The Waste of a Bad Policy on Municipal Solid Waste:

A study on the effect of the satisfaction level of citizens and the perceived quality of waste in the Netherlands.

by

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Preface

Dear reader,

The date was May the 1st 2019, when I first met Dr. Coenen in his office to talk to him about potential thesis topics. Now almost two years later, I am very satisfied with the product that lies in front of you. The list of reasons why it took quite a while to complete my thesis is long, but the most important thing is that in the meantime I kept learning and developing myself. This thesis is not only the finalization of my Master of Science in Public Administration, but is also the start of my career to hopefully contribute to society.

The idea of a topic for this thesis, municipal solid waste policy, did not came out of the blue. While working as an elected official for the municipality of Raalte, Overijssel, I have discovered that this is one of the subjects that is quite complex. In my function, I have experienced citizens complaining after decreasing the frequency rate of residual waste collection or they think that plastic packaging waste can much better be segregated by machines after collection instead of being segregated by the citizens themselves. This thesis gave me an interesting view on how waste policies are designed and executed in the Netherlands.

First of all, I want to thank my first supervisor Dr. Coenen, who has invested many hours in helping me during the writing of my thesis. In the meetings we have had together, he kept reminding me what the record was of the student that took the longest amount of time to finalize his thesis. I am glad to announce that I did not break this record. Secondly, I want to thank Dr. Klok as my second supervisor, who helped whenever necessary. Next to this, I want to express gratitude to my father Jos Elshof and my friends Ewout van Dartel and Roel Blom for helping me to send out the invitations for the survey. Also, I want to thank my brother Jorick Elshof for giving me feedback in the final stages of writing my thesis. I would also like to thank everyone in my inner circle that helped me during this process: my family, my friends and my roommate.

I hope you enjoy reading my thesis.

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Abstract

A trend in municipal solid waste (MSW) policy in the Netherlands is an increasing concern on the declining quality of waste streams. This trend is problematic for achieving sustainability goals and the efficiency rate of the costs of the MSW policy. Due to an increasing focus on financial and environmental goals, MSW policies and studies on MSW are aiming to stimulate recycling. However, the level of satisfaction of citizens in MSW studies have been neglected in these studies. The goal of this research is to try to investigate the relationship between the MSW policy, the level of satisfaction and the quality of waste. The following question is central in this research: To what extent is the quality of waste affected by the satisfaction level on the policy and the design variables of the municipal waste policy? The effect of four different design variables are investigated to answer the research question. These design variables are the collection method of waste, the frequency rate of collecting waste, the payment method for the tariffs and the segregation of plastic packaging waste. For this research, data on the level of satisfaction and the quality of waste is collected by inviting two types of residents to fill in a survey. The first type of residents lives in a selected district of a selected municipality and is invited by mail. The second type of residents is allowed to live anywhere in the Netherlands and is invited through social media. Using t-tests, ANOVA and regression models, the results show no significant effect between the aforementioned specific MSW policy design variables and the level of satisfaction in general. However, to improve the satisfaction level of the MSW policy, municipalities can adjust their policy into being perceived by their citizens as being payable, providing comfort and are contributing to the environment. Next to this, the results show that satisfaction positively relates to the quality of waste. Also, if a resident has a low frequency rate of residual waste collection, this person perceives that he or she will recycle better. The latter effect is supported by findings from prior research. The perceived level of communication also affects both the level of satisfaction as the perceived quality of waste.

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1. Introduction

In the Netherlands, household waste collection is a municipal policy for as long as everyone can remember. Municipalities are responsible for creating and executing the household solid waste. Some municipalities choose to execute their municipal solid waste (MSW) policy in cooperation with other municipalities, while others choose to collect waste with their own municipal organisation or hire a private company. According to article one of the Dutch law on segregated collection of household waste, municipalities are at least responsible for collecting segregated organic, paper, metal, plastics, glass and electronic waste (Besluit gescheiden inzameling huishoudelijke afvalstoffen, 2020). However, recently among the stakeholders of municipal solid waste MSW, an increasing concern exists on the purity of these segregated waste streams (Rijksoverheid, 2018). This is alarming, as this results in a low quality of waste streams which inflicts less recycling, loss of usable materials and higher costs. This is supported by a recent report of the Association of Netherlands Municipalities. The results of this report show that in the plastic packaging waste (PPW) and in the organic waste streams, the amount of residual waste found by waste collection is increasing and thus the quality of waste is declining (VNG, 2020). This trend is problematic for achieving sustainability goals and the efficiency rate of the costs of the MSW policy. To see what the possible causes of the low quality of waste streams are, it is important to zoom in on the history of MSW.

Managing municipal solid waste is a process that changes constantly. The trend noticed by scientific authors is that goals of MSW policies within MSW have broadened and became more complex. This resulted in MSW policies becoming more complicated (Morrissey and Browne, 2004). This trend is also visible in the history of studies on MSW management. In the 1970s, scholars focussed more on studying the practicalities regarding facility selection and vehicle route optimization for the waste collectors (Truitt et al., 1969; Esmali, 1972). A decade later, scholars shifted their focus more on mathematic models and tools to improve the efficiency of the policy execution (Hasit and Warner, 1981). Su et al. (2007) mentioned that since the 1990s, analyses on a deeper level emerged and that the polices on MSW began to become more complicated. The shift to a more economic, ecological and technological approach is made in academic research and is also made at municipalities. This is caused by new societal environmental goals. According to Astrup et al. (2009), recycling can contribute substantially towards sustainable goals. Therefore, municipalities were and still are changing their MSW policies to stimulate recycling within household waste. Academic research is trying to help by finding knowledge on incentives in MSW policy to stimulate recycling. Examples of changes in the design variables within the MSW policy to create these incentives are the differentiation on tariffs that waste depositors need to pay – also known as pay-as-you-throw, the frequency of the collection of waste, the amount of segregated waste streams and the collection of residual waste through drop-off disposal containers (Rijkswaterstaat, 2017; Shaw and Maynard, 2007; Sidique et al., 2010b; Abbott et al., 2011).

However, several studies in the beginning of the 21th century claim that the satisfaction level, in MSW policy management is a factor that has been largely neglected (Chung and Lo, 2002; Su et al., 2006). Academic research on the satisfaction level of these design variables within the MSW policy is scarce. The satisfaction level by the citizens after implementation plays an important role in the decision-making model. The accommodation to the new rules implies behavioural change in order to comply to the new policy. This behavioural change, therefore, can lead to a positive or negative behavioural actions in regards to the MSW policy (Dermont et al., 2017). Due to the small amount of available research on this topic, it is unknown what the consequences are of the satisfaction level of the MSW policy. The declining quality of waste streams could be possibly caused by a low level of satisfaction of the MSW policy and its design variables. The knowledge gap on what influences the satisfaction level of MSW policy and if the declining quality of waste has a negative consequence of the level of satisfaction, needs to be filled.

This gap is the reason that the goal of this research is to see to what extent the satisfaction level of the MSW policy relates to the quality of waste. Another goal of this research is to see if the satisfaction level is influenced by the design variables to investigate if this is part of the cause of the declining quality of waste. This results into the following research question:

To what extent is the quality of waste affected by the satisfaction level on the policy and the design variables of the municipal waste policy?

To appropriately investigate this research question, it is decomposed into three sub-questions. These sub-question are created to investigate the different relations between the key concepts, which are the design variables of MSW policy, the level of satisfaction and the quality of waste. The sub-questions are presented below:

1. To what extent do the design variables of municipal waste policy affect the satisfaction level of the citizens?
2. To what extent does the satisfaction level affect the quality of the waste?
3. To what extent do the design variables of municipal waste policy affect the quality of waste?

Like stated in the introduction, there are already research results on the design variables of policies to stimulate the separation of household waste. These researches mostly scrutinized the effectiveness of these design variables on the separation of waste, by measuring the decrease of collected residual waste. Answers to the effect of the level of satisfaction are largely absent. When completing the goal of this research, it can contribute to a part of the academic research of the neglected social aspect of the design variables within municipal solid waste collection. This is done by not only providing answers about the effect of MSW policy on the satisfaction level, but also looking into what the effect of the satisfaction level is on the quality of waste of this policy. The practical relevance of this research is, at first, to deliver answers for municipalities in regard to a relative low quality of the waste streams, which they are already experiencing (Rijkswaterstaat, 2018). On the basis of this research, municipalities can find out which design variables are leading towards a better quality of waste. This will result in a more sustainable policy, but also in a less expensive policy due to the fact that municipalities have to pay for burning their waste which has an insufficient quality. Secondly, this research intends to show how municipalities can increase the satisfaction level for their MSW policy. This could be interesting for municipalities that find policy satisfaction of importance while governing and could also lead to making changes in their policy to achieve a higher quality of their waste streams.

This thesis consists out of six chapters. In the second chapter the theory behind this thesis is presented. In the third chapter the methodology is discussed. In the fourth chapter the results are presented. In the fifth chapter the conclusion from the results is presented. As sixth and last, a discussion section is formed to review the limitations and implications.

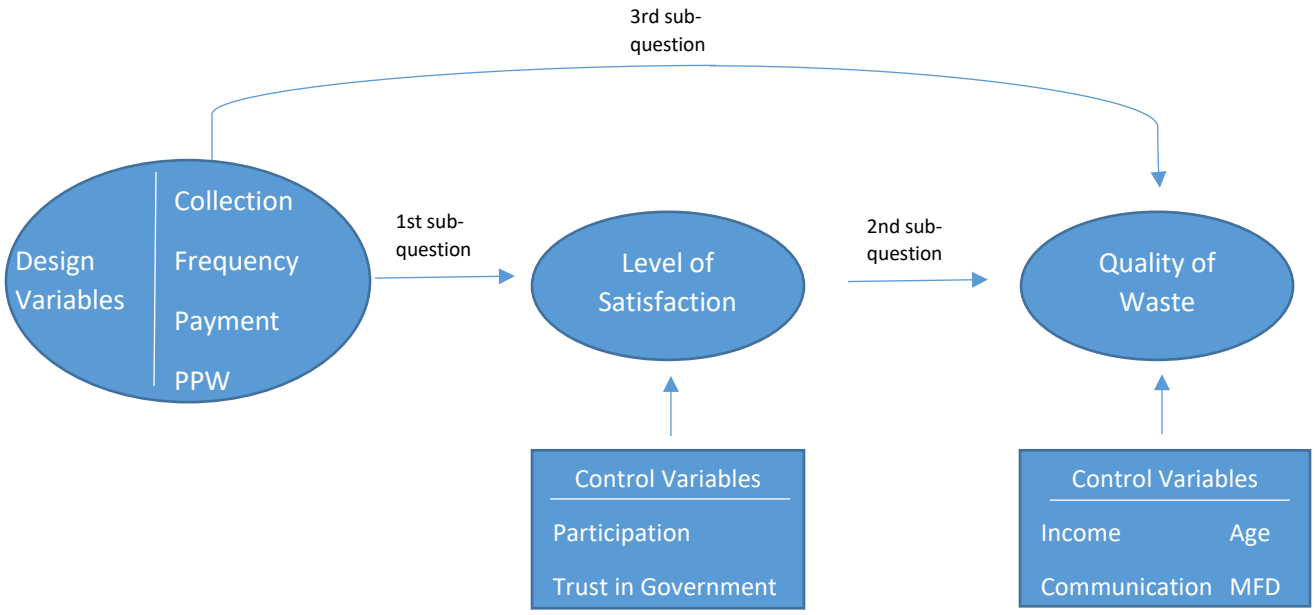
2. Theory

In this chapter the theoretic framework of this research is presented. Next to this, the hypotheses, build upon existing research, are presented.

Theoretic framework

In this section, the theoretic framework is displayed. As stated before, the core concepts of this research are the design variables of the MSW policy, the level of satisfaction on the MSW policy and the quality of waste streams collected. In this section, these concepts are defined and the existing literature on these concepts are studied. The relation between these concepts as studied in this thesis is visualized in figure 2.1. These relations are derived from the research question and the sub-questions.

Figure 2.1: Relations between the core concepts



Design Variables:

Municipalities can choose from several design variables when designing their MSW policy. Noehammer and Byer (1997) distinguishes nine policy design variables of collecting MSW. The first policy design variable is to make the program type of the MSW policy is mandatory or voluntary. The second variable is the type of materials that is collected by the municipality. The third design variable is the number of segregations. The fourth variable is the choice whether the resident is required to pay a provision for a collection container. The fifth design variable is the frequency of the collection of the household waste by the municipality. The sixth variable is the day on which the household waste is collected. The seventh design variable is the type of truck or vehicle is used to collect the waste. The eight variable is the type of education program provided by the municipality. The last design variable is the usage of economic incentives by the municipalities. However, one collection method in this research is missing that is used in other research. Sidique, Lupi and Joshi (2010a) identify the collection method of waste as another policy design variable. This makes it ten variables in total in the municipal toolbox for designing MSW policy. These ten design variables are further elaborated on in this section.

The first of the design variables of MSW policy is the collection method. In this research, the collection method is the method that the municipality uses to collect the waste of their residents. There are different methods used in the Netherlands to collect residual waste, organic waste or PPW. In the Netherlands, municipalities can choose to let citizens dispose their waste through kerbside collection, drop-off containers or using municipal bags. Kerbside collection is the collection program where waste will be collected on the kerb of the residents house through containers. This type of collection method is used to limit the incurred time to recycle (Abbot et al., 2011). Drop off centres are places where containers are located to dispose the different streams of waste. According to Sidique et al. (2010a), drop-off recycling methods are cheaper to operate in comparison to kerbside collection and are a financially interesting method in rural areas with a high population. In the Netherlands, the most frequently used collection method in low density areas is kerbside collection, which is used 284 times of the data of 316 municipalities. For high density areas the most used collection method is through drop-off centres, which is used 245 times of the data of 291 municipalities (Rijkswaterstaat, 2018). The wide implementation of both methods makes it interesting to see how these methods affect the satisfaction level and the quality of waste. Due to the low adaption of the municipal bags collection method, this type is not interesting to further investigate.

The next design variable in the scope of this research is the frequency level of collection of the residual waste. When using the kerbside collection method, the municipality also needs to determine the frequency of collection of the containers. Noehammer and Byer (1997) state that the decision to choose which frequency rate is desirable, is mostly based on costs. However, the frequency rate does have consequences according to Abbott et al. (2011). When people are confronted with fewer residual waste collection, they receive an incentive to put more time in segregating recyclables and non-recyclables. The lower the frequency, the more waste is stored in a household. When low effort on the segregation of waste is spend, this will eventually give disturbance in the form of low capacity. This incentive is also recognized by Kuo and Perrings (2010), who state that a high frequency of non-recyclable waste reduces the time costs of this form of disposal. Therefore, this research is trying to investigate the effect of the frequency rate of residual waste on satisfaction and the quality of waste.

Another design variable of MSW policy is the payment method. This is the variable that can be used to make use of an economic incentive for citizens to financially reward them for recycling. Differentiated tariffs or Pay-as-you-throw (PAYT) for disposing waste provides an economic incentive which receives growing attention from governments and academics. The PAYT method result in charging the residents for the unrecyclable waste streams to make sure that the polluter and the bad recycler pays more. The payment method can take different forms in municipalities. For instance, the fixed payment could be for each household in the municipality the same, or could be calculated based of the number of residents. The payment amount of PAYT methods could be determined by the amount of kilograms a resident offers within a year, or could be based on the times that the resident offers there waste. According to Reichenbach (2008), the PAYT design variable is being more and more used in many countries in West-Europe. This is likely because previous studies show that PAYT in MSW policy leads to more recycling (Sidique et al., 2010b; Shaw and Maynard, 2008). In the Netherlands, the number of municipalities that use the PAYT-system has grown from 27% in 2003 to 48% in 2018 (Rijkswaterstaat, 2018). Therefore, the payment design variable is taken into the scope of this research, to further investigate the effect of PAYT on the level of satisfaction and the quality of waste.

The last design variable of MSW policy in the scope of this research is the amount of segregated waste streams. Noehammer and Byer (1997) stated in the late nineties that little research has been done on

the effect of the number of segregations. This was not yet an important subject. However, PWW recycling began to gain importance in the 2000s. Astrup et al. (2009) studied the effect of the recycling of plastics on the contribution to global warming and Ambrose et al. (2002) studied the quality of recycled plastics. Since 2008, Dutch regulation was issued on packaging waste with the goal to recycle 42% of PPW (Bing et al., 2012). Due to the composite of plastics, it can be mechanically sorted out of residual waste. According to Bing et al. (2012) this is easier to apply and the separation rate is higher than manual separation by the households. Therefore, some municipalities chose to segregate the PPW after collection, whereas others chose to collect PPW in a separate waste stream. In a field study by De Bruin, Zuyderduyn and Oldenhof (2018), 30 municipalities in the Netherlands have a MSW policy that jointly collects PPW and residual waste to sort these streams mechanically. Therefore, the effect of the segregation of PPW on the satisfaction level and the quality of waste is investigated in this research.

