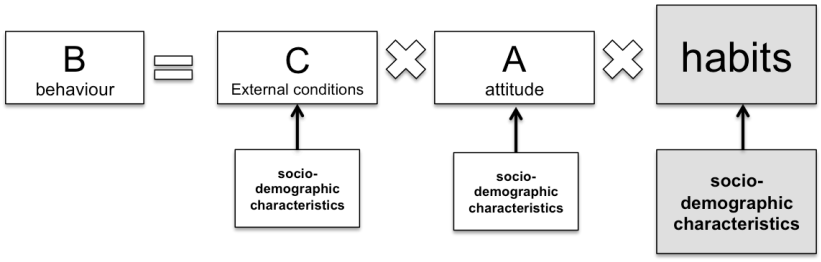

Figure 7 - This step focuses on the relevance of socio-demographic factors in explaining the development and presence of recycling habits. Adapted from ABC theory by Stern (2000).

Recycling habits. Applying the framework of Figure 7, following results on the influence of socio-demographic factors to the development and presence of habits could be shown:

- *Age.* Individuals with less habitual driven action were found to be younger (Knussen & Yule, 2008). Studies on students and habits showed that their transient and time-pressured lifestyle deters from developing a habitual recycling behaviour (WRAP, n.d.).
- *Type of housing.* The type of housing was shown to imply pro-recycling habits among students: students living in their own homes self-reported the strongest pro-recycling habits, whereas those living in university-owned accommodation or privately-owned halls of residences presented weaker habits for recycling (NUS, 2013).
- *Gender.* When it comes to habits that concern a green and sustainable lifestyle, gender plays a role in developing pro-environmental habits. It could be shown that female individuals show stronger pro-environmental habits than their male colleagues (Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen, 2003).
- *Cultural background.* An individual originating from another country with a less prominent recycling culture has less strongly developed habits within the waste recycling field than somebody that grew up within a 'recycling' culture (Avfall Sverige, 2008).

As it can be seen from the list above it was not possible to draw upon abundant knowledge on the influence of personal characteristics on habits.

4 Analysis of implications of socio-demographics

The first part (Chapter 4.1) of the analysis carried out in this chapter confronts theoretical findings from the literature on socio-demographics with experiences from Swedish practitioners, academic researchers and experts in the field of waste management.

The second part (Chapter 4.2) examines the applicability of the findings on socio-demographic variables in describing the engagement of social groups in recycling activities. The chapter is finalised by a discourse on the practical application of the findings. Recommendations for different social groups are outlined.

The third part (Chapter 4.3) provides with a practical set of measures as well as describes fields of interest that practitioners can review in order to identify improvable areas within local waste management practices.

4.1 Literature evaluation

As opposed to the previous chapter 3, which arranged the findings according to their relation to different factors of recycling behaviour (attitude, habits and external conditions), this chapter presents the findings according to socio-demographic factors. Only these socio-demographics (see list below) are analysed that showed relevant findings in the precedent literature review for the behavioural factors attitude, external conditions and habits. The following analysis is structured as follows:

i. Income
ii. Age
iii. Gender
iv. Cultural aspects

In the same step, the literature is confronted with experiences and statements voiced by experts in the Swedish context. This knowledge was either extracted from published reports on recycling management in Sweden (referring to Ewert et al. (2009), White Arkitekter (2013), Avfall Sverige (2008) and Hage & Söderholm (2008)) or conveyed in a 30 min lasting structured telephone-interview (for the case of Patrik Johansson (2014) and Åkesson (2014)). Background information on the used reports and consulted experts is given in the following paragraphs.

Ewert, Henriksson, & Åkesson (2009): Susanne Ewert and Lynn Åkesson are researchers at the Department of Arts and Cultural Sciences at Lund university, and perform their studies in the division of ethnology. Greger Henriksson is researcher at the Stockholm based Kungliga Tekniska Högskolan (KTH) and is teaching in the sustainable development and environmental sciences division. The report used in this analysis „Osäker eller nöjd - kulturella aspekter på vardagens avfallspraktik“ (Uncertain or satisfied – cultural aspects of everyday waste practices) is part of the research project Towards Sustainable Waste Management (TOSUWAMA). This part of the ten-part project has an ethnologic focus and aims at describing how people think about waste management, how their actual behaviour looks like and which opportunities exist to develop sustainably within the field of waste management at the national level in Sweden.

Johansson, 2014: Patrik Johansson is the communicator of the Swedish project skitlite2020, that was inaugurated in 2013 aiming at finding and applying strategies to reduce the generated yearly household waste of 500kg down to 300 kg per person and year. Eleven municipalities and three waste management companies in northwestern Scania in Sweden are collaborating to achieve this objective

by 2020. The process is supported by White architects and Sopsamarbete Skåne Nordväst. More on www.skitlite2020.se

White Arkitekter, 2013: White architects is Sweden's leading architecture company, working interdisciplinary striving for sustainability in the fields of architecture, buildings, landscape, inhouse design, desing and environment. The authors Anna Ågren & Viktoria Walldin (both Social Sustainability) conducted this study on recycling behaviour in order to understand the attitudes towards waste and waste management of the citizens of northwestern Skåne in an interview study on 46 households. More on white architects on www.white.se

Avfall Sverige, 2008: 'Avfall Sverige' is the Swedish Waste Management and Recycling Association with 400 members from both public and the private waste management and recycling sectors. The report used for this analysis compiles experiences on the communication of recycling to newly immigrated persons. These have been gathered during surveys and interviews with immigrants and depict how immigrants understand recycling and waste management in Sweden, as well as which information they are provided with by the municipality and Swedish for immigrants (SFI svenska for invandrare). More on www.avfallsverige.se/in-english

Hage & Söderholm, 2008: The two Swedish researchers Olle Hage and Patrik Söderholm perform their research at the institute for economy, technology and society at Luleå university in the North of Sweden. The article used for the analysis, focuses on determinants of plastic packaging in Sweden and employs a regression analysis based on data from 252 Swedish municipalities in order to explain recycling participation differences.

4.1.1 Income

Table 2 - Analysis of the socio-demographic variable 'income': Effects on external and internal factors of recycling behaviour.

Factors	*Literature*	*Experts*
External factors	Higher income is correlated to higher amounts of waste generated and a potential need for a more frequent collection or bigger waste bins. Higher income households are more likely living in a single house than in a multi-occupancy building, and as according to (Fråne et al., 2014) only 9% of the Swedish single houses have kerbside collection, distance to the next recycling point appears to be a constraining factor. Income could be correlated to the type and amount of waste created, with unemployed individuals collecting more plastic waste than their employed colleagues and multi-occupancy households collecting less food-waste than other forms of dwelling.	According to Johansson (2014), the claim that higher income leads to higher amount of waste generated, could be confirmed within the spatial scope of Scania. Households generating higher amounts of waste hence require bigger disposal containers. Higher income households were also said to produce higher amounts of bulky waste such as furniture that these households replace more often than in lower income households. It was noted that lower income households collect/generate more plastic packaging waste, which can be explained to some extent as the result of confinement to cheaper products wrapped in plastic packaging. The in-house-architecture was mentioned to be not in line anymore with the requirements for space of the modern recycling system, with greater flats more in favour of space than smaller apartments – smaller collection space in-house leads also to a need to dispose off

	Furthermore, low-income and deprivation was seen to influence the type of media consumed, with stronger deprived households consuming more TV than more affluent households.	single fractions more frequently (Ewert, Henriksson, & Akesson, 2009). It was not possible to establish a link between socio-economic status and amount of waste produced (White Arkitekter, 2013)
Internal factors	Literature describes that with increasing income, the cost of time increases and with that personal costs for recycling efforts increases.	Individuals living in a single house have a more positive attitude towards recycling than the individuals living in a multi-occupancy dwelling. Individuals living in a single dwelling are less anonymous than individuals using a shared recyclables collection point as it can be seen when they sort out wrongly (White Arkitekter, 2013; Johansson, 2014). Multi-occupancy households were seen to have a more negative attitude towards recycling food waste (White Arkitekter, 2013), potentially through the odour.

Remarks on socio-demographic parameter 'Income'

Literature and practitioners experience agrees that income is an indicator of the amount of waste generated. Income seems also to determine the amount of plastic collected, with lower income recycling more plastic packaging in absolute terms. Higher income households on the other hand dispose more waste in total than compared with lower income households.

