

# Waste prevention strategies of municipalities in the Netherlands

A policy instrument analysis

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## Colophon

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## Abstract

The global depletion of resources is an issue high on the agenda of the Netherlands. The national government has established a program called From Waste to Resource, which consists of various objectives for municipalities to improve recycling and reduce the total amount of household waste. Currently, municipalities are mainly focused on recycling which occurs within the boundaries of waste minimisation instead of prevention. This is insufficient to achieve material well-being and environmental quality among the population.

This study investigates the possibilities and limitations of four different municipalities' current waste prevention policies in the Netherlands and examines best practices and/or opportunities for improvement. The following research question has been formulated for this purpose:

**What are the possibilities and limitations of the current mix of policy instruments used by Dutch municipalities for household waste prevention, and could these strategies lead to possible opportunities for other municipalities in the Netherlands?**

In order to answer the research question, a policy instrument theory is used to categorise waste prevention strategies into regulatory instruments, economic instruments, soft instruments and organisational instruments, followed by a SWOT analysis to discuss the effectiveness of these instruments.

Results show that limitations of the current waste prevention instruments among municipalities are mainly related to the missing legal foundation of the national government. Nevertheless, this research provides insight into the possibilities that municipalities can apply.

**Keywords:** Policy instruments, Waste prevention, SWOT analysis, Dutch municipalities

## Preface

With pleasure, I now present my master's thesis on waste prevention strategies of the municipalities of Almere, Heerenveen, Hengelo and Vught in the Netherlands. It has been written to complete the Master of Environment and Society Studies and the specialisation Local Environmental Change and Sustainable Cities at the Radboud University of Nijmegen. Executing this thesis was made possible by the academic skills I acquired in the past educational year and with the help and support of a group of people whom I would like to thank.

First, I would like to thank Duncan Liefferink, my supervisor from the Radboud University of Nijmegen, for giving constructive feedback, challenging me in the right ways and always being optimistic about my ideas. I also want to express my gratitude to Mark Wiering, my second reader.

Second, I would like to thank my internship company, de Jonge Milieu Advies (JMA), for welcoming me to the office once a week in times of COVID-19. A different environment was exceptional and gave me the energy and motivation to continue this process. A special thanks goes to my supervisor Jesper Coeleveld for giving me the opportunity and the freedom to work out my ideas. Furthermore, I appreciate working with your extensive network, which brought me into contact with the selected municipalities.

I would also like to express my sincere gratitude to the respondents of Almere, Heerenveen, Hengelo and Vught and the various organisations - RWS, NVRD, VNG and the ministry of I&W. I enjoyed our interesting conversations and the enthusiasm you all have for your work. Thank you for sharing your time and knowledge. Without your cooperation, I would not have been able to conduct this research.

Last but not least, I have a special mention for my housemate for our discussions and encouraging conversations about my thesis.

The result is a thesis I enjoyed writing and of which I am very proud. I hope you will find similar joy in the reading of it.

Marise van der Linden

Amsterdam, July 2021

## Summary

Depletion of resources is becoming a more significant environmental concern with current consumption patterns and population growth trends. Part of the solution lies within conscious waste management as part of the circular economy. The Netherlands addresses this issue using the VANG program, which creates ambitions for municipalities to increase recycling practices and to reduce waste with a focus on residual waste. A critique mentioned by the NVRD and Rijkswaterstaat was that municipalities are lacking attention to prevention.

This research offers on different waste preventing strategies among the municipalities of Almere, Heerenveen, Hengelo and Vught using the following research question:

**What are the possibilities and limitations of the current mix of policy instruments used by Dutch municipalities for household waste prevention, and could these strategies lead to possible opportunities for other municipalities in the Netherlands?**

A political instrument theory is used to research these different approaches. The instrument theory divides the policy approaches of each municipality into four categories: regulatory, economic, soft and organisational instruments. The theory creates a better understanding of the complexity of the chosen tools. A SWOT analysis is performed to evaluate the policy mix and provide insight into the possibilities (strengths and opportunities) and limitations (weaknesses and threats).

Qualitative methods are used to acquire the necessary data. Scientific literature and policy documents are used to construct data about the government and municipalities' waste practices. Semi-structured interviews with relevant actors of the municipalities and external experts are conducted to gain more in-depth information.

The study identified interesting possibilities and limitations of the used policy instruments, which enlightened the current waste prevention processes. It concluded that many differences exist in the implementation properties of the waste system, which comes with its own possibilities and limitations. However, when adjusting to a broader view, the instrument choice is reasonably alike. Regulatory instruments are lacking because the legal foundation for prevention is missing. Economic instruments are mostly a pay-as-you-throw system in different forms and the incineration tax implemented by the national government. Communication is stated as essential according to all municipalities and executing organisations. This contributes to the motivation, capacity and opportunity of residents. Lastly, organisational instruments are mainly infrastructural and are executed in programmes and one circular upcycle centre.