These four of the ten variables mentioned by Noehammer and Byer (1997) and Sidique et al. (2010b) are selected for this research. Three of the other six variables are considered irrelevant due to national regulations and customs. The first is the program type variable in which municipalities can choose to make participation in waste collection mandatory. Participation in the Netherlands is mandatory, as municipalities charge their residents with the costs of the waste policy (Besluit gescheiden inzameling huishoudelijke afvalstoffen, 2020). The second variable is to provide a collection container to the resident. Getting a first container per waste stream in the Netherlands is free of charge. The third is the type of materials collected. As stated in the introduction, the type of materials collected is decided in national law (Besluit gescheiden inzameling huishoudelijke afvalstoffen, 2020). Two other variables are expected not to give results, these are the collection day and collection vehicle type. Everett & Peirce (1993) have found that the collection day variable did not increase recycling rates. Noehammer and Byer (1997) only found that the vehicle type affects the cost of the MSW policy. No link is made to recycling rates or satisfaction. The last variable that is not included, is the education program. This variable consist of many aspects to make it very difficult to complete this research in the time given. Therefore, the argumentation of Noehammer and Byer (1997) is used in which they explain why they do not investigate the education program: “While education programs can be very important to program effectiveness, the design of such programs is highly varied and therefore beyond the scope of this paper” (p.408). However, the level of communication is taken into account in this research as explained later.

Satisfaction level:
The satisfaction level by the citizens after implementation plays an important role in the decision-making model. The accommodation to the new rules implies behavioural change in order to comply to the new policy. This behavioural change, therefore, leads to a certain outcome (Dermont et al., 2017). In their study on waste management in Hong Kong, Chung et al. (2003) mention that the supportiveness of the local community is a prerequisite for a sustainable waste policy. This means that a low level of satisfaction could reduce the willingness to recycle and influence the level of waste quality. Next to this, in their study Chung et al. (2003) use the broad concept social acceptability, in which they define that next to residents, executive stakeholders, governmental bodies and the industry also are part of the acceptability. To investigate the cause of the declining quality of waste as a result of the behaviour of the waste producer, this research will use the level of satisfaction variable. This means that the study limits the social acceptability to the subjects of the MSW policy, the residents, and call this variable the level of satisfaction. For this research the level of satisfaction is therefore defined as the level of which a resident is satisfied about complying to the regulation of the MSW policy when disposing their waste.

There are some variables that prior research indicate that they correlate with the level of satisfaction. Serval academics state in their paper that citizen participation in designing policy, affects the satisfaction

level in environmental policy. In this research citizen participation is defined as a way of a citizen to help design or deliver input for designing the MSW policy of their municipality. Prager and Freese (2009) found that participation by stakeholders increased the satisfaction level on agri-environmental policies. Langer et al. (2017) state that increasing participation by citizens in policy on wind energy projects, will have a positive effect on their satisfaction. In a case study on environmental impact assessment, Cuppen et al. (2012) show that "careful design and management of public participation are essential for a successful project, and can contribute to the legitimacy of policy-making" (p.72). The results of all these studies show that the level of citizen participation in environmental policy have a positive effect on the satisfaction level. In their study on solid waste policies, Chung et al. (2003) mention that the interest of, among others, residents "should be appropriately represented for effective policy implementation" (p.124). Because of this, it is interesting to see if the level of citizen participation also has a positive effect on the satisfaction level within MSW policy. This research will therefore take into account if citizens have contributed in designing and have given input for the MSW policy.

Another variable is the level of trust in the government and its institutions. Although not specific for MSW policy, Blumer et al. (2018) show that the trust in the government and its institutions can affect the satisfaction of policies concerning the environment. Ricci et al. (2010) define trust as the idea that someone acts in your best interest. If a resident does not trust the local government, it is likely that this resident also does not have trust that the MSW policy is in his or her best interest. This can result into a reluctant behaviour towards recycling and a good quality of waste streams. Trust is therefore defined in this research as the perception of the resident if their representatives act in their best interest. This variable will be used to test the effect of trust in the government on the level of satisfaction and is expected to correlate positively with the level of satisfaction.

Quality of Waste:
The quality of the waste streams is the outcome of the recycling behaviour of the citizens. Each waste stream represents a recyclable, like organic waste and PWW, or the residual waste. If the quality of the waste stream is high, the recyclables are segregated according to the instructions of the MSW policy. In 2018, a rapport from the Dutch government is made in which is stated that the municipalities worry about the decreasing quality of recyclable waste streams (Rijkswaterstaat, 2018). With this information, it is also plausible to assume that citizens wrongly dispose their waste into the different waste streams. This research investigated if the outcome of citizens wrongly disposing their waste could be because of a low satisfaction level, or directly by design variables of MSW policy.

Some socio-demographic variables could also play a role. Miafodzyeva and Brandt (2013) found that the socio-demographic variables of age and income are of importance. Saphores et al. (2006) have shown that middle-aged adults are the ones with the highest willingness to recycle. Income correlates positively with recycling Kurz et al. (2007). Gender and education were showing inconsistent results on recycling behaviour. The variables of age and income are therefore taken into this study.

Communication is also affecting behavioural outcomes of the MSW policy. In their study on an effective MSW policy, Yukalang, Clarke and Ross (2017) found that 40% of their interviewees and 100% of their focus groups mentioned that poor communication by the municipality is an issue for their MSW policy. Seacat and Nothrup (2010) also find that recycling goes up when communication regarding the policy improves. Davis et al. (2006) and Tonglet et al. (2004) conclude that the amount of information about the MSW policy strongly effects the level of recycling. Therefore, communication on the MSW policy is another variable that is used in this research.

The variable of the proportion of high-rise buildings or multi-family dwellings (MFD) in a municipality is another factor that influences the construct of the research design. According to DiGiacomo et al. (2018), "there is general consensus in the literature that residents of MFDs recycle less than residents of single-family dwellings" (p.310). This could mean that these citizens have a whole other experience with recycling and could affect variables in the design of this research. As previously stated, in the Netherlands by far the most municipalities use drop-off systems as a collection method for high density areas which contains many multi-family dwellings. By adding this variable, the effect of MFDs and the drop-off collection method can be investigated more clearly.

Hypothesis Building

In this section the hypotheses are derived from existing literature. At first the effect on the level of satisfaction and the quality of waste of each individual design variable is investigated. Next, the relationship between the satisfaction level and the quality of waste is investigated. The hypotheses are also visualized in table 2.1.

Table 2.1: Hypotheses of this research and their expected effect.

H	*Independent variable*	*Dependent variable*	*Expected effect*
H1	Collection by drop-off	Satisfaction Level	+
H2	Collection by drop-off	Quality of Waste	+
H3	Frequency rate	Satisfaction Level	+
H4	Frequency rate	Quality of Waste	-
H5	Payment by PAYT	Satisfaction Level	+
H6	Payment by PAYT	Quality of Waste	+
H7	Segregation of PPW	Satisfaction Level	-
H8	Segregation of PPW	Quality of Waste	-
H9	Satisfaction Level	Quality of Waste	+

Collection Method

In an early study, McDonald and Ball (1998) found that a lack of local recycling facilities was an important reason for residents to invest less in recycling. Over a decade later, Sidique et al. (2010b) found that the implementation of drop-off disposal leads to an increase in the rate of recycling if a municipality uses drop-off containers in their ordinance. The authors argue that this is driven by the motivation of residents finding drop-off disposal containers more convenient than kerbside collection (Sidique et al., 2010a). Due to the research of Sidique et al. (2010b), it is interesting to test the assumption on an increase of the satisfaction level. Also Saphores et al. (2012) has found in a study on e-waste that drop-off centres are perceived as convenient. To test if the drop-off collection method is also perceived as more convenient and leads to a higher quality of waste in the Netherlands, this method is compared to the kerbside collection method. As stated before, these two methods are by far the most implemented options in MSW policy in the Netherlands. Therefore, the hypotheses for this research is as follows:

- *H_1: The implementation of a drop-off centre has a positive effect on the level of satisfaction level*
- *H_2: The implementation of a drop-off centre has a positive effect on the quality of waste*

Frequency Rate

The lower the frequency of waste collection, the more waste is stored in a household. Abbott et al. (2011) developed a theory stating that this provides an incentive to recycle and distribute the waste across multiple waste streams to reduce waste overflows. In this study the results show indeed a negative relation between the frequency rate of collection of non-recycle waste on the recycling rate. These results are also supported by, Kuo and Perrings (2010). They have found the same negative relation in their study of recycling in Taiwan and Japan. However, a longer storage of waste can feel as a burden for some citizens. In the study done by Czajkowski et al. (2014), respondents in general preferred a higher frequency rate. This means that the frequency rate can affect the level of satisfaction. Therefore, this research will test the following hypotheses:

- *H_3: The frequency level of collection of residual waste has a positive effect on the satisfaction level*
- *H_4: The frequency level of collection of residual waste has a negative effect on the quality of waste*

Payment Method

In an early study, Van Houtven and Morris (1999) showed in their project that variable pricing techniques increased recycling by the residents in Georgia, US. In the Netherlands, Linderhof et al. (2001) studied the pilot of Oostzaan, which was the first municipality that introduced weight-based residual waste pricing. After the first year of introduction about 30% less residual waste was collected and the researchers found a significant positive effect of this payment method on recycling. This effect is not only caused by the economic incentive of variable tariffs. When PAYT is used properly, it could lead to the perception of a more fair pricing system and to an increasing satisfaction level of MSW policy (Reichenbach, 2008). Because of this, it is interesting to see if citizens are satisfied with the PAYT-system in their municipality. However, one could argue that the PAYT method could motivate residents to circumvent around the economic incentive by dropping residual waste in recyclable waste streams which are not or less charged. Prior research, however, did not find support for this claim. Therefore, due to the increased level of recycling in Oostzaan and the fair pricing theory, this research will test the following hypotheses:

- *H_5: The PAYT pricing system has a positive effect on the satisfaction level*
- *H_6: The PAYT pricing system has a positive effect on the quality of waste*

PWW segregation

As previously stated, due to the environmental gain, PWW recycling is an important part of MSW policies. Bruvoll and Nyborg (2002) noticed that the segregation process is perceived by citizens in Norway as inconvenient and would prefer their waste to be collectively segregated. The results of a research conducted by Czajkowski et al. (2014) in Poland suggests otherwise. In this research, people preferred segregating into more waste streams. Also, this study shows that people find burdensomeness of less importance than economic and environmental reasons in waste management. Because of the results of these studies, and their differences, it is interesting to see what the number of segregations does with the satisfaction level and if the perceived burden of segregating directly effects the quality of the waste streams. Because of the more plausible arguments of segregation seen as a burden as stated by Bruvoll and Nyborg (2002), this research will test the following hypotheses:

- *H_7: The segregation of PPW on household level by citizens has a negative effect on the satisfaction level*
- *H_8: The segregation of PPW on household level by citizens has a negative effect on the quality of waste.*

Level of satisfaction

As stated earlier, the level of satisfaction is expected to be positively related to the quality of waste. When the level of satisfaction is high the behavioural change should be positive, however, when the behavioural change is negative, the level of satisfaction outcome is most likely also to be negative. This is shown in the following hypothesis:

- *H_9: The satisfaction level has a positive effect on the quality of waste*

3. Methodology

In this chapter the methodology of this research is explained. First of all, the data collection method is discussed. After this, the sample selection of the survey is presented. At third, the operationalization of the variables used in this research is explained. The validity and reliability issues of this research is discussed afterwards. As last, the data analysis method is presented.

Data collection method

There are multiple options to collect data on the MSW policy, the level of satisfaction and the quality of waste. The MSW policy can be accessed via open to the public policy data or asked from the residents. The level of satisfaction of the residents can best be collected by asking the resident how satisfied this person is with the MSW policy, as this generates the highest robustness. Asking a representative by for instance asking the municipality, an elected official or the waste collection company could also be an opportunity. This way, the communication of the municipality and waste collection company and the participation levels of the residents can also be measured. However, asking these institutions about the level of satisfaction on their MSW policy provide a bias as they are (partly) responsible for the policy. To collect data on the quality of waste, different methods can be used. Arguably, the best method is to look inside the trash bin of the unit of observation to identify the quality of the different waste streams. This time consuming approach is not doable due to the time limit of this research. Another option is to collect data from the waste collectors on the quality of the waste streams that they collect form the district of the unit of observations. However, an unsuccessful attempt to ask help from several waste collection companies led to the conclusion that this method was also unavailable. For all reasons mentioned before, a survey is used as data collection for this research to accurately collect the MSW policy applicable for the resident, the level of satisfaction of the resident, the participation effort of the resident and the income, age and trust in the government of the resident. Next to this, the quality of waste and the communication level of the respondent can be measured, albeit only in the perception of the residents. These variables are therefore self-reported and will henceforward, when applicable, be called perceived quality of waste and perceived communication level.

The first sub-question will analyse the level of satisfaction caused by the MSW policy design variables. As the data is obtained through a survey, the unit of observation is the individual resident. The design variables of the municipalities of the unit of observations need to differ from each other to identify a potential effect. This means that the municipalities of the unit of observations needs to have different MSW policy design variables. This is further elaborated in the sample selection section of the methodology. For the second sub-question, researching the effect of the level of satisfaction on the quality of waste, data on the quality of waste needs to be collected. The data on the level of satisfaction is already available from researching the first sub-question. As previously mentioned, the method to collect data about the quality of waste used in this research is to ask the unit of observation via the survey how they think that they correctly segregate their waste into the different streams and thus concerns the perceived quality of waste. For the third sub-question, the data on the design variables collected via the survey is used. This also is the case for the perceived quality of waste. This research strategy leads to the situation that the data is collected on an individual level, but the data can be analysed on both an individual level as well as on a municipal level.

Sample Selection

For the survey, citizens from municipalities with different design variables were invited. Assuming a response rate of 10% and at least 30 respondents per municipality to carry out the analysis, 300 invitations need to be delivered per municipality. Due to the time limitation of this research, it is

estimated that the number of municipalities in the scope of this research should be five. Assuming that for each municipality a day is spend to send out the invitations, the time spend on this part of the research is limited to a working week. To determine from which municipalities the citizens needed to be approached, a selection is made based on the frequency of policy design combination in the Netherlands. From the 355 municipalities, data about the MSW policy was available for 235 municipalities over 2017. The most frequent policy combinations are displayed in the appendices. The top four combinations are selected. Also the seventh most frequent combination is selected, to include the PPW segregation variable difference. These five combinations are expected to give the most interesting results due to the diversity. Of each of the selected combinations, a municipality is selected to represent this combination. In order to try and get a sufficient amount of respondents to make statistically significant analysis, this selection is based on convenience, which means that the municipality with a reduced travel time is selected. These municipalities are 's Hertogenbosch, Enschede, Raalte, Noordoostpolder and Leeuwarden. Of these municipalities a representative district within the municipality is selected to represent this municipality. This is based on the control variables of the amount of MFDs and the distribution of age and income. This means that the selected municipality need to have a district that is representative for the municipality. Within these districts, both kerbside collection and drop-off collection is available. The citizens of these districts were invited for the survey by mail. For each municipality, 300 invitations were delivered door-to-door. In this invitation, the goal of this research, the amount of time the survey consumes and personal contact data of the researcher is stated. To simplify the access to the survey, respondents could scan a QR-code or could go to the URL: www.elroyelshof.nl. Both methods would redirect the respondent to the survey website of Qualtrics. In the case of insufficient response by the invitees, another sample is approached via internet and social media channels. They were asked in the survey to what types of MSW policy design variables they are subject to. This method is easy to generate responds quite quickly, however the people invited are not randomly as they are part of the network of the researcher. The survey questions are included in appendix two.