Income can be related to the type of dwelling, even though literature by itself does not necessarily express a correlation. It was stated that single-dwellings are more likely to recycle than multi-occupancy dwellings and the latter one less likely to collect food waste than single-house dwellings. The type of housing, however, relates to which collection system is provided. Single-dwellings in Sweden have to a low degree private kerbside collection whereas multi-occupancy buildings have close-by shared recycling stations obscuring the activities of single persons. Transparency of individual actions (as more visible in private kerb-side collection systems than in shared recycling points) was described to increase the pressure to recycle correctly (Johansson, 2014). Recycling collection stations that are used by several households present a higher anonymity than private collection bins that can be directly linked to a certain household.

The idea that the type of dwelling determines how much space for the collected recyclables is available could not be confirmed by the practitioner Johansson (2014). Moreover, all households claimed to have too little space for the difference fractions (Johansson, 2014). Ewert, Henriksson, & Åkesson (2009) reveal in their report that especially these flats that are small and at the same time unfavourably planned (for waste collection) constitute an issue for individuals, demotivating them to set up a collection system for different waste fractions. Similar was reported by students about their space situation at their student housing. The provision of a sorting/collection system, which is often available for single-dwellings (bin with 4-8 different sections for different materials), for smaller housing situations, was considered as facilitator to recycle.

There seems to be disagreement on the relation between income and attitude, pinpointing to the issue of the collecting data on attitude: Measuring the influence of income on the attitudes and habitual factors was mentioned to be an intricate exercise as respondents are inclined to answer what they are expected to answer. The relevance of the respondent's statements is therefore questionable. The actual behaviour can be tested by conducting an analysis of the disposed household waste, which was seen to not necessarily resonate with the disposer's attitude. Here a lack of knowledge on how to determine attitude was expressed (Johansson, 2014).

According to a meta-analysis on recycling determinants, income ranks as the second most studied variable, after age. The income-related variable 'type of dwelling' is claimed to be a dependent variable on recycling behaviour (Miafodzyeva & Brandt, 2013).

4.1.2 Age

Table 3 - Analysis of the socio-demographic variable 'age': Effects on external and internal factors of recycling behaviour.

Factors	*Literature*	*Experts*
External factors	Age seems to be contributing to recycling activities in the sense that it influences the personal capabilities to carry and dispose off recyclables but seems to influence also the transport type used. Much could be found on which information source is used by which age group, with the newspaper as media for the individuals with age over 40 and the internet as predominant information source for the individuals under 40.	The age group 45-64 is the group that is predominantly using the car to leave recyclables, whereas the 18-29 year old individuals go by foot, bike or take public transport (FTI & Avfall Sverige, 2013) Johansson (2014) confirms that elderly people are more negative about distance to the next recycling station. Elderly individuals that were using helpservices at home mentioned that they do not want to use their time for recycling activities, even though these homehelp-organisations are required to recycle if a recycling collection point is within the district (Ewert, Henriksson, & Akesson, 2009) It was found that elderly people require much information when it comes to establish new habits on for example food waste recycling, as they are less prone to change than younger people. Information should also be printed or provided during personal meetings (White Arkitekter, 2013)
Internal factors	When it comes to attitudes towards recycling, younger individuals seem to be more willing for a change in attitude compared to older individuals. Their recycling habits also seem to be less strongly developed in comparison	Younger individuals between 18-29 seem to be more willed to start recycling when a property close collection point is installed, the age group 65-85 the least (FTI & Avfall Sverige, 2013). Elderly people are said to express the strongest environmental concern and will to recycle,

	to older individuals, indicating a high potential within the younger age-category.	making it easier to explain why recycling is important (e.g. when there is a new system such as food waste is introduced) (Johansson, 2014). Especially for young individuals that have just moved out, developing a recycling routine is important (White Arkitekter, 2013). Johansson (2014) adds that young individuals that just moved out might want to break with the (recycling) routines of their parents and start their own life. In many cases they however return later to the habits that have been learnt in their parental home. Most engaged and positive in recycling activities were older women, the most negative attitude towards recycling showed young male individuals (Ewert, Henriksson, & Akesson, 2009). The latter was confirmed by Johansson (2014). He also mentioned that particularly young women are willing to change behaviour. Elderly people that still are capable to recycle and bring recyclables to the station are willed to spend some 'extra' time on recycling (White Arkitekter, 2013)

Remarks on the socio-demographic variable 'Age'

For the socio-demographic parameter age, it could be seen that young individuals often lack the habits and attitude towards recycling but are easier to influence. Young individuals can be supported in practical issues such as how to set up a collection system at home as well where to leave recyclables. Older individuals with stable lifestyles appear to be more prone to social norms.

Regarding external factors, literature and praxis agree upon that age has implications on which type of transport media (bicycle, public transport, car) is used to transport the recyclables to the recycling point. Whether the type of transport is used because of personal capabilities or for the reason that different age groups live in different types of dwelling or whether a certain type of transport is preferred due to the ownership of a car could not be determined.

Consensus seems to be on the aspect of sourcing of information: with elderly people more in need of printed information and younger more of the media that is consumed by them, namely internet and social media. The difference in habitual manifestation of recycling among older and younger individuals needs to be taken into account: for elderly people a stronger focus on change of habits and younger people a stronger focus on assisting in establishing a recycling habit. This due to the experience that older people often already present a will to recycle and have knowledge on recycling whereas young people do possess often a weaker pro-environmental attitude.

Regarding the relevance of the variable age, age ranks as the first most studied variable, before income and education, according to a meta-analysis on recycling determinants. The variable age was found to be a dependent variable in more than 50% of the cases examined (in explaining recycling behaviour) (Miafodzyeva & Brandt, 2013).

4.1.3 Gender

Table 4 - Analysis of the socio-demographic variable 'gender': Effects on external and internal factors of recycling behaviour.

Factors	*Literature*	*Experts*
External factors	Female individuals perceived distance and untidiness of collection points as more constraining than men.	A study by the Swedish producer responsibility organisation FTI (Förpacknings- och Tidningsinsamlingen) showed that women are more likely to overcome longer distances by foot, bike or public transport to leave waste fractions at the point of collection (FTI & Avfall Sverige, 2013). This could not be observed by Johansson, (2014).
Internal factors	Female individuals were seen to have stronger pro-environmental habits, belief and environmental concerns than their male colleagues.	Female individuals are said to be more interested in environmental issues and take a greater responsibility in recycling household waste (White Arkitekter, 2013; Johansson, 2014).

Remarks on the socio-demographic parameter 'Gender'

Regarding external factors, there seems to be no agreement on gender-related aspects of the recycling infrastructure such as distance and tidiness of the recycling collection point. Literature identified stronger pro-environmental habits within female individuals, which could be confirmed by practitioners within the Swedish national and regional scope. If this means that more women use recycling infrastructure, it should be ensured that the infrastructure appeals to them. A relevant measure for men might lie in norm-activation strategies, and the establishment of recycling habits.

Gender is in general a widely applied variable in studies on recycling behaviour, but seems to have weak practical implications. According to a meta-analysis on recycling determinants, gender ranks as the fourth most studied variable, after age, income and education Miafodzyeva & Brandt, 2013). The variable is described by many authors as insignificant in explaining recycling efforts and resulted in ambiguous findings, resonating with the findings in this research (Hage, 2008; Knussen & Yule, 2008; Valle, Reis, Menezes, & Rebelo, 2004; Berglund, 2006).

4.1.4 Cultural aspects

As identified earlier, it could be seen that the socio-demographic factor cultural background is insufficiently covered by literature. A direct application of the framework for the analysis of this aspect was not possible to the same extent the framework was used for the socio-demographics income, gender and age. The analysis takes therefore the form of a literature analysis on what has been written on the influence of cultural aspects and Swedish migrating

individuals in particular, complemented by opinions and experiences from practitioners and researchers operating in Sweden.

Experiences

Firstly, it can be noted that most literature on cultural aspects appears to focus on immigrants. The recycling behaviour of immigrants is subseqeuently related to the fact that this group has a different culture than the Swedish. In some cases there is a distinction made between newly immigrated persons and second-generation immigrants. The studies fail, however, to depict different cultural aspects distinct for a particular culture.

Newly arrived immigrants are described to have issues understanding the recycling system, more in detail problems to understand what to recycle and were to put the fractions (Avfall Sverige, 2008). As variable for explaining recycling behaviour, it could be seen that the variable 'newly arrived immigrants', describing foreign citizens with 0-4 years in Sweden, is in the Swedish context statistically significantly related to the recycling outcome (Hage & Söderholm, 2008). There was few academic literature that used the variable immigrants and therefore this appears a single standing example that needs further investigation to form a reflected opinion. Initial problems with the local recycling system in Sweden seems, however, to be a typical issue as familiarising with a new system requires time to understand. A lower participation in recycling activities appears to be more an issue of lack of integration than a cultural issue.