This research will serve as an inspiration to other municipalities in the Netherlands by showing the possibilities of waste prevention despite the lack of a legal base for waste prevention.<sup>1</sup>

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<sup>1</sup> Refer to appendix 1 for a Dutch summary

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## List of abbreviations

|          |  |
|----------|--|
| CBS      | Central Bureau for Statistics  |
| COVID-19 | Coronavirus SARS-CoV-2   |
| EU       | European Union   |
| I&W      | Infrastructure and Water Management  |
| JMA      | de Jonge Milieu Advies   |
| LAP      | Landelijk Afvalbeheer Plan / National Waste Management Plan  |
| NATO     | Nodality, Authority, Treasure and Organisation   |
| NVRD     | Koninklijke Vereniging voor Afval en Reinigingsmanagement /<br>Royal Association for Waste and Cleaning Management |
| OECD     | The Organisation for Economic Co-operation and Development   |
| PAYT     | Pay As You Throw / Gedifferentieerde Tarieven (DIFTAR)   |
| PESTLE   | Political, economic, sociological & demographic, technological,<br>legal & regulatory and environmental            |
| PET      | Polyethylene Terephthalate   |
| PMD      | Plastic, Metals, Drinking cartons  |
| PVDA     | Partij van de Arbeid /   |
| R@S      | Reduction at source  |
| ROVA     | Regionaal Orgaan Verwijdering Afvalstoffen /<br>Regional Body Waste Disposal                                       |
| RU       | Re-use   |
| RWS      | Rijkswaterstaat / Department of Waterways and Public Works   |
| SP       | Strict Prevention  |
| SUP      | Single-use-plastics  |
| VANG     | Van Afval naar Gronstof / From Waste to Resource   |
| VANG-HHA | Van Afval naar Gronstof Huishoudelijk Afval /<br>From Waste to Resource Household Waste                            |
| VNG      | Vereniging van Nederlandse Gemeenten /<br>Association of Dutch Municipalities                                      |
| VVD      | Volkspartij voor Vrijheid en Democratie  |



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## Chapter 1 Introduction

### 1.1 Research problem statement

Over the last two centuries, as the world's population has grown exponentially, and with the current materialistic aspirations of the economy, environmental concerns such as the continuous depletion of natural resources have arisen (Rogoff, 2014). To relieve pressure on these increasingly scarce natural resources, changing demand and trends to substitute these materials through increased recycling is needed. Therefore, waste becomes a valuable concept for many countries, which is reflected in policies regarding reducing and recycling waste.

In 2008, the European Union (EU) implemented the Waste Framework Directive with the following goal:

To protect the environment and human health by preventing or reducing the negative impacts of waste generation and management, by reducing the overall impacts of resource use and by improving the efficiency of such use. Which is crucial for the transition to a circular economy and for ensuring the long-term competitiveness of the Union. (EU, 2008, article 1)

This directive provided an incentive for the Dutch waste policy. In 2013 the government initiated the Green Growth Strategy, which led to critical challenges and opportunities within eight domains, including the program From Waste to Resource (VANG). The operational goals within the VANG program include improving waste separation and recycling and reducing the amount of waste. This goal has become part of the government-wide approach to a circular economy in the Netherlands, to be implemented by 2050. It will be executed by the Ministry of Infrastructure and Water Management (Ministerie van Infrastructuur en Waterstaat, I&W), Department of Waterways and Public Works (Rijkswaterstaat, RWS), the Association of Netherlands Municipalities (Vereniging van Nederlandse Gemeenten, VNG) and the Royal Association for Waste and Cleaning Management (Koninklijke Vereniging voor Afval en Reinigingsmanagement, NVRD) (VNG et al., 2021).

Despite being a national governmental policy, collecting and processing household waste is enforced and regulated by municipalities. Therefore, in addition to the overarching policy described, municipalities have a large degree of freedom to shape waste policies according to their insights. The latter leads to unclarity regarding the means and their effects.

Furthermore, there is a remarkable trend according to the Central Bureau for Statistics (CBS) (Straver, 2019). Residents of Dutch municipalities are recycling more waste than the previously, and therefore residual waste is decreasing. However, the quantity of waste generated by an average household has somewhat stagnated, despite the waste prevention goal of the VANG program. In 2018, the total amount of household waste (separately and non-separately collected) was 495 kilograms per inhabitant (NVRD et al., 2019). An average of 65 percent of this amount was separated. In 2019, this amounted to 489 kilograms per inhabitant, 66 percent of which was separated (NVRD et al., 2020). Waste recycling alone is insufficient for resource recovery to achieve material well-being and environmental quality among the world's population because it comes with many inefficiencies (Lehmann, 2012). Notably, most material streams are being 'downcycled' because the quality of the material is degrading over time. This ensures the continued demand for new virgin materials. Furthermore, the recycling process itself also contributes to energy and resource consumption. Hence, why prevention is a necessary action to not only close the material chains but also making the chains smaller.

The VANG program focuses on reducing residual waste, increasing recycling practices and decreasing waste in its totality. The ambitions of 2015–2020, were as follows: municipalities should at least lower their residual waste to 100 kilograms per inhabitant and separate 75 percent of their total waste into recycling bins or other options such as recycling centres (VNG et al., 2021). The evaluation

of 2020 (NVRD et al.) clearly states that the ambition of preventing waste requires additional attention for the upcoming goal of 2025. Current trends are focusing on treating the symptoms of the disease rather than curing it. This thesis, therefore, investigates the policy strategies of different municipalities that can be used to prevent and consequently reduce the quantity of household waste.