Operationalization

- *The four design variables*

As mentioned the four design variables are the collection method, the frequency rate, the payment method and the segregation of PPW. The collection method is the method that the unit of observation uses to dispose of his or her waste. Because of the fact that in most municipalities the collection methods of the waste streams are the same for each housing situation, in this research, the variable of the collection of residual waste is used as a proxy for the other variables (Rijkswaterstaat, 2018). In the sample selection, all five municipalities use both the kerbside as well as the drop off collection methods. The kerbside collection method is used for low density houses and the drop-off centres are used for high-density centres. Therefore, we use a dichotomic variable to see if the respondent uses a kerbside or drop-off collection method. The second design variable is the frequency rate of collection of the residual waste. Specifically the residual waste is taken, as Abbott et al. (2011) showed that this variable effects the recycling rate of citizens. Of the data on 303 municipalities, 172 collected residual waste once in two weeks, 100 collected residual waste once in four weeks, 19 collected residual once in three weeks and 12 collected residual waste once a week. By far the two most used variables are once in two weeks and once in four weeks. The third design variable is the payment method. All municipalities need to use a payment method to collect the fees of the residents that are subject to the MSW policy. These can be fixed or flexible depending on the waste disposal. In this research these two items are measured. However, within these methods different types exists as mentioned in the theory section of this research. To limit the amount of combinations, this variable is also created into a dichotomy of using PAYT or not using PAYT. The last variable is the segregation of PPW. This variable measures of the

respondent is subject to a policy where the municipality asks the resident to segregate PPW from residual waste, or if the respondent does not need to do so. This is also operationalized into a dichotomous variable.

- *Level of Satisfaction (Comfort, Environmental and Payable)*

The level of satisfaction is assessed in three different stages. The first stage is using a variable that measures the satisfaction of the MSW policy in general. This is a single item survey question with a 0 to 10 scale. This variable can be used to analyse the effect of the different design variables on the level of satisfaction in general. After determining if the level of satisfaction is affected by the different design variables, it is interesting to check the source for the level of satisfaction. In prior research, terms like inconvenient, burden, economic and environmental reasons are mentioned to indicate the source for the level of satisfaction of the policy (Bruvall & Nyborg, 2002; Sidique et al., 2010b; Czajkowski et al., 2014). Therefore, this research will also explore the effect of the design variables on comfort, economic, environmental, to check the source of the level of satisfaction. In this second stage of measuring satisfaction, is quantified how the level of comfort, the contribution to the environment and the capability to pay for the tariffs of the policy will affected by the different design variable to explain for the level of satisfaction. These three variables are measured by asking three questions. The first question is on a 0 to 10 scale how the respondent thinks that the MSW policy is comfortable. The second question is on a 0 to 10 scale on how the respondent thinks this MSW policy is good for the environment. The last question is on a 1 to 5 scale on if the respondent finds the tariffs for the MSW policy payable. The third stage is measuring the satisfaction of the individual design variables. This is measured by asking about the satisfaction on the four different design variables of the respondent with a 0 to 10 scale. These new variables can be used to analyse the effect of the satisfaction of the individual design variable level on the perceived quality of waste.

- *Perceived Quality of Waste*

The perceived quality of waste is measured by the opinion of the respondent on how he or she is segregating their waste into the correct waste streams. This question will be different for people who need to segregate their PPW and people who do not have to segregate their PPW to account for the PPW segregation variable. Respondents who do not have to segregate their PPW will be asked how much percent of their residual waste consists out of the right material. People who do have to segregate their PPW will be asked, in addition to the previous question, how much percent of their PPW consists out of the right material.

- *Control Variables*

The control variables participation, communication, trust in government, MFD, age and income are also measured using the survey. Participation will be measured by asking if the respondent participated in creating, developing or altering the current MSW policy. The perceived level of communication is measured by asking if the respondent thinks that the municipality or the collection company is communicating sufficiently towards the respondent. This is measured on a 0 to 10 scale. Trust in government is measured by a two items scale based on Blumer et al. (2018), in which is asked if the respondent has trust in the local government and if the respondents feels like their voice can influence the local decision making. These questions are both asked on a 0 to 10 scale. To determine if the respondent lives in a MFD, this question is included in the survey. This is a dichotomous variable. The age and income of the responded are also asked in the survey. The income is gross and measured in euros.

Table 4.1: The MSW policy design variable of the municipalities and the districts that represent these municipalities.

District	*Municipality*	*Frequency*	*Payment method*	*PPW Segregated*
Stadsveld-Noord Bruggert	Enschede	≤3 weeks	PAYT	Yes
Transvaalwijk	Leeuwarden	≤3 weeks	Fixed	No
Emmeloord Centrum-West	Noordoostpolder	≥4weeks	Fixed	Yes
Heeten-Kern	Raalte	≥4weeks	PAYT	Yes
Graafsebuurt-Noord	's Hertogenbosch	≤3 weeks	Fixed	Yes

Validity and Reliability

Some validity and reliability issues are accounted for when conducting this research. First of all, regarding content validity, some concepts are not fully measured according to the methodology above. The dichotomy of the collection method variable excludes the municipal bag option. For the respondents of the five municipalities this makes no difference as they are not subject to this variable. The survey respondents that are invited through social media, were given an extra option in the survey to give them the opportunity to select the third collection method, namely through municipal bags. Secondly, the dichotomy of the frequency ration creates the same problem. By only using the two variables of once in two weeks and once in four weeks, the amount of policy design variables is limited. To not exclude data from respondents that are approached by social media, this variable is computed into a dichotomy, where a distinction is made between a rate of once in three weeks or sooner and once in four weeks or later. Therefore, these options are used to measure the frequency rate. At third, to directly ask the income of people might be a bit discouraging for the respondent. To account for respondents not wanting to answer this question, an ordinal scale is made from 1 till 8 where each number represents a category. This is as follows: 1=<20k, 2=20k-30k, 3=30k-40k, 4=40k-50k, 5=50k-60k 6=60k-70k, 7=70k-80k, 8=80k>. At fourth, at the survey question if the respondent lives in a MFD the definition of the Dutch Central Bureau of Statistics is added to make clear what the concepts of a MFD is in this research. At last, naturally, when conducting a survey, some reliability issues are present. The first issue that arises, occurs when inviting survey respondents through social media. This method is easy to generate responds quite quickly, however the people invited are not randomly as they are part of the network of the researcher. The second issue is the self-selection bias that the survey invitations creates. People can choose if they want to participate, this makes this study prone to self-selection bias. The third issue is that the survey data is in the perception of the respondent of the point of time when filling in the questionnaire. The point of view of the respondent could change over time due to for example the newspaper of that day on recycling or new communication of the local government or the waste collection company and partially place their unsatisfaction to the municipal solid waste policy. Next to this, respondents might answer the survey questions with socially desirable replies. This social-desirability bias can lead to respondents over-reporting their good behaviour and thus increase the probability of a higher reported quality of waste level than exist in reality. This bias is reduced by stressing the fact that the survey is anonymous and can not be linked to the individual respondent.

Data Analysis

Of the in total 1500 invitations, 191 persons responded. This gives a response rate of 12.7%. Via the internet and social media, another 188 respondents completed the survey. To provide answers on the main and sub-questions and to test the hypothesis, the data needs to be analysed in a structural way. This section is dedicated to describe the analysis process.

Univariate and Bivariate Analysis

Of all the variables used in this research, the descriptive statistics are analysed. The output of the descriptive statistics can be found in table 4.2. During the univariate analysis of these variables, a few things are worth to mention. First of all, the two items within the survey on the level of trust in the government, will be combined into one variable using the summated scores after standardization of the two items. The Cronbach Alpha of these two items ($\alpha = 0{,}801$) is sufficient. Next to this, the outliers within the dataset are identified. The boxplots identify outliers that are datapoints outside of 1.5 times the interquartile range. These boxplots are presented in the appendices. From these boxplots is concluded that the identified outliers are a result of the wide but relatively concentrated results of the survey. However, the outliers are not really outliers in the sense that in between the interquartile range and the outlier, no other data is present. There is a consequent line between the data points. This shows that the data is rather skewed instead of consisting of many outliers. Because of this, the data of the identified outliers are not removed or winsorized. Next to analysing the outliers, also the normality of distribution of the variables is analysed. The skewness and kurtosis of non-control and non-binary variables exceeded the desirable level between 1 and -1. Due to the function of these variables in this research, of each of these variables a logarithm with a base of 10, a natural logarithm and a square root are calculated to compute which of these three methods had most effect on normalizing the skewness and kurtosis of the data. This will increase to robustness of the results. The descriptive statistics including skewness and kurtosis before transforming the data variables are presented in the appendices.

Sub-Question One

To answer the first sub-question on the effect of design variables on the satisfaction level of citizens the data on the four design variables and the general level of satisfaction is needed. To analyse this effect the means of the different groups are compared using t-tests. The dichotomous design variables make the t-test an attractive option. Because of the independence between the groups of the design variables, the independent t-test is used. The comfort, environment and payable variables are added to help give an explanation for the results. The difference across the means of these variables can explain why some design variables are leading towards a higher or lower satisfaction level. Although the hypotheses are one-tailed formulated, the t-test will be two-tailed to also test for any unexpected significant outcomes. The t-tests will give results for the individual policy design variables. To see if design variables as a package give different results between groups, an ANOVA test is used. The ANOVA test will analyse the means of the level of satisfaction of the five different municipalities with different design variables. This means that in the t-tests the unit of analysis is each respondent and for the ANOVA the unit of analysis is the municipality. To test the robustness of the outcomes a regression analysis is used to test the control the results for the input and trust in government variable. The following model is used, where the X denotes the different design variables:

$$\textit{Satisfaction Level} = \beta\textit{Intercept} + \beta\textit{Design Variable}X + \beta\textit{Trust in Government} + \beta\textit{Input Action} + \varepsilon$$

For this and future regression analysis, a bivariate analysis is necessary to check for correlations and multicollinearity . Because of the many ordinal variables used in this research, the Spearman's Rho is perceived to deliver to most robust correlation results. The Spearman's Rho correlation table is presented in table 4.3.

Sub-Question Two

The second sub-question is answered by investigating the effect of the satisfaction level on the perceived quality of waste. To do this, regression analyses are used. Regression models offer the possibility to test the coefficient of the level of satisfaction on the perceived quality of waste while controlling for age,

income, MFD and communication control variables. In the regression model the unit of analysis is the individual respondent. To analyse the effect of the satisfaction level of the different individual policy design methods on the perceived quality of waste, at least five different models are executed. One for the satisfaction level in general and four for the satisfaction levels on individual policy variables. Every model contains a different satisfaction level. The formula for the models looks as follows, where the X denotes the different types of satisfaction.

Quality of Waste = ßIntercept + ßSatisfaction LevelX + ßAge + ßIncome + ßMFD + ßCommunication+ ε

An important robustness check of a regression analysis, is to analyse if the independent variables of the regression model do not correlate. This multicollinearity can be checked by the correlation table of the bivariate analysis. Table 5.2 shows that the perceived communication level significantly correlates to the satisfaction level in general as well as the satisfaction levels on individual policy design variables. Therefore, to robustly test the level of satisfaction, the two correlating variables will be not be included in the same model. The model for the first robustness check looks as follows, where the X denotes the different types of satisfaction:

Quality of Waste = ßIntercept + ßSatisfaction LevelX + ßAge + ßIncome + ßMFD + ε

Another way to deal with multicollinearity is to use a principal component analysis to combine the correlating variables. This additional technique is used to test the robustness of previous results. This means that the different levels of satisfaction and the perceived communication level will be combined in into one concept: Relation with the local government or Relation Government. It must be said that due the fact that respondents making use of drop-off disposal containers do not have a frequency rate nor a satisfaction level about the frequency rate. This new variable excludes the respondents making use of drop-off disposal containers. The Cronbach's Alpha ($\alpha = 0{,}796$) is sufficient. The scree plot of the eigenvalues of these variables are shown in the appendices. This scree plot 'takes a knee' after the first component, indicating that is it possible to only extract one component out of these variables. The PCA scores of the new variable: Relation Government are tried to make less skewed and kurtoses using a logarithm with a base of 10 as this method created the outcome with the lowest level of skewness and kurtoses. With this variable a new regression model can be created. Note that this model excludes the respondents that use drop-off disposal containers. The model for the second robustness check looks as follows:

Quality of Waste = ßIntercept + ßRelation Government + ßAge + ßIncome + ßMFD + ε

Sub-Question Three

To analyse the effect of the design variables on the perceived quality of waste, the means of the different groups are compared. To test if these means significantly deviate, the independent t-tests and an ANOVA test are used. These are the same methods as used for sub-question one. The independent variable is the same and the dependent variable also has a metric scale. Although the hypotheses are one-tailed formulated, the t-test will be two-tailed to also test for any unexpected significant outcomes. As already explained, the t-tests will give results for the individual policy design variables. To see if design variables as a package give different results between groups, an ANOVA test is used. The ANOVA test will analyse the means of the level of satisfaction of the five different municipalities with different design variables. For the t-tests the unit of analysis is each individual respondent and for the ANOVA the unit of analysis is the municipality. The above mentioned models do not account for the control variables. To

test for the robustness of the t-test results, a regression model is used including the control variables. The following model is used, where the X denotes the different design variables:

Quality of Waste = ßIntercept + ßDesign VariableX + ßAge + ßIncome + ßMFD + ßCommunication + ε

Table 4.2: Descriptive Statistics after accounting for skewness and kurtosis

	N	*Range*	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*	*Skewness*	*Kurtosis*
Collection Method	368	1	0	1	0,22	0,420	1,300	-0,311
Frequency	276	1	0	1	0,48	0,501	0,073	-2,009
Payment Method	359	1	0	1	0,40	0,491	0,393	-1,856
Segregation of PPW	360	1	0	1	0,15	0,360	1,938	1,767
Input Action	358	1	0	1	0,03	0,173	5,461	27,983
Communication	351	10	0	10	6,72	1,769	-1,314	2,486
Satisfaction General	343	2,32	1	3,32	2,370	0,402	-0,258	1,179
Satisfaction Collection	333	1,04	1	2,04	1,554	0,228	0,347	0,545
Satisfaction Frequency	264	1,04	1	2,04	1,530	0,229	0,329	0,623
Satisfaction Payment	341	2,32	1	3,32	2,381	0,519	-0,405	0,152
Satisfaction PPW	341	1,04	1	2,04	1,540	0,270	0,145	-0,238
Comfort	334	2,32	0	2,32	1,347	0,483	-0,315	0,484
Environmental	334	2,32	0	2,32	1,320	0,464	-0,300	0,520
Payable	334	1,24	0	1,24	0,422	0,181	0,032	2,258
Quality of Waste	319	8,95	1	9,95	6,449	1,918	-0,770	0,211
Trust in Government	320	5,819	-3,43	2,39	0	1	-0,883	1,587
Multi Family Dwelling	321	1	0	1	0,66	0,474	-0,681	-1,546
Age	318	73	20	93	50,93	16,327	-0,148	-0,791
Income	309	7	1	8	4,28	2,195	0,335	-0,991
Municipality	188	5	0	4	1,771	1,412	0,309	-1,128
Relation Government	250	0,90	1	1,90	1,440	0,146	0,536	1,282

Table 4.3: Correlation Matrix Spearman's Rho. Significance is shown using *,**, meaning respectively significance at the 5% and 1% level[1].

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Collection Method	1,000																	
2	Frequency		1,000																
3	Payment Method	,016	-,302**	1,000															
4	Segregation of PPW	-,075	-,392**	,485**	1,000														
5	Input Action	-,024	,029	-,015	-,031	1,000													
6	Communication Level	-,054	,080	-,026	-,068	,094	1,000												
7	Satisfaction General	-,107	,037	,067	,021	,113*	,619**	1,000											
8	Satisfaction Collection	-,220**	,102	,102	,103	,109*	,432**	,566**	1,000										
9	Satisfaction Frequency		-,057	,040	,065	,068	,466**	,539**	,543**	1,000									
10	Satisfaction Payment	-,136*	-,136*	,315**	,166**	,118*	,327**	,523**	,436**	,556**	1,000								
11	Satisfaction PPW	-,068	,289**	-,250**	-,292**	,074	,352**	,549**	,401**	,309**	,244**	1,000							
12	Comfort	-,192**	-,009	,168**	,195**	,087	,438**	,656**	,597**	,551**	,457**	,383**	1,000						
13	Environmental	-,021	,199**	-,154**	-,232**	,015	,457**	,576**	,334**	,372**	,267**	,532**	,455**	1,000					
14	Payable	-,043	-,195**	,214**	,110*	-,010	,214**	,295**	,141*	,291**	,342**	,009	,268**	,120*	1,000				
15	Quality of Waste	-,137*	,210**	-,080	-,039	,112*	,176**	,248**	,241**	,320**	,203**	,327**	,243**	,284**	,022	1,000			
16	Trust in Government	-,072	-,030	,004	,055	,143*	,285**	,404**	,259**	,294**	,313**	,155**	,262**	,263**	,019	,161**	1,000		
17	Multi Family Dwelling	-,115*	,019	-,042	-,087	-,046	,077	,083	,076	,117	,020	,078	,283**	,245**	,290**	,013	,106	1,000	
18	Age	-,141*	-,071	,165**	,104	,042	,087	,130*	,110	,282**	,231**	-,021	,168**	,062	,087	,207**	,027	,106	1,000
19	Income	-,131*	-,228**	-,078	-,009	,048	-,095	-,009	-,006	-,004	,091	,088	,229**	,098	,125*	,097	,115*	,021	-,095

[1] The table intersections between row 2 and 9 with column 1 are empty. This is due to the fact that if a municipality uses the drop-off collection method, they do not have collection frequency rate, as residents need to deposit their waste themselves. This also means that these residents were not asked how satisfied they are with the frequency level as they are not subjected to this variable.