The Swedish authors Hage & Söderholm (2008) furthermore explain that the social norms on recycling in Sweden show a strong effect on particularly new immigrants. The researcher Åkesson (2014), expert on cultural aspects in relation to environmental behaviour, confirmed that immigrants adapt typically very quickly, in a timeframe of around some weeks. The wish to conform and adapt to the new environment was mentioned to be the reason for this effect. Interestingly, the same social pressure plays a less important role for second-generation immigrants, as Martin et al. (2006) claim. The reasons for this difference is not explicitly stated, raising the question if the participation rate of second-generation immigrants is akin to the Swede without foreign background. This in turn means that second-generation immigrants behave like Swedish citizens without a foreign background and with that a cultural difference in recycling behaviour is defeated. In order to advance understanding the analysis would need to take into account other socio-demographic factors such as socio-economic conditions and other circumstantial factors. As Johansson (2014) argues, do many immigrants live in the type of areas that are burdened with social issues and deprivation. This is confirmed by other academic literature (Coggins, 2001). These differences in conditions would need to be eliminated in order to correctly depict the influence of cultural differences. Whether the conditions can be established in practice is questionable.

Results on cultural factors from Swedish projects on immigrants

The Swedish researchers Ewert et al. (2009) were conducting a study on the cultural aspects and their influence on waste recycling in the Swedish context. The researchers sourced information from informants that were responsible for reporting waste-related problems and issues that arose in their local direct environment and who were also actively talking to people on recycling in their neighbourhood. One of the findings was that the greater generation of food waste by an immigrated person in a bigger household is related by themselves to the immigrants' culture, but not to the size of the household. The fact that the household the immigrant compared the own household with comprised only of one person

was neglected (Ewert, Henriksson, & Akesson, 2009). Experiences from the comprehensive project on the reduction of waste in Southern Sweden could however show that the amount of food waste can be related to certain cultures: In some cultures hospitality is shown in the form of rich amounts of food provided for the guest(s) resulting in higher amounts of food waste than in cultures which do not conceptualise food so strongly (Johansson, 2014). Culture may in this case provide with an explanation for the increased food waste, as well as the size of the household does. The researchers Ewert et al. (2009) could not identify a relevant difference in waste sorting behaviour between Swedes and integrated immigrants with a non-swedish background. Some informants reported that immigrants mentioned that it is difficult for them to 'live up' to the high tidiness and recycling-requirements of the Swedish culture.

In a study on immigrants conducted by the Waste Association Avfall Sverige, the authors note that the reason for differences in participation rates among immigrants and Swedish-born citizens are rather insufficiently examined. Hence the aim was to identify whether observed initial lower participation rates are a result of less knowledge on the recycling system or whether this phenomenon is a cultural issue. The interviewed immigrants were non-academics, with low income, between 20 and 60 and living in a renting situation. Both genders were equally distributed and covered immigrants representing African, Latin American and Middle-Eastern culture. These socio-demographics factors have even without cultural differences already implications on the behaviour (see more in chapter 3): It can be seen that individuals with low income, that rent a flat appoint less efforts to recycling activities. Lower income indicates also less wasteful food practices but depending on the household size the amount of food waste generated in lower income households in absolute terms is higher than a household with a single person, requiring bigger bins at home or more frequent disposing. The examined population covers different age groups that, according to earlier findings, are more or less prone to conduct recycling. According to earlier findings it was also seen that lower educated individuals hold less knowledge on environmental issues and are therefore less likely to hold a pro-environmental attitude.

A further finding from the Swedish study by the Waste Association Avfall Sverige was that in some cultures household waste is strongly connoted with diseases and unhygienic living conditions: Household waste shall not be kept at home for that reason, deterring individuals from collecting different material fractions at home in their kitchen. This attitude constitutes particularly an issue when the appearance of the recycling infrastructure provided is not able to change that perception but rather confirms the associations made with household waste (Avfall Sverige, 2008). This could mean that to appeal to these individuals with a culture that is especially sensitive to such aspects of hygiene, collection infrastructure should allow them to feel safe and protected from harm.

Moreover, the waste practices of the immigrant's country of origin will influence whether the individual is familiar with recycling and conducted recycling activities on a regular basis or if no recycling habits are present. An individual originating from another country with a less prominent recycling culture has less strongly developed habits within the waste-recycling field than somebody growing up within a 'recycling' culture (Avfall Sverige, 2008). Recycling habits develop under conditions that enable and promote recycling and in that sense a person's habits seem to be highly correlated to the local context the individual inhabited before migrating to Sweden (FTI & Avfall Sverige, 2013)

The results of the study showed that 90% of the respondents (immigrated persons living in Sweden) of the study did not know what happens to the waste after sorting out (Avfall

Sverige, 2008). This is likely to influence the attitude towards recycling in the sense that the individual does not see the relevance of his/her action. The respondents understood that they have to recycle, probably partly through the presence of strong social norms on recycling in Sweden but had difficulties with how and why. This becomes a problem when somebody that does not have an internalised moral norm and positive attitude towards recycling (because the relevance is not understood) sees somebody else throwing away all materials in one bag, defeating his/her own action ('why should I do it when the others do not do it?').

Furthermore seemed past poverty and newly achieved affluence of the immigrating individual to play a role: it was reported that when a newly migrated person experiences him/herself as much richer than in his/her own country, the moral norm to recycle is rather low as s/he believes that s/he do not have to do this type of activity. In some cultures, waste sorting is associated with negative connotations and looked upon as an activity of the poor, averting individuals from carrying out this behaviour (Avfall Sverige, 2008).

Similarly, a person that experiences poverty, ascribes recycling activities a rather low priority and activities such as how to feed the family and find a job are more in the foreground. When it comes to the amount of household waste generated, developed countries such as Sweden range substantially higher than developing countries challenging newly immigrated individuals with managing not only with a new concept, that is recycling, but also with the amounts of household waste created (Avfall Sverige, 2008).

When it comes to information, it was noted that particularly in developing countries, citizens do not want to rely on information distributed by the government. The trust in media and information provided by waste management organisations has to be established first (Avfall Sverige, 2008). Further, it was noted that the immigrants' country of origin in many cases represent paternalistic cultures with women mainly responsible for household and hence waste separation. The male character in the household might hold the decisive power on whether the household recycles or not, therefore it seems to be important to apply different strategies for men and women (Avfall Sverige, 2008). The fact that some cultures inherent a clear gender role division, it was noticed that in some cases women are not allowed to "tell" the men to recycle. Identifying the person that is responsible to conduct recycling activities but also functions as an informant for other people within the household or community can be an effective way of communicating recycling (WRAP, n.d.).

Furthermore it was noted that in some countries nature is perceived as dirty and unhealthy (for example through strong pollution) and the pro-environmental attitudes are due to these circumstances not so strongly developed. It was further reported that in some cultures nature is not used for recreation to that extent as it is in Sweden (Avfall Sverige, 2008).

An interesting comment was made by a master student on Cultural Analysis reporting from her experiences with waste handling in different countries and cultures: Her experiences in Saudi Arabia showed that cleanliness is incorporated in their religious doctrine, quoting the Quran "Cleanliness is half the faith" (Steponavičiūtė, 2013). A similar comment was made in an interview with a representative of an association for somalian women (SWIS - Somali Women in Sweden) in Stockholm: Tidiness and maintaining a clean home is very important in the Somalian culture (Garad, 2014). This is assumed to have implications on how the collection of household waste is regarded upon.

Yet does it seem as if different standards are applied to public space: the master student Steponavičiūtė (2013), who was researching within the subject of cultural analysis, reported that in Saudi Arabia waste gets disposed off in public space without anyone taking care. Similar observations were made by friends of mine travelling the Middle East, reporting that household waste was discarded directly on the streets and garden, accumulating without anybody taking care of the waste. There seems to be no issues related to the presence of household waste outside of the house. This might explain observations made by practitioners, stating that immigrants tend to litter their household waste in front of the house.

Another interesting comment relating to waste was made on a culturally strongly embedded standard within the Japanese culture on hygiene: in Japan food products are usually packaged in smaller portions in order to ensure high quality at consumption. This culturally required standard would create high amounts of plastic waste and impede the progress on the way to a reduction of packaging materials (Numata, 2014).

No difference between Swedes with and without foreign background?