4. Results

In this chapter the results of the data analyses are reported. The results of the three sub-questions are presented in order. The first sub-question concerns to what extent the design variables of municipal waste policy affect the satisfaction level of the citizens. The second sub-question investigates to what extent the satisfaction level affects the quality of waste. The last sub-question explores to what extent the design variables of municipal waste policy affect the quality of waste.

MSW policy design variables and satisfaction level

The first sub-question is investigating the relationship between the four MSW policy design variables and PPW segregation and the satisfaction level. To analyse this effect the means of the different groups are compared using t-tests. After the t-tests results, the regression model results are presented in which the effect of the different design variables on the level of satisfaction is tested using control variables. In the end of this section, the results regarding the ANOVA test are discussed, in which the means of the different types of level of satisfaction are compared between the five municipalities.

An overview of the results of the independent t-test are shown in table 6.1. The t-test is two-tailed to test for any significant outcomes. The t-tests give results for the individual policy design variables. The comfort, environment and payable variables are added to see how these variables are affected by the different policy design variables. In this section, the results for the uneven hypotheses are discussed, as these hypotheses investigate the relation between the policy design variables and the level of satisfaction.

Table 6.1: T-statistic outcomes of the two-tailed independent t-tests. A positive t-test statistic presents a higher mean of the first group, in all cases the first group is 0. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level.

	Collection Method			*Frequency Rate*			*Payment Method*			*PPW Segregation*		
	Kerb	Drop		≤3 w	≥4 w		PAYT	Fixed		Separate	Jointly	
Satisfaction Level	2,39	2,30	*	2,37	2,41		2,35	2,40		2,37	2,37	
Comfort	1,40	1,18	***	1,40	1,39		1,29	1,44	***	1,31	1,56	***
Environmental	1,33	1,29		1,25	1,42	***	1,38	1,24	***	1,37	1,05	***
Payable	0,43	0,41		0,46	0,39	***	0,39	0,47	***	0,42	0,47	**

The first hypothesis stated that the collection by drop-off would expect to have a positive effect on the collection method. However, the results of table 6.1 show that drop off disposal usage delivers less satisfaction on a general level than kerbside collection usage. This relationship is only significant at the 10% level. This relationship is not in line with the findings of Sidique et al. (2010b) and Saphores et al. (2012). Their proposition of drop off disposal usage being more convenient is contested by the significant relation of the level of comfort. This means that people whose residual waste is collected on their kerbstone perceive their policy more comfortable than people who need to dispose their waste at a drop off container. At this moment, trying to explain this contradicting effect would be guessing. Based on the t-test the first hypothesis should be rejected, as an opposing effect is found in regard to the first hypothesis.

In the third hypothesis is mentioned that the frequency rate is expected to have a positive effect on the satisfaction level. The t-test results show no significant effect between the frequency rate and the level

of satisfaction. However, the frequency variable t-test results does show a significant negative statistic for environment. This means that people with a high frequency find that the MSW policy is less environmental oriented. The results of the frequency rate also show that people with a higher frequency do find that their policy is more payable than people with a lower frequency. Due to the insignificant result of the t-test between the frequency rate and the satisfaction level, based on the t-test the third hypothesis should be rejected.

For the fifth hypothesis, a positive effect is expected between the payment by PAYT and the satisfaction level. Results regarding the payment method show that people who pay based on PAYT are not statistically more or less satisfied of their policy than people who pay a fixed tariff. However, people with a fixed tariff do find their policy significantly more comfortable and payable. The results also show that people who pay a flexible tariff find the MSW policy more environmental than people who pay a fixed tariff. Because of the insignificant results between the payment method and the level of satisfaction, based on the t-test the fifth hypothesis should be rejected.

As for the seventh hypothesis, in which PPW segregation is expected to have a negative effect on the level of satisfaction, results show that people who are segregating their plastic packaging waste are not significantly more or less satisfied than people who dispose their PPW with their residual waste. However, these findings do support the study of Bruvoll and Nyborg (2002) as on average people do find their policy more comfortable if they do not have to separate their plastic waste. This is in contrast of the study of Czajkowski et al. (2014) where respondents preferred segregating their waste into more streams. The t-test results also that people that do not separate PPW find their policy more payable. This means that people that can dispose their PPW with their residual waste find their policy more payable than people who manually have to separate their PPW from their residual waste. This is an interesting result, as Bing et al. (2012) found that mechanically separation of PPW involves more costs for municipalities. For the perception of environmental friendliness of the MSW policy, people that have to separate find their MSW policy significantly more environmental. Due to the insignificant result of the t-test between the PPW segregation and the satisfaction level, based on the t-test the seventh hypothesis should be rejected.

Table 6.2: Regression analysis. In the table the unstandardized coefficients are presented. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level. The dependent variable is the general level of satisfaction

	Model 1		***Model 2***		***Model 3***		***Model 4***	
(Constant)	2,379	***	2,359	***	2,351	***	2,379	***
Action Input	0,145		0,013		0,143		0,141	
Trust in Government	0,171	***	0,172	***	0,175	***	0,174	***
Collection Method	-0,064							
Frequency Rate			0,053					
Payment Method					0,043			
PPW Segregation							-0,027	
R Square	0,186		0,178		0,194		0,191	
Adjusted R Square	0,178		0,168		0,187		0,183	
N	311		246		319		320	

In table 6.2 the results of the regression models are presented to test the effect of the design variables on the level of satisfaction. For each regression model a different policy design variable is used. For model 1, the collection method is selected, in model 2 the frequency rate is used, model 3 utilizes the

payment method and in model 4 the PPW segregation is applied. For the different design variables, there are no significant results. This means that the result of the t-test on the collection method is not robust when accounted for the control variables. Furthermore, these results show that across the models, the trust in government significantly positively affects the general satisfaction level.

The first hypotheses stated that the implementation of a drop-off centre has a positive effect on the level of satisfaction. The t-test results showed a negative effect while the regression model showed an insignificant effect. Therefore, this hypothesis is rejected. For the third, fifth and seventh hypotheses, in which the frequency level and the PAYT pricing system are suggested to have a positive effect and PPW segregating is suggested to have a negative effect on the satisfaction level. These three hypotheses are rejected due to insignificant results for the t-tests as well as the regression models.

To see if the combination of these design variables give different results regarding satisfaction and perceived quality of waste, one-way ANOVA is used. The ANOVA test, is a technique to test if the means of the five municipalities significantly differ from each other. For the dependent variable, the satisfaction level of the resident on the MSW policy in general is used. Next to this, the satisfaction level of the residents on each of the four policy design variables is used. These results are presented in table 6.3. For the satisfaction level in general, there is no statistical significant difference across the means of the municipality. However, the satisfaction level of de individual design variables show some significant results. The municipalities do statistically at the 5% level differ in the satisfaction level of payment. ‘s Hertogenbosch and Leeuwarden score with the highest means, while these two municipalities use the fixed tariffs design variable. The difference of means of the satisfaction levels of the variable to segregate PPW or not is significant at the 1% level. ‘s Hertogenbosch has a very low mean while segregating PPW. Raalte also segregates PPW, however this municipality has a relatively high mean. Leeuwarden has the lowest mean, while not segregating PPW. From these results can be derived that between these municipalities the satisfaction level in general on the MSW policy does not differ. The same is true for the level of satisfaction on the collection method and on the frequency rate. As for the satisfaction level on the payment method, municipalities that use PAYT are more satisfied with their choice within the MSW policy than municipalities that use a fixed tariff. The results of the satisfaction level on segregating PPW show that residents within the municipality that do not have to segregate PWW are more satisfied with this option within the policy.

Satisfaction level and quality of waste

The second sub-question is investigating to what extent the satisfaction level affects the perceived quality of waste. The hypothesis belonging to this sub-question is that the satisfaction level positively affects the perceived quality of waste. Regression model results are presented in which this effect is tested using control variables. To test how the satisfaction level influences the perceived quality of waste a regression analysis is used, that is displayed in table 6.4. The regression model consists of six models. In the first model only the control variables are included. The second model is the main model as stated earlier in which the general satisfaction level is added. In model 3 till 6, the effect of the satisfaction levels of the individual design variables is measured.

Table 6.3: ANOVA results of the different levels of satisfaction across the selected municipalities.

ANOVA

	Satisfaction General			*Satisfaction Collection Method*			*Satisfaction Frequency*		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*	*N*	*Mean*	*SD*
's Hertogenbosch	45	2,409	0,388	45	1,610	0,249	33	1,591	0,243
Enschede	37	2,305	0,597	37	1,513	0,251	31	1,514	0,272
Raalte	45	2,477	0,344	45	1,588	0,152	42	1,534	0,178
Noordoostpolder	16	2,293	0,591	16	1,572	0,249	15	1,509	0,280
Leeuwarden	35	2,401	0,303	35	1,579	0,149	29	1,530	0,222
Total	178	2,393	0,437	178	1,575	0,211	150	1,539	0,232
		F	Sig.		F	Sig.		F	Sig.
ANOVA		1,018	0,399		1,166	0,328		0,583	0,675

	Satisfaction Payment			*Satisfaction PPW Segregation*		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
's Hertogenbosch	44	2,649	0,407	44	1,412	0,263
Enschede	36	2,332	0,628	37	1,549	0,276
Raalte	45	2,383	0,342	45	1,620	0,193
Noordoostpolder	16	2,345	0,551	16	1,533	0,256
Leeuwarden	35	2,529	0,444	35	1,367	0,315
Total	176	2,465	0,479	177	1,495	0,276
		F	Sig.		F	Sig.
ANOVA		3,206	0,014		6,267	>0,001

Table 6.4: Regression analysis on the effect of the level of satisfaction on the perceived quality of waste controlled for all aforementioned variables. In the table the unstandardized coefficients are presented. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level. The dependent variable is the perceived quality of waste.

	Model 1		***Model 2***		***Model 3***		***Model 4***		***Model 5***		***Model 6***	
(Constant)	3,599	***	1,985	***	1,681	*	2,472	***	1,540	**	2,885	***
Level of Communication	0,230	***	0,040		0,144	**	0,057		0,138	**	0,173	**
Multi Family Dwelling	-0,196		-0,211		-0,256		-0,257		-0,068		-0,183	
Age	0,019	***	0,017	***	0,018	***	0,007		0,021	***	0,016	**
Income	0,096	*	0,090	*	0,099	**	0,050		0,081	*	0,082	*
Satisfaction General			1,274	***								
Satisfaction Collection Method					1,501	***						
Satisfaction Frequency							2,125	***				
Satisfaction PPW Segregation									1,744	***		
Satisfaction Payment											0,559	**
R Square	0,080		0,125		0,111		0,095		0,135		0,100	
Adjusted R Square	0,068		0,109		0,095		0,075		0,120		0,094	
N	292		292		282		223		290		289	

The first model shows that the control variables perceived communication level and age have a positive strong significant effect on the perceived quality of waste. This means that the better perceived communication about the waste policy and a higher age results in a better perceived quality of waste. Also income positively affects the perceived quality of waste, however this result is only significant at the 10% level. When the satisfaction level variable is included in the second model, it shows that this also has a positive significant effect on the perceived quality of waste, as well as the age variable. However, the perceived communication level variable does not have a significant effect anymore. This is due to the strong positive significant effect of the bivariate correlation between the satisfaction variable and the perceived level of communication variable. This means that the perceived level of communication positively effects the level of satisfaction and that it has an indirect positive effect on the perceived quality of waste trough the level of satisfaction. After adding the general satisfaction variable in model two, the R square changed with 4,5%, meaning that in total the second model explains 12,5% of the variation. The other models show that satisfaction about the individual design variables also affects the perceived quality of waste. All these results are strongly significant, except for the satisfaction level of the payment method which is only significant at the 5% level. The control variable age also remains significant and positive across the different models, except for the satisfaction level on frequency. Income remains little significant and positive across the models.

Table 6.5: Regression analysis on the effect of the level of satisfaction on the perceived quality of waste controlled for all aforementioned variables excluding the level of communication. In the table the unstandardized coefficients are presented. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level. The dependent variable is the perceived quality of waste.

	Model 1		***Model 2***		***Model 3***		***Model 4***		***Model 5***		***Model 6***	
(Constant)	5,039	***	2,010	***	1,938	**	2,553	***	1,986	***	3,604	***
Multi Family Dwelling	-0,117		-0,204		-0,208		-0,251		-0,247		-0,125	
Age	0,021	***	0,018	***	0,019	***	0,007		0,023	***	0,016	**
Income	0,085	*	0,089	*	0,092	*	0,049		0,048		0,069	
Satisfaction General			1,376	***								
Satisfaction Collection Method					2,082	***						
Satisfaction Frequency							2,330	***				
Satisfaction PPW Segregation									2,022	***		
Satisfaction Payment											0,748	***
R Square	0,040		0,124		0,098		0,093		0,122		0,080	
Adjusted R Square	0,030		0,112		0,086		0,077		0,109		0,067	
N	293		291		287		228		291		294	

As stated in the data analysis chapter, the variable perceived level of communication correlates with the satisfaction levels. Because of this multicollinearity, it is unclear which variable affects the dependent variable. Therefore, an alternative regression model is analysed without the variable perceived level of communication. The results of this regression model is presented in table 6.5. The models are the same in table 6.4, however the perceived level of communication is excluded from these models. From these results can be derived that the satisfaction level for the payment method has increased in significance. Also, the results for the variable age remains to show a positive significant effect. Therefore, satisfaction level does have a positive significant effect on the perceived quality of waste.

To test for the robustness when all variables, including the satisfaction level of the individual design variables, are included in the same model, a PCA is used to create the new variable Relation Government. As stated in the data analysis chapter, note that this variable does not account for the collection method of drop off disposal, due the fact that respondents making use of drop-off disposal containers do not have a frequency rate nor a satisfaction level about the frequency rate. This outcome of a regression model with this new variable is presented in table 6.6. These results show a strong positive significant effect of the relation government variable and that the significance of the age variable disappears. This means the effect of the age variable is not robust in this model and that the relationship with the respondent and the government has a positive strong effect on the perceived quality of waste. Because of this and all previous results, hypothesis nine is supported and robust.

Table 6.6: Regression analysis on the effect of the resident's relation with government on the perceived quality of waste. In the table the unstandardized coefficients are presented. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level. The dependent variable is the perceived quality of waste.

	Model 1
(Constant)	0,380
Multi Family Dwelling	-0,327
Age	0,008
Income	0,064
Relation Government	3,950 ***
R Square	0,101
Adjusted R Square	0,084
N	216

MSW policy and quality of waste

In the third sub-question is the relationship between the four MSW policy design variables and the perceived quality of waste investigated. In this section the even hypotheses are discussed as these investigate the effect between the design variables and the perceived quality of waste. The second hypothesis expected a positive relationship between the collection by drop-off and the quality of waste. In the fourth hypothesis is mentioned that the frequency rate is expected to have a negative effect on the perceived quality of waste. For the sixth hypothesis, a negative effect is expected between the payment by PAYT and the perceived quality of waste. The eight hypothesis state that a negative effect is expected between the segregation of PPW and the perceived quality of waste. To analyse these hypotheses the means of the different groups are compared using t-tests. After the t-tests results, , the results regarding the ANOVA test are discussed, in which the means of the perceived quality of waste is compared between the five municipalities. Afterwards, the results of the regression models are presented.

Table 6.7: T-statistic outcomes of the two-tailed independent t-tests for the perceived quality of waste. A positive t-test statistic presents a higher mean of the first group, in all cases the first group is 0. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level.

	Collection Method			*Frequency Rate*			*Payment Method*		*PPW Segregation*	
	Kerb	Drop		≤3 w	≥4 w		PAYT	Fixed	Separate	Jointly
Quality of Waste	6,60	6,02	**	6,27	6,88	**	6,58	6,23	6,50	6,18

The results of the t-test of the different design variables on the perceived quality of waste are presented in table 6.7. The results show some statistics with significant results at the 5% level. People that dispose of their residual waste through kerbside collection think that they dispose their waste more correctly than people that make use of drop off containers. This contradicts the results that Sidique et al. (2010b) has found in which people with dorp-off containers recycled more. As for the frequency variable, people who have a lower frequency of collection think that they more correctly dispose their waste than people who have a high frequency rate. This supports the results of Abbott et al. (2011) and Kuo and Perrings (2010), as they have found that a low frequency rate increases recycling. For the payment method as well as the PPW segregation, no significant difference in means was found. The outcome of the one-way ANOVA test is presented in table 6.7. The results of the ANOVA test show that the means of the perceived quality of waste is not statistically different across the municipalities. Therefore, we can conclude that these municipalities do not statistically differ in means of perceived quality of waste and that the design variables combined in a policy do not show different results.

Table 6.7: ANOVA results of the perceived quality of waste across the selected municipality.

ANOVA

	Quality of Waste		
	N	*Mean*	*SD*
's Hertogenbosch	38	6,402	1,954
Enschede	35	6,239	2,281
Raalte	44	6,723	1,774
Noordoostpolder	15	6,609	2,176
Leeuwarden	33	6,404	2,184
Total	165	6,472	2,033
		F	Sig.
ANOVA		0,314	0,868

A regression model analysis is used to see how the different design variables affect the perceived quality of waste with control variables. The outcome of the regression model is presented in table 6.8. For each regression model a different policy design variable is used. For model 1, the collection method is selected, in model 2 the frequency rate is used instead, model 3 utilizes the payment method and in model 4 the PPW segregation is applied. The results of the regression models show that in a model one, the collection method variable does show a negative result but this result is insignificant. The frequency rate still remains significant at the 5% level. Note that a higher data input for the frequency rate variable a lower real-life frequency is. Thus, the positive significant result means that a lower frequency rate leads towards a higher perceived quality of waste. In this regression model, the payment method does become significant at the 10% level. Although, not very robust, this means that the PAYT method leads to a higher perceived quality of waste. The second hypotheses suggested that the implementation of a drop-off centre has a positive effect on the perceived quality of waste. The t-test results showed a negative effect while the regression model showed an insignificant effect. Therefore, this hypothesis is rejected. The fourth hypothesis, in which the frequency level is suggested to have a negative effect on the perceived quality of waste, is supported. Both the t-test as well as the regression model show a negative effect of the frequency level on the perceived quality of waste. This supports the theory by Abbot et al. (2011) that a low frequency rate provides an incentive to the resident to recycle more. For the sixth hypothesis, the PAYT pricing system are expected to have a positive effect on the perceived quality of waste. This hypothesis is rejected. Payment method shows an insignificant result in the t-test

and a very low significant result in the regression model. The eight hypothesis sates that PPW segregation is expected to lead to a lower quality of waste. The results shows insignificant results for the t-test as well as the regression model. This hypothesis is therefore rejected.

Table 6.8: Regression analysis on the effect of the MSW policy design variables on the perceived quality of waste. In the table the unstandardized coefficients are presented. Significance is shown using *,**,***, meaning respectively significance at the 10%, 5% and 1% level. The dependent variable is the perceived quality of waste.

	Model 1		***Model 2***		***Model 3***		***Model 4***	
(Constant)	3,877	***	4,083	***	3,744	***	3,633	***
Multi Family Dwelling	-0,272		-0,199		-0,201		-0,220	
Age	0,017	**	0,014	*	0,021	***	0,020	***
Income	0,094	*	0,088		0,092	*	0,097	**
Communication	0,230	***	0,178	**	0,220	**	0,229	***
Collection Method	-0,389							
Frequency Rate			0,543	**				
Payment Method					-0,369	*		
PPW Segregation							-0,314	
R Square	0,087		0,065		0,088		0,084	
Adjusted R Square	0,071		0,044		0,073		0,068	
N	287		228		295		296	

5. Conclusion

The goal of this research was to see to what extent the satisfaction level of the MSW policy relates to the quality of waste. Another goal of this research was to see if the satisfaction level is influenced by the collection method, frequency rate, payment method and PPW segregation choices made in the MSW policy. These goals were set to investigate if the satisfaction level and the MSW policy cause a decline the quality of waste. These goals were translated into the following research question: To what extent is the quality of waste affected by the satisfaction level on the policy and the design variables of the municipal wate policy? To help answering this research question, several sub-questions were formulated. These are: To what extent do the design variables of municipal waste policy affect the satisfaction level of the citizens? To what extent does the satisfaction level affect the quality of the waste? And to what extent do the design variables of municipal waste policy affect the quality of waste? Also, several hypotheses were proposed. These hypotheses and their outcome are presented in table 7.1.

Table 7.1: Hypothesis results

H	*Independent variable*	*Dependent variable*	*Expected effect*	*Result*
H1	Collection by drop-off	Satisfaction Level	+	Rejected
H2	Collection by drop-off	Quality of Waste	+	Rejected
H3	Frequency rate	Satisfaction Level	+	Rejected
H4	Frequency rate	Quality of Waste	-	Supported
H5	Payment by PAYT	Satisfaction Level	+	Rejected
H6	Payment by PAYT	Quality of Waste	+-	Rejected
H7	Segregation of PPW	Satisfaction Level	-	Rejected
H8	Segregation of PPW	Quality of Waste	-	Rejected
H9	Satisfaction Level	Quality of Waste	+	Supported

The first sub-question is used to help answer to what extent the design variables of municipal waste policy affect the satisfaction level of the citizens. The design variables investigated in this research are the collection method, the frequency rate, the payment method and the segregation of PWW. To help answer this sub-question, four hypotheses are stated on the basis of prior research. These hypotheses stated that the collection by drop-off, the frequency rate and a flexible payment method would have a positive effect on the satisfaction level. The last hypotheses stated that the segregation of PPW would have a negative effect on the satisfaction level. Of the four different design variables analysed in this research, the frequency rate, the payment method and the PPW segregation gave insignificant results in the t-test and in the regression model. Therefore, these results lead to the rejection of the hypothesis which state that the design variables affect the satisfaction level of the citizens. The t-test results showed that, of the collection method, the kerbside collection led to a (significant at the 10% level) higher level of satisfaction. However, prior research led to a reverse hypotheses as the drop-off collection method was predicted to lead to a higher level of satisfaction. In the regression model results, the effect of the collection method was not significant. Therefore, this result is not robust. In the regression results, the trust in government showed to have a significance and positive effect on the level of satisfaction. Also in the Spearman's Rho results, the perceived communication level had a strong positive significant correlation with the level of satisfaction, with the level of satisfaction on the individual design variable and on the perceived quality of waste. In conclusion, this research did not found robust results of design

variables affecting the level of satisfaction. However, trust in government and the perceived communication level showed to have a significant effect on the level of satisfaction.

The second sub-question investigated to what extent the satisfaction level affects the quality of waste. To help answer this sub-question, a hypothesis based on prior research was stated, in which the level of satisfaction is expected to have a positive effect on the quality of waste. Due to methodology choices, residents were asked to self-report the perception of them on the quality of their waste. Eleven different regression models in this research showed that the satisfaction level significant positively affects the perceived quality of waste. Even a higher level of satisfaction about a single design variable significant positively affects the perceived quality of waste. Important to mention at these results is that the perceived communication level significant strongly correlates with the level of satisfaction and also significantly correlates with the perceived quality of waste. Although not as strong, also the age, comfort and environmental variable show a positive and significant correlation on the perceived quality of waste.

The third sub-question is formed to research to what extent the design variables of MSW affect the quality of waste. Also for this sub-question, the self-reported quality of waste is used to measure the perceived quality of waste as a proxy. Just like for the first sub-question, the design variables investigated are the collection method, the frequency rate, the payment method and the segregation of PWW. To help answer the third sub-question, four hypotheses are stated on the basis of prior research. These hypotheses stated that the collection by drop-off and a flexible payment method would have a positive effect on the perceived quality of waste. The other hypotheses stated that the frequency rate and the segregation of PPW would have a negative effect on the perceived quality of waste. Kerbside collection showed by the t-test to be significant at the 5% level to give a higher perceived quality of waste then the drop-off collection. This effect was hypothesised the opposite. In a regression model this effect became insignificant. Both the t-test as well as the regression model showed significant result at the 5% level for a negative effect between the frequency level and the perceived quality of waste. Meaning that the less the residual waste is collected, the more people perceive their waste of higher quality. This effect was conform the hypothesis. The PAYT payment method showed to lead to a higher perceived quality of waste, however this effect was insignificant in the t-test. In the regression model this effect was significant at the 10% level. Therefore, this result is not robust. The variable to segregate PWW showed insignificant results. At the regression model, age income and the perceived communication level showed some positive significant effects on the perceived quality of waste.

Because of the conclusions of the sub-questions, the overall conclusion is that the perceived quality of waste is affected by the level of satisfaction of the MSW policy. Both the general satisfaction and the level of satisfaction on the individual design variable showed to positively affect the perceived quality of waste. As for the second goal of this research, from this research no reasons are found that the current implemented design variables lead to a lower satisfaction level.

6. Discussion

In this chapter, first the limitations of this research are discussed. Afterwards, the theoretical implications and directions for future research are presented. As last, the practical implications and recommendations for municipalities are stated.

Limitations

Naturally, this research has some limitations. First of all, using survey as a data collection method for measuring the quality of waste is not ideal. This variable is therefore a self-reported measurement. How people perceive how well they are segregating their waste into the right waste streams and the actual percentage of the quality of the segregated waste streams are two different things. Respondents can think that they are good at segregating waste, however it could be the case that this is not true. They could have obtained wrong knowledge on how to segregate their waste or they under- or overestimate their performance. Therefore, this measurement model is not the ideal method to measure the quality of waste. However, as explained before, due to measuring the actual quality of waste being time consuming and because waste colleting company did not want to share data, this was the right option for this research.

Secondly, this study only uses five municipalities with a limited variety of design variables. Therefore, this data cannot be used to draw robust conclusions on the combinations between the design variables. To address all municipalities with different combinations was too time consuming to also included in this research. However, for future research on design variables of MSW policy, it could give new insights when more combinations of policy design variable are included. This way, significant results could provide not only insights on the individual design variables, but also on the combination of these design variables.

As third, not all design variables are fully measured. Of the collection method variable only the kerbside collection and the drop-off collection are measured. In the measurement of the frequency variable there is no order in once a week, once in two weeks, once in three weeks and once in four weeks, but a dichotomous variable is created. This means that a conclusion can only be made on the basis of two items, rather than four. Previous research on recycling behaviour did make a distinction between the different frequency variables (Noehammer et al., 1997; Sidique et al., 2010b; Abbott et al., 2011). This is also the case for PAYT, as this variable is also transformed into a dichotomous variable. As stated before, in reality many forms of PAYT are in use in the Netherlands. Including all items of PAYT and frequency rate requires more time, but can provide new insights in the relationship between the frequency rate, payment method, the level of satisfaction and quality of waste.

A next limitation concerns the relation government variable. The new variable consisting out of the general level of satisfaction, the level of satisfaction on the individual design variables and the perceived communication level is created to avoid multicollinearity issues. Due to the combinations of these variable, the drop-off collection method is excluded due to the fact the respondents using the drop-off method missing data on the satisfaction on the frequency rate. It was either excluding the drop-off collection method or excluding the level of satisfaction on frequency rate.

Theoretical Implications and Future Research

In the introduction of this research, a research gap on level of satisfaction is identified. This gap identified concerns the influences of the satisfaction level of MSW policy and is the declining quality of waste a negative consequence of the level of satisfaction. After conducting this research, this gap is

partially filled. According to these results, no individual design variable affects the general level of satisfaction. However, there is a clear correlation between the comfort ($r_s(342) = .66$, $p = <.001$), environment ($r_s(342) = .58$, $p = <.001$) and payable ($r_s(342) = .30$, $p = <.001$) variables that the MSW policy provides and the level of satisfaction. Also a robust significant positive relation is found between the level of satisfaction and the perceived quality of waste, meaning that a declining level of satisfaction leads to a declining perceived quality of waste. Further research on the trend of level of satisfaction could investigate if the level of satisfaction indeed is the cause of the declining quality of waste.

Furthermore, this research supported some findings of other research. First of all, the theory of Abbott et al. (2010) in which they state that people will recycle more if the frequency of collection is lower due to reduce waste overflows, is also supported by this research. The perceived quality of waste increased when frequency dropped. Next to this, in the survey an additional open question was asked why the respondent recycle. Some people responded with “otherwise the residual waste bin gets full to soon”. Secondly, Bruvoll and Nyborg (2002) stated that residents find less waste streams to segregate more comfortable. Czajkowski et al. (2014) found the opposite relation. These results confirm that people who do not have to segregate plastic packaging waste find their policy more comfortable and therefore support the statement of Bruvoll and Nyborg (2002).

The results of this research also contradicts some findings of other research. Firstly, the kerbside collection method showed to have a little significant higher mean of level of satisfaction than the drop-off disposal method. Next to this, people who use kerbside collection perceive that they recycle better than people who use the drop-off collection method. Sidique et al. (2010b) and Saphores et al. (2012) suggested that using a drop-off collection method for residual waste instead of kerbside collection, can increase the convenience for the resident. Next to this, Sidique et al. (2010b) showed that the drop-off collection method for residual waste can lead to a higher rate of recycling in comparison with kerbside collection. The results of this research are not in line with prior research. Future research could investigate under what circumstance the drop-off and the kerbside collection method are most effective.

Secondly, Reichenbach (2008) proposed that the PAYT pricing system could be perceived to be a more fair pricing system as the residents pay according to the amount of waste they produce. This statement cannot be not one on one supported by these results, because the level of fairness of the pricing method is outside the scope of this research. However, in this research is found that residents subject to PAYT do find their policy less comfortable and payable than residents with a fixed payment system. Although this is not the same as fairness, it does raise the question if fairness leads to comfort and a positive perception of the citizen on the affordability of the MSW policy.

Another contradicting theory is the one of Bing et al. (2012), in which they state that mechanical separation of PPW involves more costs for municipalities. This research showed that people that can dispose their PPW with their residual waste find their policy more payable than people who manually have to separate their PPW from their residual waste. This is extra interesting as the municipality in this research, that jointly collects PPW with residual waste, uses a fixed pricing method, in which this research has found that this policy aspect deceases the perception that the MSW policy is payable according to the residents. One explanation for this contradiction is that it could be that the theory of Bing et al. (2012) is outdated as in the Netherlands more PPW separation systems were built since then (AfvalOnline, 2019). This could have brought the costs of using mechanically segregation down for municipalities. Among other this, more competition and lower transportation distance could reduce the cost price and the transportation costs (De Bruin et al., 2018). A new research on the costs and benefits of mechanical PPW segregation could give new insights for this topic.

Some other results were found in this research without a clear explanation. These results could also be subjected to future research. At first, MSW policies with a high frequency rate is less environmental according to the respondents. A possible explanation could be that this is caused by the pollution of the collection truck, as prior research have suggested that this is an important factor for an environmental policy (Bing et al, 2012; Hasit and Warner, 1981). Next to this, residents find that MSW policies with a higher frequency rate are more payable. An explanation for this result is missing, as logic thinking would suggest that more time and effort put into collection would raise costs. Also, the results show that people who pay a flexible tariff find their policy more environmental than people who pay a fixed tariff. It could be that the residents are aware of the recycling incentive that the flexible tariff system creates and therefore find their policy more environmental. However, this is merely a suggestion.

The last direction for future research is the level of communication. The results of this research show that the perceived level of communication positively effects the level of satisfaction and the perceived quality of waste. This supports the findings by Seacat and Northrup (2010), Davis et al. (2006) and Tonglet et al. (2004). However, the question arises how municipalities can effectively increase the (perceived) level of communication on the subject of MSW policy. Further research should investigate how municipalities can effectively and efficiently communicate towards their residents to increase the quality of waste and the recycling rates.

Practical Implications and Recommendations

From the results of this research, municipalities can derive a few actions to develop their solid waste policy. At first, the frequency of the residual waste collection could be altered to collection once in four weeks or later to increase the level of waste. As discussed earlier, this and other research have found that less residual waste collection possibilities leads to a higher (perceived) quality of waste. To prevent waste overflow, residents get the incentive to correctly dispose their recyclables and therefore save room for actual residual waste in their waste storage. These results are found in municipalities having a frequency rate of once in four weeks or later compared to municipalities having a frequency rate of once in three weeks or sooner. A municipality should not just lower the frequency rate, as the results of this research also have shown that the satisfaction of the frequency design variable by the residents also affects the perceived quality of waste. Therefore, a municipality should decrease their frequency rate only if this would not affect the satisfaction level.