When it comes to everyday issues with the physical infrastructure such as recycling stations, bins and storage space at home, no difference between Swedes with and without foreign background on how recycling infrastructure should look like could be reported. Recycling ought to be easy understandable (how to recycle) and convenient (distances should be easy to overcome, favourably as close as possible) (Avfall Sverige, 2008).

In the beginning, for immigrants deriving from a country without waste separation at the source, and/or structured waste management, motives and norms for recycling might neither be present nor internalised, leading to low participation rates in recycling schemes. Beside lack of knowledge and problems with the local language, circumstantial factors such as type of dwelling, and socio-economic situation explain weak recycling behaviour as for any other swedish individual as well. The extent to which cultural factors are relevant is difficult to determine. Great parts of recycling behaviour seems to be explainable by other socio-demographic factors that are not of cultural nature.

Remarks on 'cultural aspects'

It could be seen that different cultures possess different connotations on household waste: Waste can be associated with dirt and diseases. In that case there is a need to emphasise the material value of recyclables but also needs to be stressed that recycling is an activity that is carried out by everyone independent from the social class the person belongs to. The social norm for recycling in Sweden was reported as high, pressuring immigrated individuals to imitate recycling behaviour from Swedes in order to be accepted. In areas that are less demographically mixed and the percentage of newly immigrated is higher, this effect can assumed to be less strong. Increase food waste and potentially greater size of household in some cultures might require support in the beginning by for example introducing the households of how to manage higher amounts of household waste and setting up a collection system at home.

Taking the perspective of the authors (Ewert, Henriksson, & Akesson, 2009) that are researching in the field of culture and society, it was indicated that the cultural background is in some cases used as an 'easy way' to explain differences in recycling behaviour and perceptions on issues with recycling within immigrants habituated districts. This was

confirmed by the practitioner Johansson (2014) who compiles recycling experiences from more than ten municipalities in the southern part of Sweden, Skåne.

4.2 Practical implications

This section looks into how the knowledge on socio-demographics, gathered within the earlier parts of the document, can serve as foundation for the design of a recycling system that anticipates the needs of the users of the system.

The section is organised according to the four socio-demographic factors that were found to be most relevant in influencing attitude and habits but also explaining users' (of the recycling system) demands on external conditions (infrastructure, information). Practical implications of the socio-demographic parameters income, age and gender as well as cultural aspects are discussed and recommendations for an adapted recycling system, which anticipates individuals' needs, are proposed. Suggestions originated from discussions with practitioners in the field of waste management, researchers in the field of waste management and anthropology, my supervisors, researchers from Japan and China, but also friends, classmates and family, who provided me with ideas of how to address certain groups in an appropriate way.

4.2.1 Income

It could be seen that income relates to the amount and type of waste generated, with higher-income families likely wasting more food than lower income households, and more frequently exchanging furniture. In the case of the individuals living in a single-household dwelling with access to garden, the need to dispose of food waste can for example be met by using a house compost. Support can be provided by informing households with a garden on how to set up a compost and what to compost in order to generate a qualitative compost substrate. As this type of household is likely to waste relatively high amounts of food, provided information should include strategies on how to reduce food waste. In case the household does not have access to a garden or compost, separation of food waste from the household waste could be promoted by ensuring that the household has equipment to handle food waste. Support could be provided in the form of a designated food bin and food waste bags. The bags could be handed out in regular intervals, as an additional service during kerbside collection.

Higher income households might more likely possess at least one car allowing for rides to further located recycling stations. Information on how to reach central recycling stations might be best suited for households that do neither use a private kerbside collection system nor have access to a close-by recycling station. Due to a greater size of the house/apartment, lack of space seems probably less of a problem than compared to other forms of accommodation. As lack of space was named as one of the most hindering factors to recycle in Sweden, support on how to set up a space-efficient collection system of recyclables at home seems to be important as well. Individuals that can afford renting or buying a house might have a longer perspective regarding their location, presenting a rewarding group to address for the waste management organisation. Education and measures undertaken to support individuals in their recycling activities could hence be more sustainable than in a housing environment with fluctuating residents.

Higher income-households are also likely presented by the age-groups from over 30 years old with higher education, consuming more opinioned and reflected news on the daily basis. As these individuals are more likely holding professional roles with higher responsibilities than

for example blue-collar workers, these individuals are likely to be reached via messages, which make them feel that they are responsible for contributing to society and welfare with their activities. In the region of Scania it could for example be seen that 90% of the respondents (employees in the region) to a survey on "Who is responsible for a reduced environmental impact in the region of Skåne?" ascribed themselves responsibility. The survey respondents believed furthermore that they share the responsibility with their managers, politicians and environmental managers (Tyréns & Region Skåne, 2012). A higher level of education on environmental issues within this group can also be assumed. Messages that activate altruistic norms, located in the realm of 'think' strategies are seen as appropriate. These think messages build upon the idea that individuals want to acquire knowledge and then reflect on gained knowledge and engage in debates on the issue of interest. Think strategies seem to fit well the Swedish society, as people are used to be integrated in public decisions as opposed to a culture where rules are dictated from the top, with citizens obeying the government. Hence, it is assumed that information on how the municipal waste management organisation makes use of the collected waste will probably be welcomed within this group that is well-educated and aims to acquire knowledge on their environment. This group constitutes also of immigrated individuals deriving from other cultures with a high-level education, coming to Sweden for a certain job-position. These could be addressed in English language or at language schools for Swedish language, as they often aim at acquiring Swedish language skills. Employees from other countries that come to Sweden only for a limited time (due to a project or exchange), could be identified and addressed through their working place (e.g. companies that employ international employees).

When it comes to lower-income households, priorities seem to lie more on financial issues, assigning recycling a lower priority. Lower-income households include for example immigrants that came to Sweden in order to find a job, with low-education, urging to get away from political and safety issues in their home country. But this group represents also students and citizens with less well-paid jobs. Individuals with fewer financial resources are more likely living in multi-occupancy accommodation with smaller flats, with smaller kitchens or space available for storing recyclables. How to efficiently make use of space for collecting recyclables in a space-constrained environment seems to be of high relevance for smaller flats. It was seen that income has an effect on the type of food and products consumed: lower income households were seen to consume more ready-made products that are packaged, but generate less paper waste through a lower consumption of newspaper and less wasteful use of food. Food waste generation seems to be lower due to the fact that less fresh vegetables and fruits are used, with lower need to dispose of peels and stones. However, especially in lower-income household with a migration background and a culture in which food and hospitality are important aspects of their culture, the picture can be turned upside down. In these households, food waste is supposed to take up a higher relative amount of the household waste generated. Here support must be provided in handling the amount of food waste created by the additionally often bigger households, comprising of several family members.

Students that do fall under the category lower-income groups, can most often be found in student accommodations. Student accommodations in many cases provide with shared kitchens, with space for the collection of recyclables there. From my personal experience, it seemed as if the collective recycling systems in the kitchen were already set up and more or less well used by the students using the kitchen. In order to optimise the collection system in the kitchen, the administration of the student housing might be the right reference to talk to. The administration could also be involved when it comes to education on how to use the collection system. As this group will probably not want to assign financial resources to

buying waste bags, containments for recyclables and food waste bags, the provision of recycling equipment that is space-efficient seems to be relevant for this group. For this group it is probably also more important to understand how to recycle than why to recycle. As other things in life have more meaning at this life phase, the limited attention to issues such as recycling should rather be focused on how to recycle than why to do it. If it is not understood how to recycle, the priorities of the student-lifestyle (no time, no money, more focus on social activities and school) will probably deter the individual from assigning time to an activity that is considered as unnecessary and time-consuming. As the recycling activities of the individual are transparent within the group of students using the same kitchen, it is important to keep the recycling 'moral' up high. Therefore it is important that all students sharing the kitchen contribute likewise to recycling activities. Frequent interventions and engagement with students to ensure that they understand how to recycle could be an appropriate strategy. The same accounts for immigrants living in bigger households: they are, as well as students, part of a social group with strong social cohesion.

It was seen that addressing the 'right' person, an influential member of the social group/family, is very effective in promoting recycling activities. Local ambassadors have been found to be most suitable for engaging with the social groups students and immigrants that live in multi-occupancy accommodation. Both groups can also be reached via their interest groups and associations such as student nations and immigration associations. Particularly for immigrants, involving somebody that they can relate to, a person working for their immigration association, talking to them in their own language, explaining why and how recycling is carried out, seems to be important. It was also reported that deprived households use the television very frequently and that these households perceive information provided via this media as important. Furthermore, economic incentives could be important for this lower-income group. Students could be engaged by competitions in corridors, with the perspective to get free lunches or cinema-tickets.

Most multi-occupancy buildings have close-by recycling stations, providing with disposal containers for most or even all recycling fractions. The convenience for the users here is high in the sense that the recycling station is not remotely located. On the other hand, these facilities are used by many households, increasing the risk for untidiness and disorder. Disposal is more anonymous and wrongly recycled fractions or littering stays undetected in this anonymous environment. It could be seen that appearance of the recycling station is influencing the associations with recycling and therefore, a need to maintain a high tidiness moral has also positive impacts on how recycling is perceived. If the materials found in the recycling station are dirty, it is hard to imagine that the materials are actually valuable. A clean and tidy environment on the contrary demonstrates that the materials are valuable and that they have to be treated with care. Moreover, does the design of the recycling station and the containers, as well as the location of the containers inside serve as information source for how and why to recycle. Placing the mixed household waste within the first meter of the recycling station, encourages to dispose off all sorts of waste here as it is most conveniently reached. From my own experience I do appreciate the waste fraction food waste in the first meter of the recycling station, as I dispose off this waste fraction most frequently. It was noted that plastic recycling quotes are currently rather low, as the value of the material plastic seems to be low, in comparison to other materials such as glass and paper. Lower-income households do particularly consume more packaged products, making them a target group for the promotion of plastic recycling.

Finally, it was seen that unemployed individuals have more time to structure their household and conduct recycling activities. This behaviour might be explained by the statement that

recycling is among these environmental activities that is relatively easy to carry out, compared to other activities such as reducing car use, water or meat consumption. Recycling can hence be considered as an activity where one can easily contribute to society without high costs of time and effort. As unemployed have more time available, this activity presents a rewarding opportunity. Inactivity among this group was, however, reported as a deterring factor that would defeat the argument of having more time available for recycling activitities. Earlier in this research it was on the other mentioned that unemployed individuals present good knowledge on what and how to recycle. This could mean that this group particularly needs support in motivating this activity and less focus on education on recycling issues.

From these two precedent paragraphs it could be seen that relatively many aspects can be related to income and type of dwelling, assigning these two parameters an interesting role.

4.2.2 Age

The age-group at around 30, with high education has to some extent already been discussed earlier within the parameter income, more in detail higher income. As not all individuals aged 30 can be presumed to have a high salary, this age-group can be more generally considered a group that presents a more stable lifestyle, in terms of finances and social network, job and location. At that time of life it was, however, noticed that the earlier acquired recycling habits, learnt within the family environment, are taken up again after a phase of liberation when moving out from the parents' house.

The early education on recycling thus seems to have an impact on how the person will look upon this activity, ascribing the education on recycling issues within the family household importance. It could be seen that children are more willing to change behaviour than older individuals, making them a rewarding target group. In discussions with friends that have children, it was noted that the children that had undergone an introduction on recycling activities in kindergarten would act as ambassadors on recycling issues in their own homes, educating and pushing their parents to behave in the way they learnt to behave, showing some kind of pride to be able to apply the new knowledge gained in school and themselves being teachers. Projects in schools and kindergarten on how to reduce food waste for example to not take more on the dish than you can eat, study visits to recycling facilities, art projects on what to do with recyclables, as well as sorting games and competition among kindergarten groups or school classes, could have fruitful results. Children are thus seen as easy to influence when it comes to attitude and social norms. The messages should be easy understandable and not require too much 'thinking' as not much pre-knowledge on more global issues such as environmental issues and local waste management can assumed. When it comes to external factors, the interaction of children with waste should be designed in a children-friendly way. It was noted that often doors to the recycling stations are too heavy to move for them and requiring a key in many cases. It seems logical that the access to a close-by recycling station should be only guaranteed for the members of the households living there, in order to avoid littering and disposal of waste by others. For these recycling stations located within a multi-occupancy building (surrounded by buildings or fenced), the use of a key might, however, be unnecessary. On a trip to Augustenborg in Malmö, in a neighbourhood of multi-occupancy buildings, owned by a public housing company, the recycling stations open with a key but are easy to open and located between houses where in some cases also the playground is located at. Talking to children (< age 10) there, it became apparent that these kids were disposing recyclables there, indicating that the system there works for them. It can be imagined that the children can be easy integrated in recycling activities, as the recycling station is located close to their playground or on their way to the bus. Furthermore, as most containers are accessed through a lid that has to be moved

backwards, it could be imagined that children, who have not reached a certain height, have problems to open the containers. This could require a need to rethink the design and height of the recyclables containments. Recycling systems such as in Western harbor (Västra Hamnen bo01) in Malmö, that make use of an underground sucking system, require a key as well but the design of containers is different in the sense that the containers open to the front, allowing to feed them from the front. The containers provided to private households in single-houses are also rather high and might constitute an issue for children. Furthermore, a befriended father mentioned that he sees an issue with safety when it comes to the use of the recycling station. He reported that broken glass on the floor would deter him from sending his 6-year old kid there on his own. Another issue mentioned was that the distance to the next recycling station is too far to let his son go there by himself. The issue with safety and distance seems to be solved in a good way in Augustenborg, as the recycling stations are placed between the buildings, so that parents could oversee the activities of the children. The appearance of the recycling stations inside was also appealing. Concluding, it was seen that the design of the recyclables collection is not necessarily addressing the needs of children. As early activities in household waste issues were however seen to be relevant for establishing later habits and attitude, this important target group could deserve more attention.

Elderly individuals, who are still able to care for themselves, were found to be likely having problems with the distance to the next recycling station as well. Carrying heavy bags with the recyclables to a distant recycling station will deter especially these individuals with physical constraints due to their age. These households, however, often have help from home care services, whose employees are encouraged to separate the waste for the household, making them an interesting partner to work with when it comes to providing information on how to recycle and why. These could also play a role in shopping behaviour, for example educating them in how to avoid packaging waste when buying every day products and food. For individuals that are older but have no physical issues, similar convenience requirements as for anybody else applies. As older individuals have however already established habits and routines, changing these was found to be more complicated than changing the attitudes and habits of younger individuals that have a less developed opinion. Older individuals were noted to require more information on the reasons to recycle, for example during the introduction of a new fraction such as food waste. This group appreciates traditional information media such as printed media, leaflets, brochures but also personal meetings to explain the new recycling activity. The lifestyle of this group is much more stable than the one of their younger colleagues, and holds a less positive attitude towards change in daily activities. Constant change in the recycling system might therefore not be welcomed and it can be imagined that this group will less likely want to participate in pilot projects. This group is however very aware of their neighbours, as the frequency of social meetings and meeting new people decreases when retired. 'Policing' activities can be found in this group, making this group however a possibly interested group to work with as a local ambassadors. Retired people have often more time to read instructions and to talk to people, with the function of a local voluntary recycling ambassador maybe even representing an appealing role to this group of people.

Young families in the early 30ties that have sufficient financial resource to acquire their own house/flat value the health and safety of their children very high and arising from that are often aware of environmental issues, considering a 'green' lifestyle as 'hip'. Using second-hand clothes and procuring green products as well as a desire to decrease the environmental impact of their other activities such as travelling and in their household makes this group a very interested and interesting group for the organisation managing their waste. This group might be among these groups that are interested in testing new approaches, engaging in

neighbourhood activities as well as often are politically active. Attitudes towards recycling might be very positive and information on the how and why to recycle are assumed to both be of relevance for this group. Participation in competition on reducing waste and recycling might be well welcomed by this group as well. This group is also the only one disposing off napkins and glass containments for baby food, and other products used for baby care, requiring good solutions to deal with this kind of waste. Here midwifes could be involved in order to provide with education on how to use alternatives to single-use napkins that make up large amounts of generated waste by this group.

4.2.3 Gender

Regarding gender, it was found that male individuals hold weaker pro-environmental attitudes than their female colleagues. Women seem to express a higher concern for the environment than men, implying an increased need to engage men in recycling activities and educate them on the relevance of recycling as an activity decreasing the need for virgin materials. It could be tested what kind of message appeals to women and which appeal to men. As women seem to take more responsibility when it comes to the waste separation at home than men, this fact could imply that information on the practical issues (how to recycle) are more interesting for women or the person that takes most responsibility in the household for waste separation, than for the male person in the household (or the person taking less responsibility).