Municipalities could also invest time and effort into increasing the level of satisfaction of their residents. Even increasing the satisfaction about a single design variable could increase the perceived quality of waste. As earlier stated, this research has found that a MSW policy which is perceived as comfortable, payable and environmental correlates with a high level of satisfaction. Also the perceived communication level by the municipality and waste collection company ($r_s(351) = .62$, $p = <.001$) and the trust in government ($r_s(342) = .30$, $p = <.001$) correlates positively with the level of satisfaction. Note that these are correlations and not causalities.

Of the 359 respondents of the survey, only eleven delivered input for the MSW policy. However, delivering input correlates positively with the level of satisfaction ($r_s(343) = .11$, $p = .036$) and with the perceived quality of waste ($r_s(334) = .11$, $p = .046$). Next to this, 28,4% (102 of 359) of the respondents wanted to deliver input, but either did not know if there was an opportunity to deliver input (67 of 359) or felt like they did not had the opportunity to deliver input (34 of 359). From a democratic legitimacy point of view, one could argue that the high number of people that wanted to deliver input but failed to

do so is not desirable. Municipalities could look at how they can improve the opportunities to let citizens deliver input for the MSW policy. This could result into a higher level of satisfaction and a better quality of waste.

As previously stated, communication is important in for a good MSW policy as the perceived communication level correlates positively with satisfaction and perceived quality of waste. Next to this, communication could maybe also increase the effectiveness of the incentives of the design variable. On an extra question in the survey on the reason why people recycle, 256 out of 391 respondent out of environmental reasons, 130 respondent out of financial reasons and 103 respondent recycle because it is desired from them to do so. Seven respondents do not recycle. Interesting is that of the 214 respondents that are subject to a MSW policy with a flexible payment method, 101 (47,2%) recycle for financial reasons. This means that 113 (52,8%) respondents that do benefit from recycling, do not recycle for financial reasons. These results make it questionable if all of the respondents are aware of the financial benefits of recycling when subjected to the PAYT payment method. Further research can investigate if respondents are aware of the financial benefits and municipalities can increase the awareness by communication.

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Appendix 1: Frequency table of the different policy design variables[2]

Rank	Municipality Frequency	Frequency collection residual waste	PAYT	Drop-off centres in area's with high proportion of MFD's	PPW segregation
1	**51**	**Weekly or Biweekly**	**No**	**Yes**	**At the source**
2	**31**	**Weekly or Biweekly**	**Yes**	**Yes**	**At the source**
3	**29**	**Monthly**	**Yes**	**Yes**	**At the source**
4	**22**	**Monthly**	**No**	**Yes**	**At the source**
5	17	Weekly or Biweekly	Yes	Yes	At the source
6	10	Weekly or Biweekly	No	Yes	At the source
7	**8**	**Weekly or Biweekly**	**No**	**Yes**	**After collection**

[2] Data on the frequency of collection residual waste and drop-off centres in areas with high proportion of MFD's is collected by Rijkswaterstaat (2017). Data on the PAYT is collected by Rijkswaterstaat (2018). Data on the PPW segregation is collected by de Bruin, Zuyderduyn and Oldenhof (2018).

Appendix 2: Survey Questions

Msc_Thesis_MSW_Policy_Survey

Start of Block: Default Question Block

Q1 Welkom.
Dit is een vragenlijst met betrekking tot uw ervaringen met de inzameling van uw huishoudelijk afval. Deze vragenlijst maakt deel uit van een onderzoek ter afronding van mijn opleiding Bestuurskunde aan de Universiteit van Twente. Het invullen van deze enquête duurt ongeveer 5 minuten.
Met de gegevens van deze vragenlijst wordt onderzoek gedaan naar het effect van het huishoudelijk afvalbeleid van uw gemeente op de acceptatie van de inwoners van de gemeente. Ook wordt gekeken naar het effect van de acceptatie van de inwoners op de mate waarin afval wordt gescheiden.
Tijdens dit onderzoek wordt gevraagd naar persoonlijke gegevens. Deze zullen anoniem worden verwerkt en behandeld volgens de privacy regelgeving (AVG). U kunt ten alle tijden stoppen met de vragenlijst. De gegevens worden pas verzonden wanneer de hele enquête heeft afgerond.
Voor vragen kunt u contact opnemen via elroyelshof@hotmail.com of 06-25137215.
Alvast bedankt!
Elroy Elshof

○ Ik heb bovenstaande gelezen en ik wil verder met de vragenlijst (1)

Page Break

*

Q2 Wat zijn de vier cijfers van uw postcode?

_____

Page Break

Q4 Mijn restafval wordt ingezameld door middel van een[3]:

- ☐ Minicontainer (Kliko) (1)
- ☐ Ondergrondse container (2)
- ☐ Gemeentelijke afvalzakken (3)

Display This Question:

If Mijn restafval wordt ingezameld door middel van een: = Minicontainer (Kliko)

Q4 De route voor de inzameling van restafval komt:

- ○ Eenmaal in de drie weken of vaker langs (1)
- ○ Eenmaal in de maand langs (2)

Q5 Ik betaal:

- ○ Naast een vast tarief per jaar, ook per keer dat ik mijn restafval inlever (1)
- ○ Alleen een vast tarief per jaar (2)

[3] Option 3 was only available for the survey spread through social media

Q6 De gemeente verwacht dat ik afval van plastic-, metaal-, drinkverpakkingen (PMD):

- ○ Gescheiden van het restafval inlever (1)
- ○ Samengevoegd met het restafval inlever (2)

Page Break

Q7 Uw gemeente stelt het huishoudelijk afvalbeleid samen. Heeft u input willen leveren voor het opstellen van dit beleid? (Het gaat hier om of uw de wens hebt gehad om input te leveren)

- ○ Ja, ik heb input willen leveren voor het opstellen van dit beleid. (1)
- ○ Nee, ik heb geen input willen leveren voor het opstellen van dit beleid. (2)

Display This Question:

If Uw gemeente stelt het huishoudelijk afvalbeleid samen. Heeft u input willen leveren voor het opst... = Ja, ik heb input willen leveren voor het opstellen van dit beleid.

Q8 Heeft u ook daadwerkelijk input geleverd voor het opstellen van dit beleid?

- ○ Ja, ik heb input geleverd (1)
- ○ Nee, ik heb niet de gelegenheid gekregen om input te leveren voor het opstellen van dit beleid, maar wilde dit wel. (2)
- ○ Nee, ik weet niet of er een gelegenheid was om input te leveren voor het opstellen van dit beleid, maar wilde dit wel. (3)

Display This Question:

If Heeft u ook daadwerkelijk input geleverd voor het opstellen van dit beleid? = Ja, ik heb input geleverd

Q9 Hoe heeft u input geleverd?

Ik heb input geleverd door....

- ○ het bijwonen van door gemeente georganiseerde bijeenkomsten. (1)
- ○ door contact te hebben gehad met de gemeente (bijv. via enquêtes, ambtenaren of raadsleden) (2)
- ○ Anders: (3) _____

Q10 Op een schaal van 1 tot 10, in welke mate vindt u dat de gemeente of het afvalinzamelingsbedrijf goed heeft gecommuniceerd over het huidig afvalbeleid?

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Page Break

Q11 Nu volgen een paar vragen over hoe tevreden u bent met aspecten van het huidig afvalbeleid. Vul alstublieft in op een schaal van 1 tot 10 hoe tevreden u bent met het gevraagde aspect.

In hoeverre bent u tevreden met het volgende aspect van uw gemeentelijk huishoudelijk afvalbeleid?

Display This Question:

If Mijn restafval wordt ingezameld door middel van een: = Minicontainer (Kliko)

Q12 Inzameling via een minicontainer (Kliko)

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Display This Question:

If Mijn restafval wordt ingezameld door middel van een: = Ondergrondse container

Q13 Inzameling via een ondergrondse container

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Display This Question:

If Mijn restafval wordt ingezameld door middel van een: = Gemeentelijke afvalzakken

Q14 Inzameling via gemeentelijke afvalzakken[4]

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

[4] Question 14 was only available for the survey spread through social media

Display This Question:

If Mijn restafval wordt ingezameld door middel van een: = Minicontainer (Kliko)

Q15 De frequentie van inzameling

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q16 De methode van afvalstoffenheffing: ${Q6/ChoiceGroup/SelectedChoices}

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Display This Question:

If De gemeente verwacht dat ik afval van plastic-, metaal-, drinkverpakkingen (PMD): = Gescheiden van het restafval inlever

Q17 Het gescheiden inleveren van plastic-, metaal-, drinkverpakkingen (PMD)

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Display This Question:

If De gemeente verwacht dat ik afval van plastic-, metaal-, drinkverpakkingen (PMD): = Samengevoegd met het restafval inlever

Q18 Het niet gescheiden inleveren van plastic-, metaal-, drinkverpakkingen (PMD)

- 0 (0)
- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)

Q19 Het gemeentelijk huishoudelijk afvalbeleid over het algemeen

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Page Break

Q20 In hoeverre vindt u dat het huidige huishoudelijk afvalbeleid zorgt voor gemak?

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Q21 In hoeverre vindt u dat het huidige huishoudelijk afvalbeleid milieubewust is?

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Q23 In hoeverre vindt u dat het huidige huishoudelijk afvalbeleid betaalbaar is?

- ○ Te duur (1)
- ○ Duur (15)
- ○ Neutraal (16)
- ○ Goedkoop (17)
- ○ Te goedkoop (18)

Page Break

Display This Question:

If De gemeente verwacht dat ik afval van plastic-, metaal-, drinkverpakkingen (PMD): = Gescheiden van het restafval inlever

Q24 In hoeverre denkt u dat u uw afval op de correcte manier aan het scheiden bent? Met andere woorden: Hoe zuiver zijn uw afvalstromen restafval en PMD?Kunt u schatten uit hoeveel procent bestaat uw restafval ook daadwerkelijk bestaat uit restafval (en dus geen gft, papier, glas, PMD etc.) en uw PMD ook daadwerkelijk bestaat uit PMD?

	0 10 20 30 40 50 60 70 80 90 100
Zuiverheid restafval ()	
Zuiverheid PMD ()	

Display This Question:

If De gemeente verwacht dat ik afval van plastic-, metaal-, drinkverpakkingen (PMD): = Samengevoegd met het restafval inlever

Q25 In hoeverre denkt u dat u uw afval op de correcte manier aan het scheiden bent? Met andere woorden: Hoe zuiver is uw afvalstroom restafval en PMD? Kunt u schatten uit hoeveel procent uw restafval en PMD ook daadwerkelijk bestaat uit restafval en PMD (en dus geen gft, papier, glas, etc)?

	0 10 20 30 40 50 60 70 80 90 100
Zuiverheid restafval en PMD ()	

Q26 Om welke reden doet u aan afvalscheiding?

- ☐ Afval scheiden is goed voor het milieu (1)
- ☐ Afval scheiden zorgt voor minder kosten (2)
- ☐ Ik doe het omdat het van mij wordt gevraagd (3)
- ☐ Anders: (4) _____
- ☐ Ik doe niet aan afvalscheiding (5)

Display This Question:

If If Om welke reden doet u aan afvalscheiding? q://QID40/SelectedChoicesCount Is Equal to 2

Q27 Op een schaal van één tot tien, hoe belangrijk zijn deze redenen voor u om afval te scheiden?

	0 1 2 3 4 5 6 7 8 9 10
Afval scheiden is goed voor het milieu ()	
Afval scheiden zorgt voor minder kosten ()	
Ik doe het omdat het van mij wordt gevraagd ()	
Anders: ${Q40/ChoiceTextEntryValue/3} ()	

Page Break

Q28 Woont u in een meergezinswoning?

Een meergezinswoning is elke woning die samen met andere woonruimten c.q. bedrijfsruimten een geheel pand vormt. Hieronder vallen flats, galerij-, portiek-, beneden- en bovenwoningen, appartementen en woningen boven bedrijfsruimten, voor zover deze zijn voorzien van een buiten de bedrijfsruimte gelegen toegangsdeur (Bron: CBS).

- ○ Ja, ik woon in een meergezinswoning (1)
- ○ Nee, ik woon niet in een meergezinswoning (2)

Q29 Op een schaal van 1 tot 10, in welke mate bent u het eens met deze stelling:
Ik geloof dat mijn stem invloed heeft op de politiek in mijn gemeente

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Q30 Op een schaal van 1 tot 10, in welke mate bent u het eens met deze stelling:
Ik heb vertrouwen in de gemeenteraad van mijn gemeente

- ○ 0 (0)
- ○ 1 (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 (4)
- ○ 5 (5)
- ○ 6 (6)
- ○ 7 (7)
- ○ 8 (8)
- ○ 9 (9)
- ○ 10 (10)

Q31 Wat is uw leeftijd?

_____

Q32 In welke categorie valt uw huishoudelijk jaarinkomen (bruto, in euro's)?

- ○ <20.000 (1)
- ○ 20.001-30.000 (2)
- ○ 30.001-40.000 (3)
- ○ 40.001-50.000 (4)
- ○ 50.001-60.000 (5)
- ○ 60.001-70.000 (6)
- ○ 70.001-80.000 (7)
- ○ 80.001> (8)

Q33 Klopt het dat de vier cijfers van uw postcode zijn: ${Q3/ChoiceTextEntryValue}

- ○ Ja (1)
- ○ Nee (2)

Display This Question:

If Klopt het dat de vier cijfers van uw postcode zijn: ${q://QID3/ChoiceTextEntryValue} = Nee

Q34 Wat zijn de vier cijfers van uw postcode?