When it comes to single living male individuals it was noted that particularly younger male persons under 30 lack the structure, habit and motivation to recycle. In an observation on recycling by a student of the Department of Arts and Cultural Sciences at the Lund University, it was noted that young males tend to behave according to this quote by a young male: "I don't sort out my garbage just as I don't separate my laundry" (Qin, 2012). Recycling appears to be no pressuring issue and with not economic incentives in place, the effort related to waste separation not rewarding at any level. This group furthermore lives in urban areas defeating the need for a car. Recycling stations that are located in far distance are very likely not to be visited by a car-less unmotivated non-recycler. There is no direct group that is influencing the described group of single male individuals that lack motivation to recycle, making them particularly difficult to reach. It was found that males are much more willing to pay in order to get relieved from recycling activities than women. In discussions it was on the other hand mentioned that males have a more competitive nature, striving for achieving targets and winning in competitions. In a discussion with a friend belonging to the group of the single male non-recycler, it was mentioned that he would recycle if somebody would care: he claimed that when a camera would be installed in the recycling station he uses, he would feel pressured to recycle. Controlling their activities in a project and reporting it in a way that their achievements are visible to others (as for example within the neighbourhood) could be a possible measure appealing to competitive natures. The aspect of control seems to be relevant for this group.

When it comes to households with mixed genders, it was as already mentioned that women feel more responsible to separate their waste separate. It would be interesting to investigate whether the males feel more inclined or comfortable with taking down the waste to the recycling station. If this would hold true, it would mean that information on how to separate should be more appealing to women whereas the design of the recycling stations should be more appealing to the male gender. This gender role aspect might be also relevant for the following aspect cultural background, as some cultures have a clear division of roles in the household.

4.2.4 Cultural aspects

In the Swedish culture gender roles might not play an important role in explaining differences in recycling behaviour any longer, but in discussions with individuals from different cultures it was acknowledged, that many cultures devise household activities to the females in the household. Migrated females that are living with their families in Sweden, could hence be reached via women's organisations of their culture. Here education on how to recycle in their particular municipality or neighbourhood could be provided by the waste management organisation.

In general it was noted that often, immigrants perceive a high social pressure and express a strong desire to be integrated in the Swedish culture. Integration can be facilitated through language course on Swedish languages, where recycling issues could be taken up and the recycling system in Sweden explained. The motivation to integrate and 'fit in' is presumably high in the beginning, whereas the motivation appears to decrease after a certain time. So could be seen that second-generation immigrants do not feel the same pressure for integration as their newly immigrated countrymen. This might result in a decreased interest to conform to Swedish culture. It thus seems important to focus on these individuals that have a high motivation to integrate. As mentioned, language schools can serve as information channel but also local ambassadors recruited from the community in which a cluster of immigrants can be found have seen to be an important measure to promote recycling activities. The children of immigrants can also function as source of information on recycling issues. Here the relevance of the influence of a child might be lower when the immigrant derives from a paternalistic culture. The father might dominate in that case.

As the female in the household might still be the one responsible for the preparation of the food, education for the female on how to use the recycling system (particularly food waste) and how to set up a collection system at home seems important. For deprived immigrant areas with many individuals being unemployed, engagement in recycling activities that contribute to society could be an interesting option for some members of the community. If appropriately communicated, a function as an ambassador, taking over responsibility for the recycling of a certain local area could constitute a meaningful activity. It could be even thought about employing locally situated ambassadors for projects on awareness rising or detection of issues, as these are much closer to the community as somebody from outside (employed by the waste management organisation) can become. As the other members of this local social group identify with similar cultural aspects it might be easier for other members to follow the behaviour of the ambassador. A good organised immigrant area could suit well for pilot projects. Results on which measures work best, might be even transferable to a similarly strong social group, namely students living in studenthousing. It was noted that information provided to immigrants, should make use of symbols rather than language. On the other hand, returning back to the integration aspect, might immigrants welcome it when they get treated like any other Swede. In a discussion with a practitioner it was mentioned that easy Swedish language combined with symbols might probably work best for everyone.

As noted in the earlier chapter, does food and hospitality play a role in many foreign cultures, requiring a higher need to dispose of foodwaste. An introduction to the right equipment should be part of the introduction on how to recycle.

It was mentioned that immigrants that have been leaving their country for safety reasons and because of corrupt governments might be very sceptical to information provided by 'governmental' organisations such as waste management organisations. Personal meetings

have been stated to be more effective and trustworthy than information provided in a written form.

When it comes to information, Sweden is, as mentioned earlier built on a democratic system, aiming at integration of opinions and active citizen engagement. In discussions I perceived Swedish citizens as actively demanding information on the why of doing things (such as recycling). Moreover, controlling Swedes on their recycling activities seems to be rather unappreciated: Before I started researching for this thesis, the waste management organisation of the city of Malmö had given negative feedback to households of an area that had been introduced to food waste collection, as the participation in the collection of this new fraction was shown to be rather low. The households that had been receiving the feedback became very dissatisfied about the actions of the waste management organisation, showing that control on activities that are perceived private is not very welcomed in the Swedish society. This is in contrast to a system where citizens ought to obey governmental decisions without asking why. Increased knowledge on cultural differences explaining how citizens will react to measures, feedback, information and rules is seen to help designing measures that will effectively reach citizens deriving from different cultures.

4.2.5 Social groups and their involvement in recycling activities

The social groups of interest for this research are students, elderly people, cultural groups, families, immigrants, but also neighbourhoods, streets characterised by a stronger spatial focus than the precedent groups. Moreover, individuals affiliating with a political party, as well as representatives with a similar profession can be named. A less structured group is for example a group of individuals with similar income or educational level.

According to literature, social groups feature a group of at least two people interacting with one another, with shared beliefs and values and strong identification with the group (Sociology Guide, 2014). Social groups distinguish themselves from groups of people that identify with the same idea but are not aware of the existence or the others within the same group. Here the group is less structured as social groups and these groups are therefore referred to as quasi-groups (Sociology Guide, 2014).

According to the findings of this research, socio-demographic parameters can serve as reference to different social groups, but contribute only to a certain degree to the understanding of behaviour of different social groups. The groups 'students' and 'elderly people', can for example be approximated by the socio-demographics age and, whereas the socio-demographic characteristics of the group 'immigrants' are less explicit. This due to that there is no typical immigrant, none of the socio-demographics, such as age, gender and income, can be used to understand the particular interaction with recycling. It appears as if the category immigrant is not an appropriate category, failing to provide with information on characteristics of this group. The same accounts for individuals affiliated with a certain political party; the variety of individuals presented by a group affiliated with the same party is not sufficient to describe their engagement in recycling activities. When it comes to individuals living in the same neighbourhood or street, income might be an indirect proxy to use as it can be related to the type of dwelling.

Concluding, do social groups comprise of individuals represented by a variety of socio-demographic variables without clear pattern of parameters distinctively belonging to them. When the groups are not habituated within the same spatial scope (e.g. neighbourhood, student housing), identifying the location of the group members within the municipality is complicated. Identifying members of groups through their interests is easier. So do projects

in Sweden such as 'Skitlite 2020' (Scania region, South Sweden) address different societal groups such as students, lonesome parents living without their children, families with children aged 0-8, with children from age 9-18, families without children or with their children already moved out and retired individuals with different strategies to reduce waste generation and promote recycling. The rationale behind this division is that each group is driven by different motives, influencing their behaviour (for example assuming that above a certain age health is valued higher than material welfare). Understanding how individuals from each group think and where to apply a lever, is assumed to increases the effectiveness of measures undertaken by the waste management organisation.

Talking to practitioners of a municipal waste management organisation as well as public housing company it became apparent that measures are however more reactive than proactively organised: in general it is assumed that every individual in the municipality has similar requirements and needs when it comes to recycling infrastructure, so focus is set on convenience and making it easy for the user to understand and use the recycling system. When issues occur such as that only a low recycling rate is achieved, or that users express dissatisfaction, measures are adjusted. Information on the contrary is more tailored to different groups, such as students, immigrants, users of holiday houses, elderly individuals, detached houses, or multi-occupancy houses. This not only because the recipients are different but also because they above mentioned households use different recycling systems (close-by recycling station, kerbside collection, central recycling station). To tailor infrastructure to the needs of different groups (as named above) is seen to be too complex and not sustainable, as demographics shift over time, individuals move somewhere else, city population grows, or gentrification takes place. Besides a shift in demographics, Sweden has also the philosophy to mix societal groups and avoid clusters in the urban landscape. As the urban socio-demographic landscape is more homogenous, tailoring measures to the needs of different socio-demographic groups is practically difficult to implement. A higher grade of tailor-made measures would complicate the system, resulting in mistakes in waste management but also leading to confusion on the part of the users (households). Thus the cost-benefit of tailored solutions for the Swedish context is unknown. The focus lies hence more on tailoring information to the needs of different groups. Speaking to researchers that conduct research in this field, the practicality of such a to individuals tailored recycling system was questioned. It was stressed that the scope should be rather extended to, for example, a district or neighbourhood as the households share similar conditions and circumstances.

In another discussion with a practitioner it was mentioned that waste management is still a very traditional sector that has just started to address users and with that households more individually. The focus of the waste management sector was mentioned to be strongly focussed on technology and so far rather neglecting the user perspective. Inspired by a talk of a researcher on waste recycling systems, I learned that waste management organisations can apply two approaches: either, it tries to change the behaviour of the user and make him behave in favour of the waste management organisation or anticipate the needs of the users and adjust the system towards the users. In this context, Sweden was however perceived as applying a system where the user's needs are anticipated and integrated in the measures promoting recycling. This resonates well with the notion of Sweden as a strong democracy.

4.3 Practical set of measures for practitioners

The preceeding paragraphs were taking into account the implications of the socio-demographic variables income, age, gender as well as cultural aspects. Beyond these categories, observations that have been made during the research period as well as issues are

added that have been reported on during interviews and discussions with different persons I encountered. The chapter provides with a practical set of measures as well as describes fields of interest that practitioners can review in order to identify improvable areas within local waste management practices.

1. Build base data. Analyse the socio-demographic situation in your administrative spatial scope and understand which kind of persons do live in which area. As local demographies shift over time and gentrification takes place, the results of the analysis of a dynamic urban environment expire presumably relatively fast and need to be updated every year:
    a. Are there socio-demographic clusters of people in your administrative scope or are the socio-demographics more homogenous? This information will help you to understand whether local suiting solutions that fit a particular socio-demographic best (for example students, families, etc.) are applicable. In the case of a homogenous socio-demographic environment, different individuals can be reached via different information channels.
    b. As the income determines which products can be acquired, information on this factor can help to understand what kind of household waste to the neighbourhood pertinent households discard. According to your analysis, the focus of the local waste infrastructure can be adapted to the predominant waste patterns and quantities. Another point that appeared to be important is that due to the different size of the households and the amounts of waste generated, bags and containers should be made available in different sizes;
    c. Analyse the fluctuation rate in your administrative scope in order to understand whether long-term education strategies on recycling will pay off and how 'difficult' your recycling system can be designed (presumably more applicable to urban environments with less dynamic demographic changes). For an unstable, moving in and out population, an easier to understand recycling system might be the better option, whereas a stable urban environment might manage more advanced household recycling infrastructure and information that requires more knowledge. Interesting is also where the people come frome and which system they are used to in order to understand which basic knowledge can be assumed.
    d. As some recycling collection options have limited accessibility for users (such as kerbside collection that takes place on designated days as opposed to close-by recycling stations that can be used at any point of time), this might interfere with the life of these users that have a rather unstructured lifestyle, referring to younger individuals, such as students. As students more likely live in multi-occupancy buildings with recycling stations close by, which can be used at any time, this seems not to be an issue but should be kept in mind.
    e. As the level of education can give hints on the level of understanding of environmental issues, this information can help to understand on which level educational information should be communicated and which knowledge can be assumed.
    f. Information on the age structure of the administrative scope can help to understand where the willingness to change is high and polit projects to test new measures are most likely welcome.
    g. Generating knowledge on the cultural backgrounds of the people living in the administrative scope can help to understand to which extent education has to be provided and helps to explain behaviour and the individuals to better integrate.

2. Conduct pick analysis of mixed household waste in order to find out about which fractions are being neglected from recycling efforts and evaluate the conditions of the collection points. The former will provide with hints on which fractions households do struggle with to sort out and on which fraction to educate people. The latter will help to understand whether recycling is not carried out due to practical reasons such as filthy close-by recycling collection points and hence effort has to be placed on ensuring that practical issues are being resolved in order to promote recycling. Additionally, analysing the socio-demographics of the pertinent neighbourhood and subsequently applying the knowledge gathered in this research on how to address different socio-demographic groups, is seen to result in a locally appropriate strategy.
3. There seems to be a lack of knowledge on how to set up an efficient recycling system at home. In the well-established recycling system of Sweden, space at home for the collection of recyclables is mentioned as a deterring factor. Educating people on simple measures such as collecting plastic and metal in one recycling container in order to save space at home and further separate them in the recycling station is a possible and easy communicable measure. Other possible measure could be to provide households with so-called minimizers for soft plastics; or recommending placing recyclables with a similar time of accumulation (faster/slower) together.

5 Discussion

This chapter reflects upon the research conducted, the research topic chosen, the choice of theory used to conduct the research and the analysis of the findings carried out.

Research aim and research question

The aim of the conducted research is to make use of socio-demographic factors in order to understand how different individuals engage in recycling activities and with that adjust an advanced recycling system such as in place in Sweden, presenting already high recycling rates. The need to conduct research on socio-demographics arises from the identification of the ambiguity of knowledge on this issue, noted in an initial literature review. Interest on recycling system that is tailored more to the differences of users was expressed during discussions with researchers and practitioners in the field of waste management. The first research question thus aimed at describing the engagement of different social groups with recycling activities, applying socio-demographic factors as explaining parameters. It was assumed that socio-demographic variables are able to describe and provide with knowledge on how different individuals engage with recycling infrastructure and information. Whether this holds true or not is taken up in the later paragraph on the analysis. The author chose to approach the topic without initially defining which socio-demographic groups are examined. This choice was made on purpose in order to analyse a wider scope of academic research published and experiences described by practitioners on recycling behaviour. This approach resulted in findings that describe these socio-demographics, which have been in focus during the last two decades, indirectly pointing out these that have not been under investigation or were perceived as unimportant. As the objective was to shed light on the relevance of socio-demographic parameters in explaining recycling behaviour but also gather knowledge, the scope of the research question seems to be formulated appropriately. The literature findings were in a next step evaluated by practitioners, dismissing the findings that do not apply to the Swedish context.

Choice of framework

As an initial review showed that socio-demographic variables, describing different social groups, have only weak correlations with recycling behaviour, it was searched for another method that would allow making use of socio-demographics. As a result of a literature review on theories of recycling behaviour, the theory on recycling behaviour by Stern (2000) was chosen. The theory was applied to guide the author in the search for relevant findings on the implications of socio-demographic factors. The theory assumes three relatively widely defined factors to be determinants of recycling behaviour. These categories were seen to serve well as thematic structure to categorise findings on influences of socio-demographics.

Influence on the data collection. During the application it became apparent that the determinants provided by the theory of Stern (2000) (external factors, attitude and habits) were represented to different extents within literature. Understanding the implications of socio-demographic on habits resulted in the least findings. Whether this implies that habits are not strongly influenced by socio-demographics or whether the lack of literature referring to habits is the reason, could not be determined. Attitudes were a wider term that resulted in more findings from literature. For the category external factors, it seemed important to first find out which external conditions are of relevance to promote recycling behaviour as literature presented a wide range of external factors possibly contributing to recycling behaviour.

Lack of evaluative character of theories on recycling behaviour. The weakness of the used framework lies in its insufficiency to describe how the factors habits, attitude and external factors are weighed in their importance of influencing recycling behaviour. Other frameworks and theories reviewed seem not to provide with any indication on the importance and interdependence of the determinants of recycling behaviour either. This limitation does however not have far-reaching consequences, as this research does not focus on which factors are most important but rather describes how different socio-demographic groups could be addressed appropriately.

Other methods. In hindsight, this research could have also focussed on analyzing different profiles of individuals and their pertinent engagement with recycling activities. This would have resulted in an overview on behavioural patterns of different profiles. The British Department for Environmental, Food and Rural Affairs (DEFRA), however, already provides with an extensive model on ecological worldview, sociodemographics, lifestyle, attitudes towards behaviours, motivations and barriers and knowledge of different types of individuals, called the 'environmental segmentation model' (2008)[8]. This research could have not claimed similar time and resources capacity.

Analysis

The research conducted in this thesis investigated each socio-demographic factor individually, detached from other factors. This does not correspond to reality, as individuals present a mix of characteristics that can be described by socio-demographics; furthermore does looking at socio-demographic factors individually disregard contextual factors such as the direct environment the person lives in. These are however included in the analysis as 'external conditions' and are taken into account when suggesting recommendations provided in the later chapter of the analysis. Once more, the complexity of behaviour and dependency on various factors is recognised and thus only indications between factors and recycling behaviour can be presented.