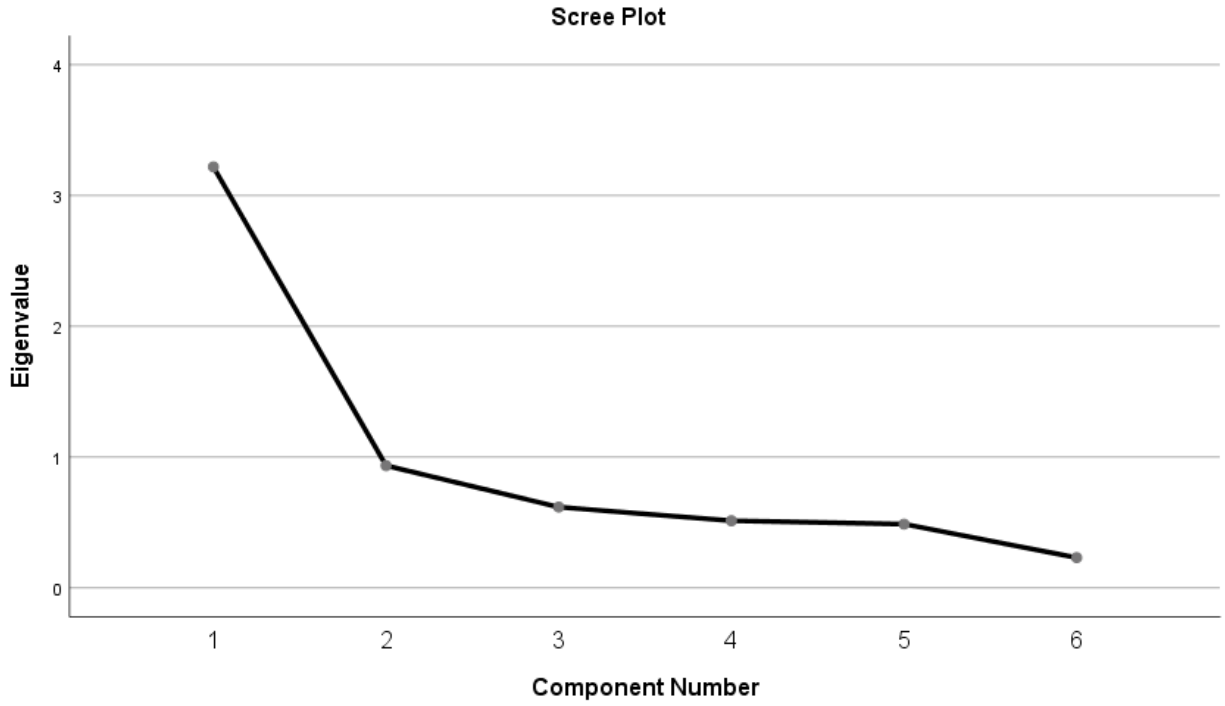
_____

End of Block: Default Question Block

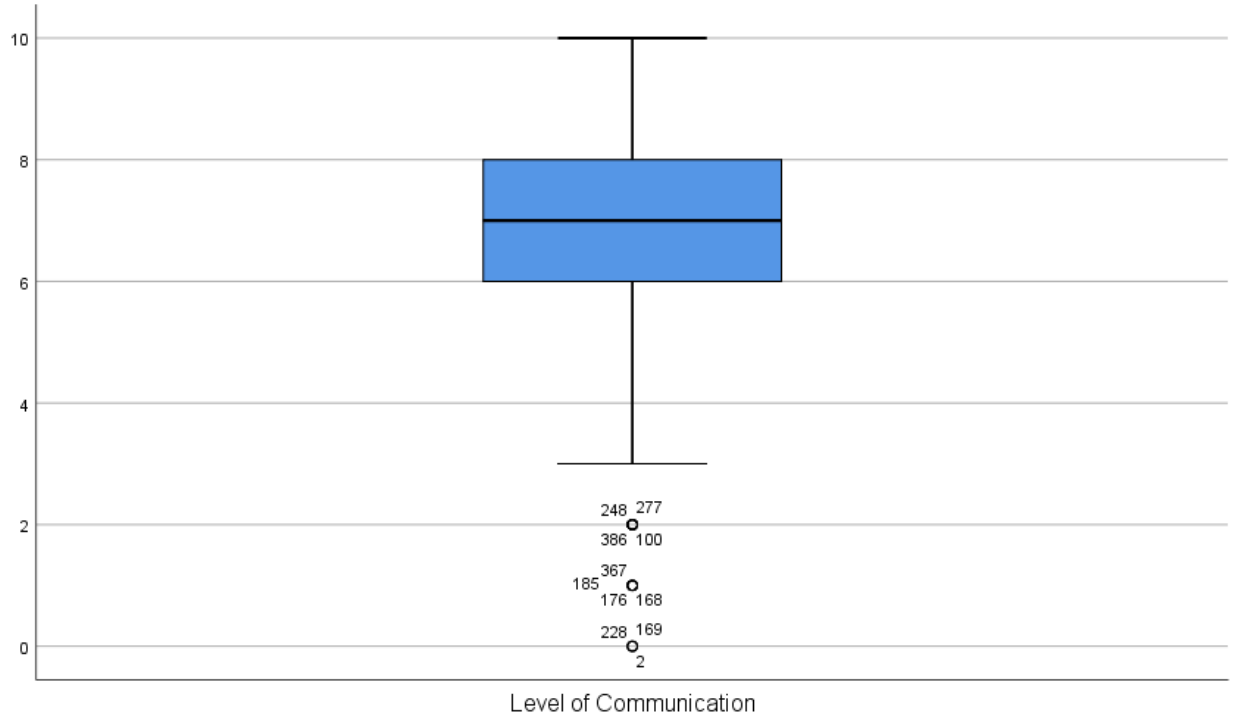
Appendix 3: Descriptive statistics of the variables before correcting for skewness and kurtosis

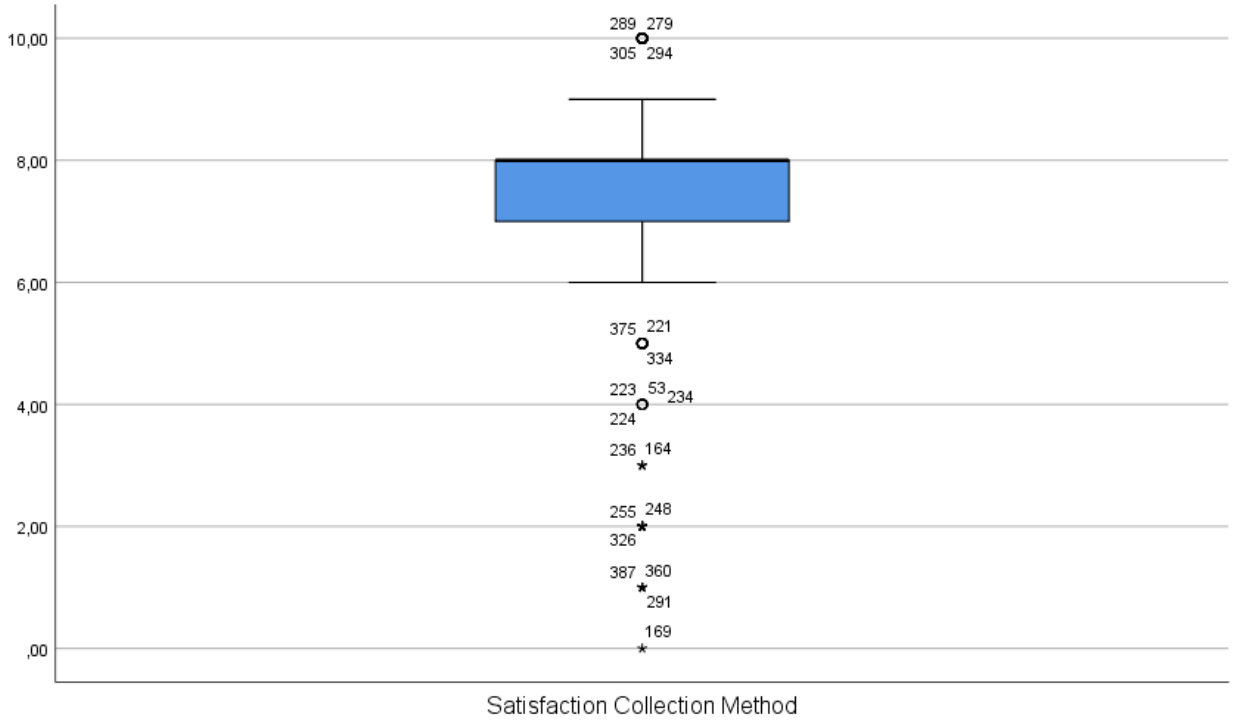
	N	*Range*	*Minimum*	*Maximum*	*Mean*	*Std. Deviation*	*Skewness*	*Kurtosis*
Collection Method	368	1	0	1	0,22	0,420	1,300	-0,311
Frequency	276	1	0	1	0,48	0,501	0,073	-2,009
Payment Method	359	1	0	1	0,40	0,491	0,393	-1,856
Segregation of PPW	360	1	0	1	0,15	0,360	1,938	1,767
Input Action	358	1	0	1	0,03	0,172	5,461	27,983
Communication	351	10	0	10	6,72	1,769	-1,314	2,486
Satisfaction General	333	10	0	10	7,51	1,860	-1,593	3,274
Satisfaction Collection	264	10	0	10	7,30	1,988	-1,563	3,021
Satisfaction Frequency	341	10	0	10	6,97	2,153	-1,133	1,200
Satisfaction Payment	341	10	0	10	7,19	2,401	-1,334	1,335
Satisfaction PPW	343	10	0	10	7,04	1,632	-1,191	2,976
Comfort	334	10	0	10	6,88	2,010	-1,129	1,618
Environmental	334	10	0	10	6,79	1,947	-1,079	1,455
Payable	334	4	1	5	2,67	0,661	-0,534	1,104
Quality of Waste	319	98	2	100	77,07	20,616	-1,589	2,059
Item 1 Trust in Gov	321	10	0	10	6,17	1,735	-1,096	1,995
Item 2 Trust in Gov	321	10	0	10	5,59	2,043	-0,585	0,208
Trust in Government	320	5,81	-3,43	2,38	0	1	-0,883	1,587
Multi Family Dwelling	321	1	0	1	0,66	0,474	-0,681	-1,546
Age	318	73	20	93	50,93	16,327	-0,148	-0,791
Income	309	7	1	8	4,28	2,195	0,335	-0,991
Municipality	368	1	0	1	0,22	0,420	1,300	-0,311

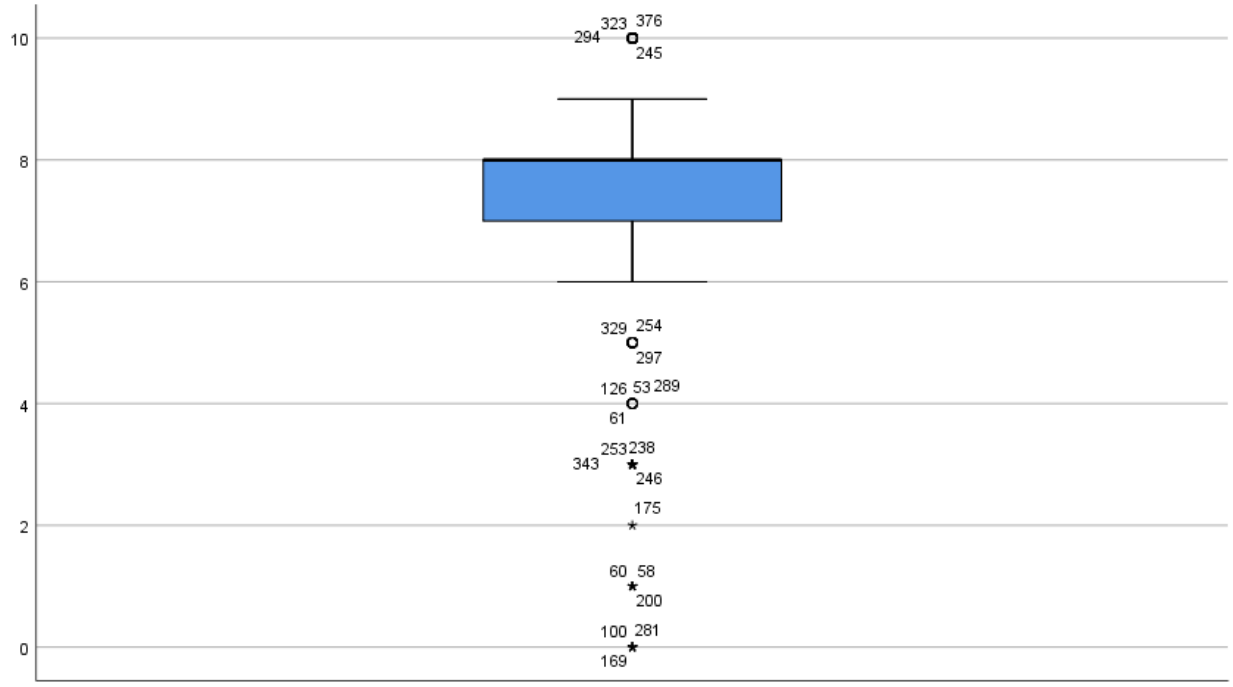
Appendix 4: Scree plot of eigenvalues of PCA of the Relation to Government variable