The analysis took into account only these socio-demographic parameters that were found to have an effect on external conditions, attitude and habits. These socio-demographic parameters that were only relevant for one of the factors of recycling behaviour were excluded from the analysis. As it was noted that the influence of cultural aspects on recycling behaviour is not well covered by literature despite its mention as an interesting topic that needs more attention, cultural aspects were taken up in the analysis. The framework (ABC-theory by Stern, 2000) used for the analysis of the socio-demographics gender, age and income appeared to be not appropriate to identify the relevance on cultural aspects on external factors, attitude and habits.

In order to put the findings of academic literature and reports into a practical perspective, practitioners were consulted. It was noted that most practitioners do not link recycling rates to socio-demographics and therefore could not provide with a reflected opinion on the findings from literature. This resonates with what I had been recognising during interviews with different persons from academics but also praxis: Literature findings on determinants seem in many cases not directly transferrable into applicable measures for practitioners. In order to contribute with results that are more practical than theoretical, the last part of the

[8] DEFRA, A framework for pro-environmental behaviours, 2008

analysis provides with suggestions that have been inspired by different interviewees from academia and praxis but also users.

Research questions answered?

In order to answer the research question posed, literature, covering various socio-demographic factors, is consulted. The amount of theoretical knowledge to draw upon was greater than the practical knowledge on the implications of characteristics of individuals, which was analysed in the second part of the thesis. Whether this means that socio-demographics are not important in the practical context and all residents should be treated the same when it comes to recycling infrastructure and information or whether this means that there is a need to harness and translate theoretical knowledge better is difficult to define. I think, however, that this approach has particularly potential in a well-established recycling system that has already exploited most options of improvement of recycling infrastructure. Here, in order to reach more individuals that currently not recycle, taking the users' perspective constitutes another option of improvement. The potential might be higher in cities or urban areas with clusters accommodating different social groups, whereas a more homogenous population requires less distinction of measures and information.

It became also apparent that recycling behaviour depends not solely on the socio-demographic characteristics of a person, but rather on a set of factors including attitude, habits and external conditions. Socio-demographics can on the other serve well to approximate the personal capabilities and probability to express a certain attitude and access to information or capability to carry out recycling activities.

With the approach chosen, findings from literature could be gathered and structured according to either socio-demographics or external and internal factors determining recycling behaviour. Literature did however not provide with practical solutions on how to address different individuals but supported by insights from practitioners the results could be translated into practical recommendations, allowing answering the second research question.

In this sense, the contribution of this thesis lies in the translation of the gathered theoretical knowledge into practical recommendations for different socio-demographic groups.

Generalisability

The practical implications of socio-demographic factors were formulated for an urban context that presents a high participation rate, good recycling infrastructure, rather homogenous socio-demographics and a democratic political system. The system further builds on a system that separates the household waste at the source, depending on public participation. The democractic culture in Sweden is not one of an obeying society but rather of integrative nature, which requires anticipation of the citizens. The recommendations might therefore be less relevant to a society not presenting similar characteristics.

Furthermore, the research was generalising the findings on behaviour for all fractions of household waste. So is for example not distinguished between attitude towards glass recycling, food waste recycling, and plastic recycling. In the same train of thought it is thus assumed that the attitude of different socio-demographic groups towards all fractions is the same, which might not hold true. Particularly the recycling of 'older' fractions, such as glass and paper that have been recycled for a longer period of time than food waste for instance, might be considered as a matter of course compared to newer fractions such as food waste.

The results would thus have benefited from a higher resolution of the analysis sorted by fractions of waste.

Further research

As was mentioned earlier, it could be seen that the amount of literature available for the analysis of cultural aspects, as a potentially contributing factor shaping behaviour, is limited and needs further research. In general there is a lack of practical recommendations in academic research that might deter practitioners from applying findings from academic research. As there is an abundancy of information available on determinants of recycling beahviour, focus should be put on how to practically make use of the information provided. According to practitioners knowledge on determinants is not fully applied yet. Another topic appears also to deserve more attention: very little could be gathered on how determinants of recycling behaviour influence each other, which factors (infrastructure, information, social pressure etc.) are the most important for which individual, how do external factors influence internal factors as well as the other way around. Frameworks that give practical suggestions as well as provide with indications on what measures and determinants should be prioritised for who, are seen to support the design of recycling systems that are able to promote recycling activities in the designated urban environment and help to reach the ambitious targets set out by regional waste plans.

6 Conclusions

In Sweden, household waste is separated at the source, making the success of the recycling system largely dependent on the active participation of the citizens. The success of this scheme appears to benefit from an increased understanding of the users perspective. This system, hence, appears to particularly benefit from a better understanding of how households engage with the recycling system in order to promote recycling activities. An abundance of academic research is available on determinants of recycling behaviour, stating convenience, concern for the environment, moral norms and information to be of highest relevance in contributing to recycling behaviour. Theories within the social and behaviour sciences explain recycling behaviour to be a function of external conditions, personal capabilities, attitudes and habits (Stern, 2000).

The academic literature reviewed provided with interesting knowledge on socio-demographics: Some indications of how parameters such as income, age and gender influence behaviour that developes as a result of external conditions, attitude and habits could be made. A lack of knowledge on the influence of cultural aspects on recycling behaviour was found: particularly the aspects hygiene and gender roles were brought up in discussions with immigrants, implying a need for further investigation of these two aspects. The analysis of cultural aspects in this research showed that immigrants as any other Swedish citizens wish for a convenient recycling system that is easy to use. Cultural aspects seem to have no correlation to how and if recycling habits are formed, but rather that habits are the result of the direct environment of the individual. This in turn means that if an individual origins from a country where recycling has not been part of the daily household activity a recycling habit needs to be newly established. How attitude is formed is more ambiguous but it could be seen that the strong presence of social norms on recycling in Sweden function as pressure to comply with what is commonly done.

When it comes to other parameters describing individuals, this research found that the most interesting socio-demographics were gender, age and income. All these showed effects on what a person thinks about recycling, whether recycling has been developed to a recurring activity, and how and what infrastructure is used. For habits it could be seen that this behaviour is less strongly influenced by individual characteristics such as age, gender and income whereas attitude was shown to correlate to socio-demographics. The personal capabilities of a user of the recycling system determine as well how external conditions are perceived and whether they are in favour or whether they deter the user of separating waste. To conclude, it can be said that socio-demographics help to approximate the engagement of different individuals with the recycling system and with that support to understand the users perspective. To summarise the main findings of this research, the following can be said:

- Children: Acknowledge the potential of on recycling issues educated children, and adjust recycling infrastructure better to the needs of children, through increased safety and improved usability of recycling bins and recycling stations;
- Immigrants:
    - Acknowledge the cultural aspect of hospitality and the role of food and supply these individuals deriving from such cultures with food waste equipment;
    - Improve the image of recycling activities among these immigrants deriving from a country in which waste management is carried out predominantly by the poor;
- Social groups

    - Employ recycling ambassadors in groups with strong social cohesion such as families, immigrant clusters, students in studenthousing, harnessing group dynamics such as social pressure and identification with the group allowing interventions to be effective;
    - Use channels used by different socio-demographic groups such as associations, printed media and other media.
- Low-income users: Economic incentives seem particularly interesting for users with lower financial means;
- Young non-recyclers: Establish control mechanisms and/or involve households in competition.

The recommendations give an idea on how to approach different individuals in order to promote recycling participation. Information on the socio-demographic parameters seem not to be sufficient in explaining recycling behaviour but can definitely help to understand the user perspective. A 'one-size fits all solution' is shown to reach till a certain recycling quote, but in order to go beyond it seems important to take into account the users perspective.

This research would have benefited from more knowledge on the particular influences of single socio-demographics, thus encouraging researchers in the field of recycling behaviour to conduct more bivariate analysis: correlating socio-demographics to attitude, habits and external conditions as contributing factors to recycling behaviour. When it comes to cultural aspects in explaining recycling behaviour it appears to be important to apply a more reflected differentiation of the term immigrants. A possible approach to understand better the influence of cultural aspects could to assess the differences in cultures as well as differentiating between initial difficulties with recycling for newly immigrated groups and a lack of integration of immigrants. So far the different cultures of immigrants are not always clearly distinguished within research. Second-generation immigrants might constitute a fruitful source of information on dominant cultural aspects that interfere with recycling activities. For practitioners, it could be interesting to make more use of the academic literature on socio-demographics and investigate more the concept of social marketing for the field of waste management. A next step could then be to identify which group to prioritise in their administrative scope. An increased understanding of how to address different socio-demographic groups seems then even applicable in the context of the prioritised waste strategies 'reduce' and 'reuse', as confirmed by Anna-Carin Gripwall (2014).

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