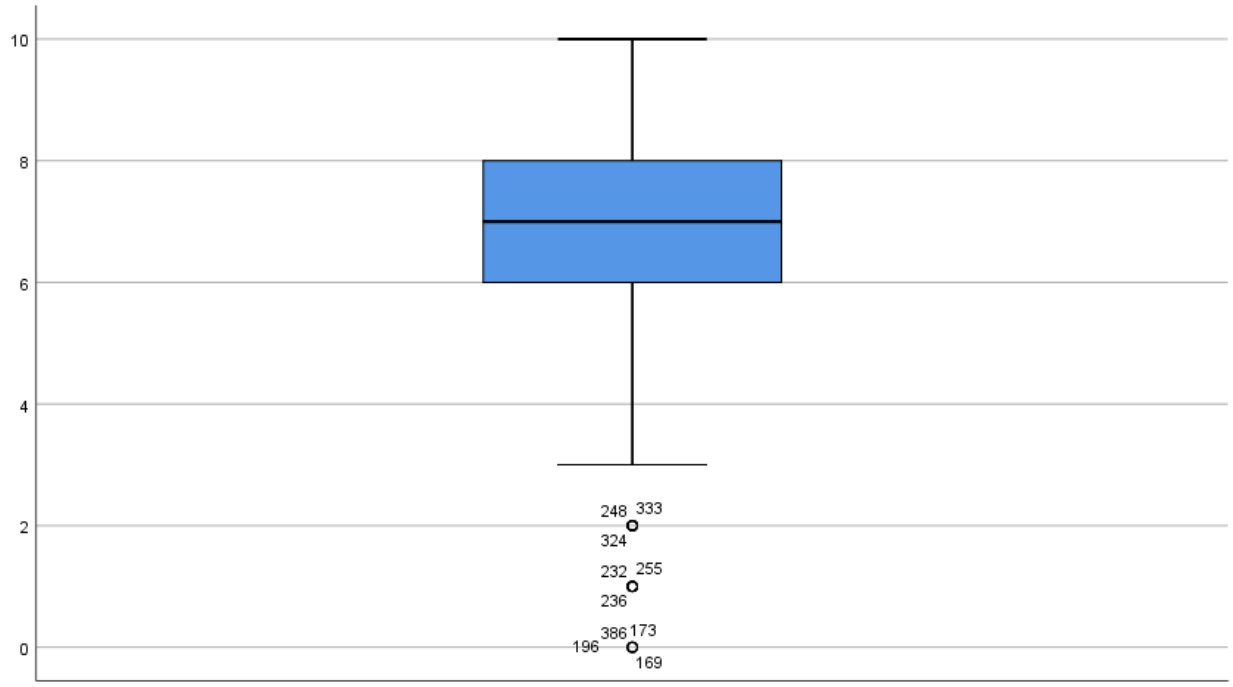
Appendix 5: Boxplots of the variables



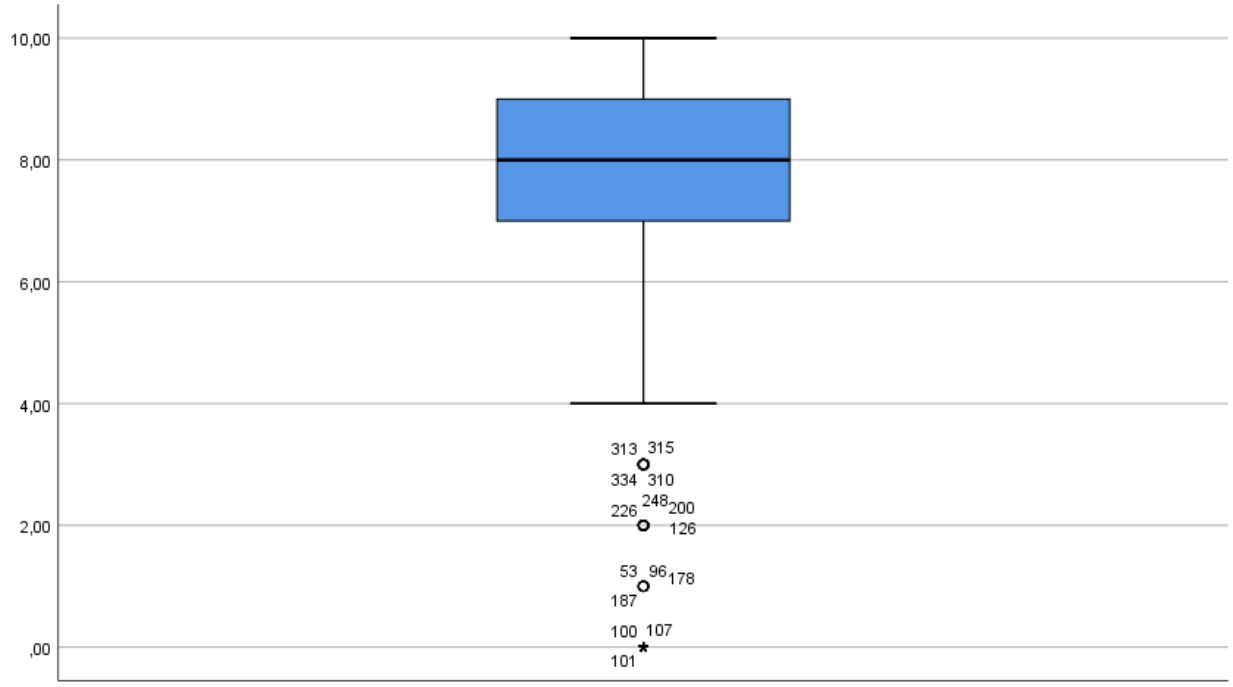




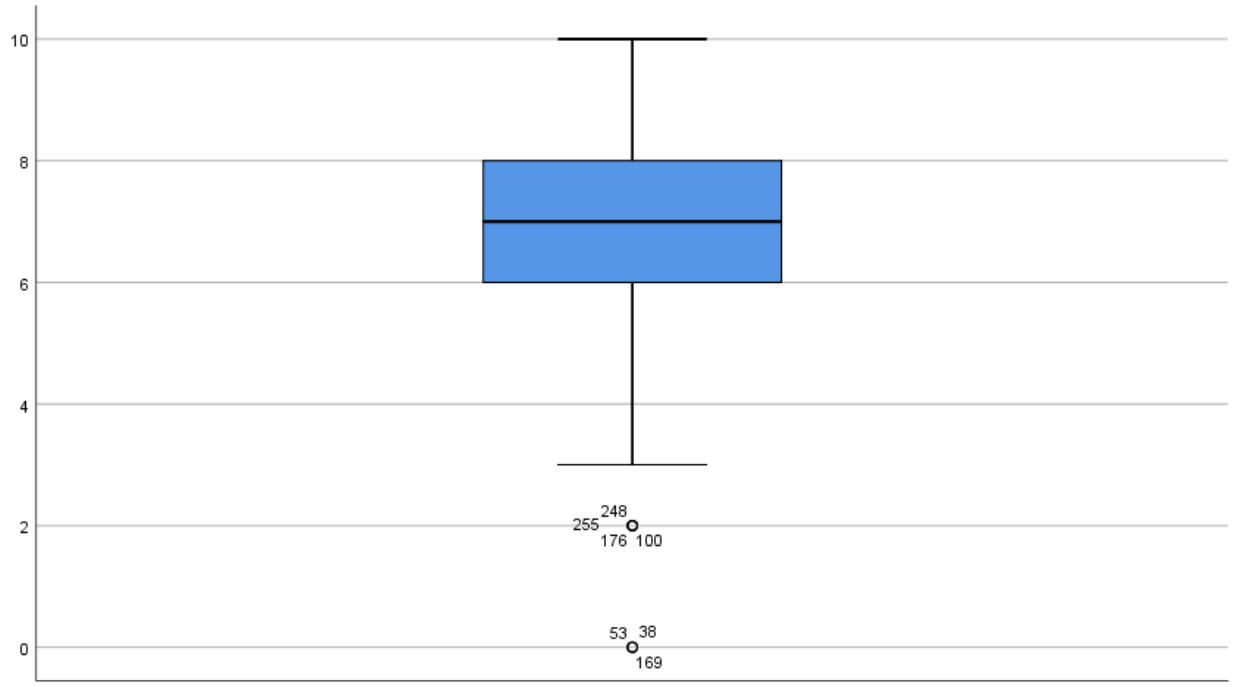
Satisfaction Level Frequency



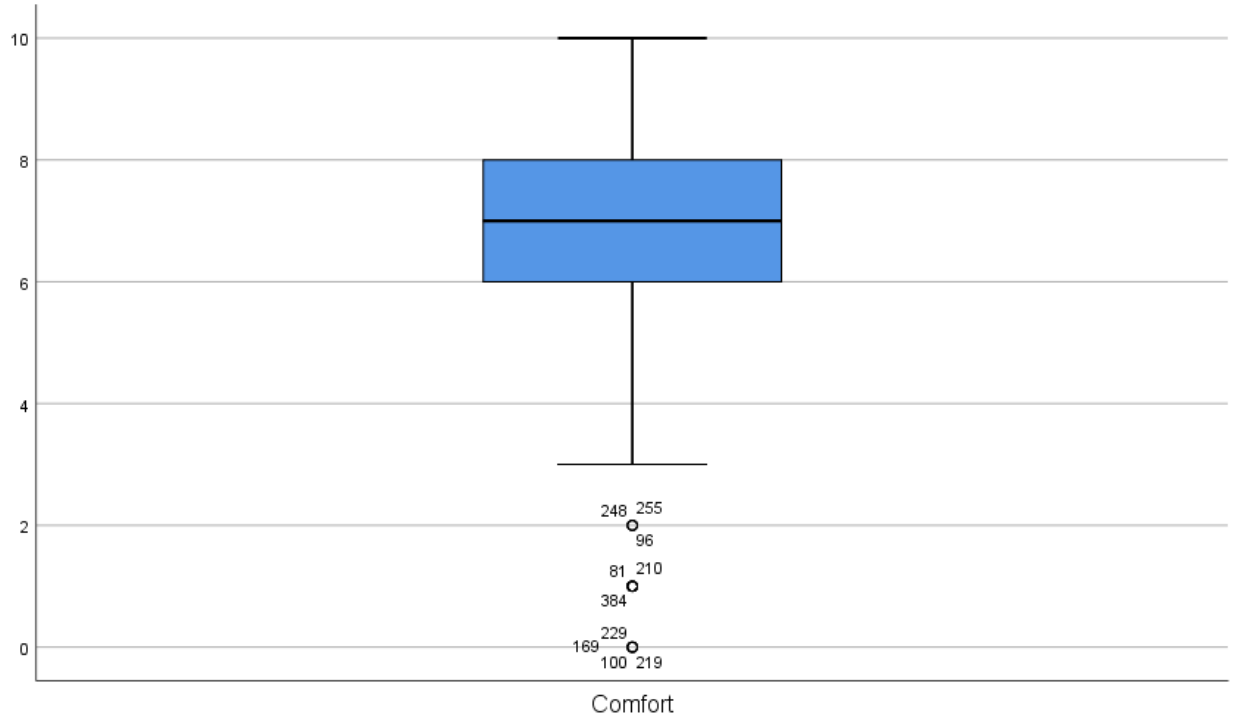
Satisfaction Level Payment

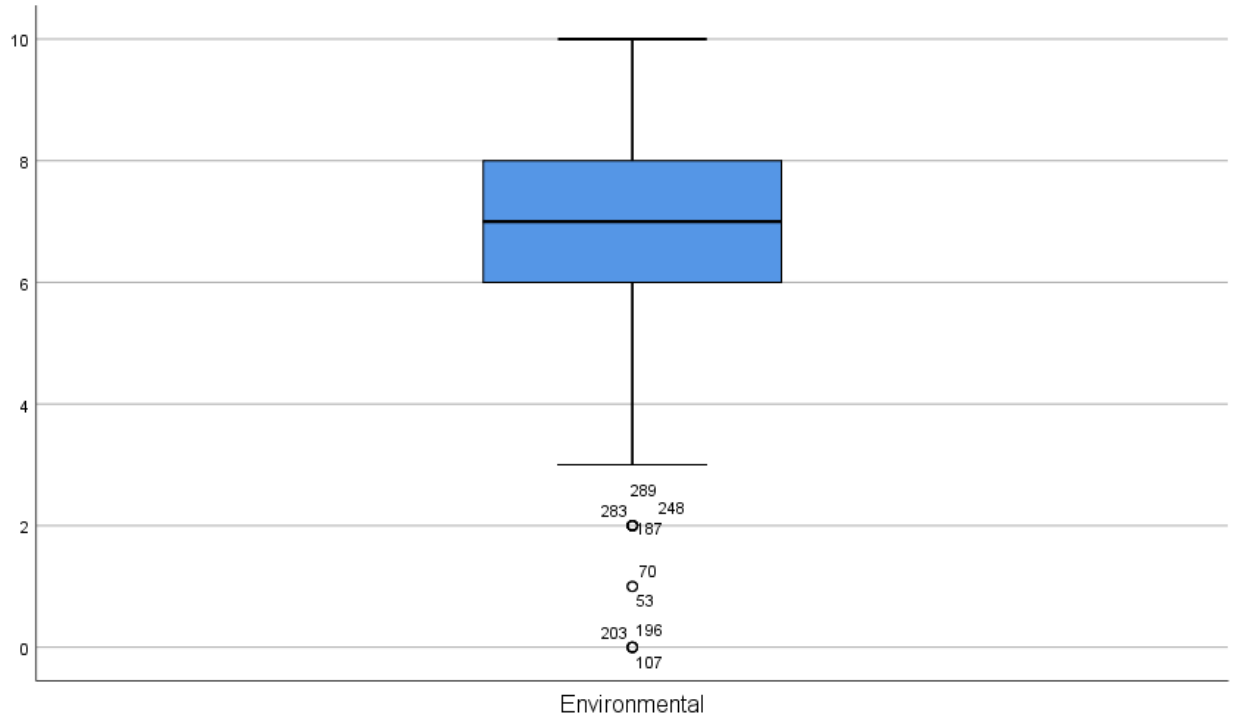


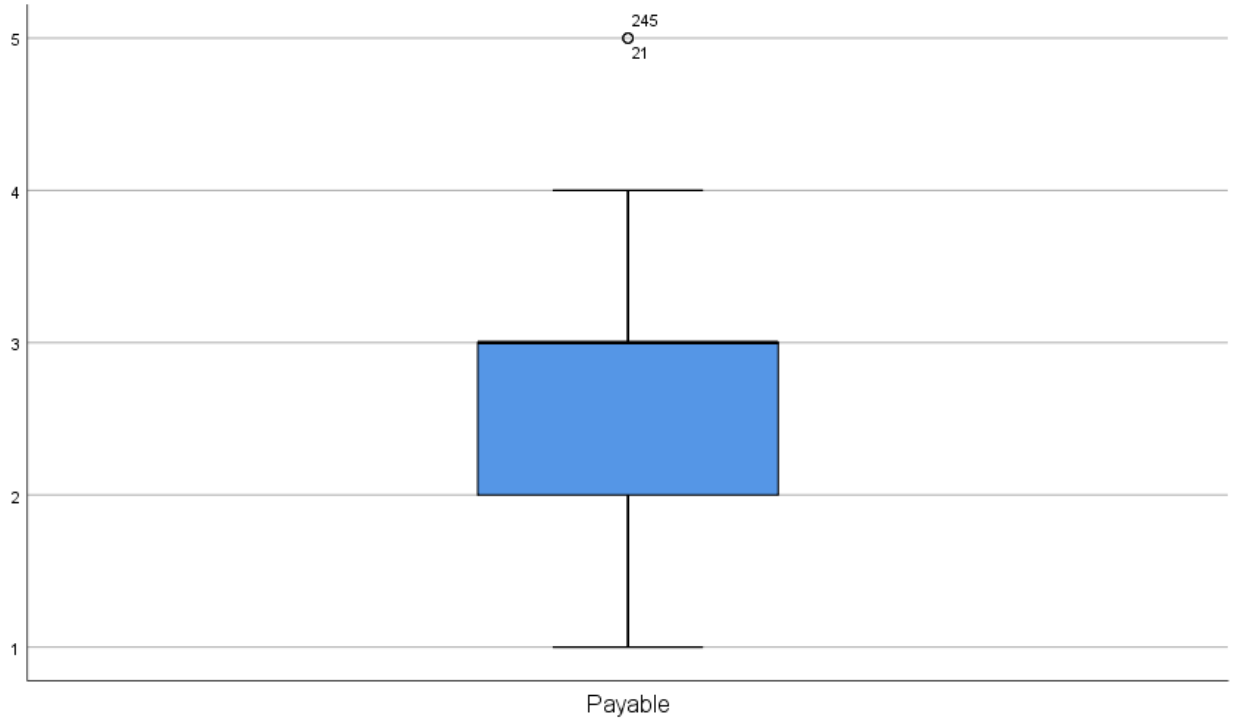
Satisfaction Level PWW Segregation

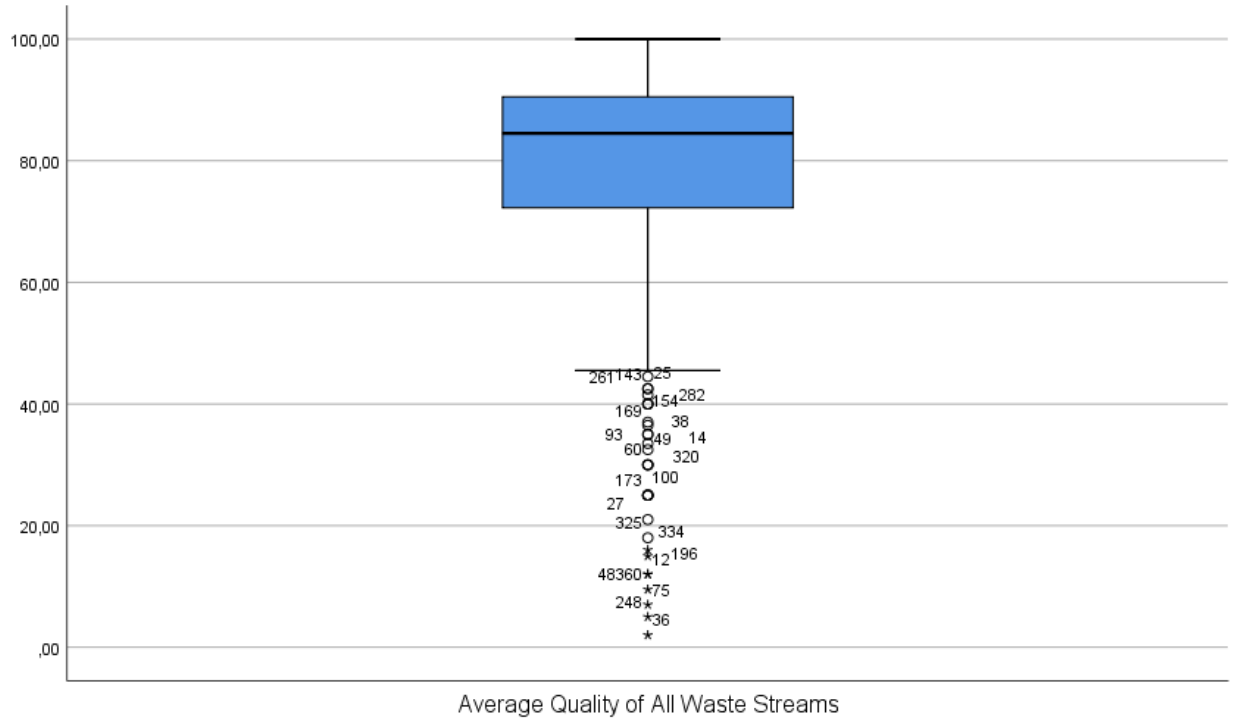


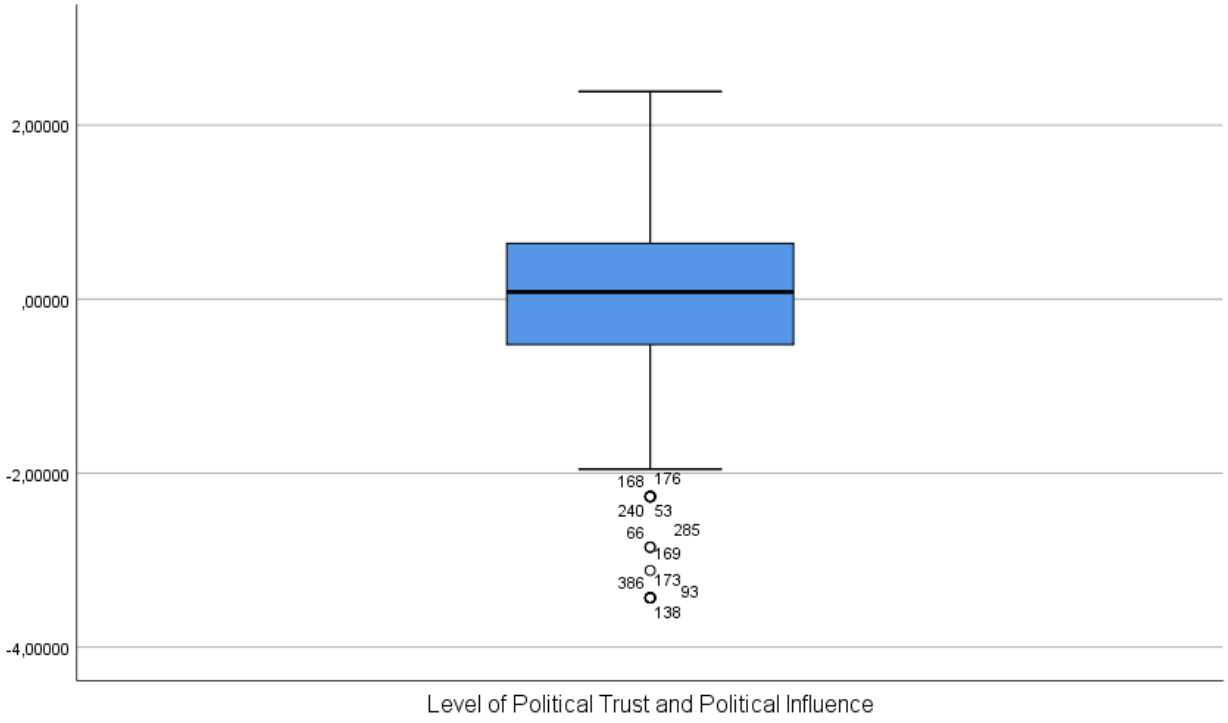
Satisfaction Level General


10
8
6
4
2
0
248
255
96
81
210
384
229
169
100
219
Comfort


10
8
6
4
2
0
289
283
248
187
70
53
203
196
107
Environmental


245
21
5
4
3
2
1
Payable


100,00
80,00
60,00
40,00
20,00
,00
261
143
25
154
282
169
38
93
49
14
60
320
173
100
27
325
334
12
196
48360
75
248
36
Average Quality of All Waste Streams



Level of Political Trust and Political Influence