## 1.2 Research aim and research questions

This research develops an understanding of different elements regarding the topic of waste prevention. As mentioned before, prevention is a challenging topic, which becomes apparent when examining the stagnating waste numbers of Dutch municipalities. There is little central guidance from the national government, which constitutes a significant autonomy for the municipalities, leading to various approaches in different municipalities. This research aims to gain insight into the regulations and strategies of waste prevention on the local level. It identifies best practices by comparing four municipalities regarding their waste management to provide de Jonge Milieu Advies (JMA), the internship organisation, and other Dutch municipalities with a recommendation for the upcoming VANG goal of 2025. Furthermore, to research the regulations and strategies of municipalities, the government and its vision on the prevention component of the VANG objectives also are to be included in this research.

The type of waste that will be the focus of this thesis is municipal solid waste, better known as household waste. Therefore, industrial, agricultural, nuclear, clinical and mining waste will be excluded from the research. Furthermore, the research will only concentrate on the prevention actions of the national government and municipalities and consequently on the reduction of waste outputs. Hence, despite their importance, the reduction of raw material inputs, which lies in market responsibility and commercial

The main research question will be as follows:

**What are the possibilities and limitations of the current mix of policy instruments used by Dutch municipalities for household waste prevention, and could these strategies lead to possible opportunities for other municipalities in the Netherlands?**

The municipalities will be selected via non-probability sampling to ensure they are homogenous in terms of high-rise class and their current progress regarding the VANG objectives is comparable in terms of progressiveness. Waste prevention is barely integrated into Dutch municipal waste management. Subsequently, four progressive municipalities will be chosen to identify as many best practices as possible that can be used to achieve the upcoming VANG objectives.

Municipalities that meet these requirements are being purposively selected.

Sub-questions:

- I. What is the vision of the VANG objectives regarding waste prevention?
- II. What are the national and local government roles regarding waste prevention and what tools are offered by the national government and executing organisations to achieve this goal?
- III. Which policy instruments and tools are proposed in municipalities a, b, c, d regarding waste prevention?
- IV. What are the current strengths, weaknesses, opportunities and threats of the current waste prevention policies of municipalities a, b, c, d?
- V. What lessons can be drawn of the possibilities and limitations from the selected municipalities for a more suitable waste prevention strategy for other Dutch municipalities?

## **1.3 Social and scientific relevance of the proposed research**

### **1.3.1 Societal relevance**

There is a strong need for waste prevention. Resources are depleting rapidly and have no time to recover due to the ever-increasing demand of the growing population. Therefore, it is essential to emphasise the potency of waste and be sensible regarding resource use. The Dutch vision on waste, the VANG objectives, next aspires to increase recycling percentages and minimise residual household waste to reduce the actual number of household waste in its totality. A municipality and its residents are crucial in reaching this goal. While the VANG evaluation explained the significance and attention needed for preventing waste, the most frequently heard criticism is that the government does not offer practical instruments and advice on achieving those objectives since the legal obligation is lacking (P. Burgering, personal communication, February 22, 2021). This places a barrier on Dutch municipalities since they are obliged to care for the separate collection and processing of waste and are devoted to the targets of VANG. An additional barrier of most municipalities is the business case of the waste charges since they are not allowed to profit from it and therefore create funding for innovation. Furthermore, there is no direct funding from the national government, which leads to little room for technical innovation, communication practices and programs for waste prevention. Another barrier is the market forces that influence consumerism and the processing of the offered recyclables. First, the communication efforts of the municipalities to create awareness about prevention have to compete with the communication possibilities of the market that promote consumerism. Second, the prices for processing recyclables are very uncertain and likely to increase yearly. Thus, it is difficult for municipalities to motivate residents about waste prevention when the prices keep increasing (P. Burgering, personal communication, February 22, 2021).

This research aims to identify and disseminate best practices regarding waste prevention by identifying the strengths, opportunities, weaknesses, and threats of the selected municipalities and the government's chosen policy instruments and tools. It is of social relevance to help improve and achieve future policy goals regarding waste prevention. This research may benefit both stakeholders who were part of the research and excluded stakeholders, such as other municipalities in the Netherlands.

### **1.3.2 Scientific relevance**

This research is of scientific relevance in various ways. First of all, after an analysis of the scientific discussion, it appears that little to no scientific research has been conducted regarding instruments of waste prevention used by municipalities in the Netherlands, which clearly shows an uncovered area by previous researchers. There is an extensive amount of scientific literature on policy instruments, tools and mixes. However, this research is rather theoretical despite policy choices being very context-dependent. To offer insight into this process, it is relevant to apply the theory of policy instruments to a real-life case such as waste prevention among (local) governments, in this case in the Netherlands.

There has been research conducted on Dutch waste strategies. The most recent reports of Raak et al. (2014 & 2019) focus on the transition agenda of the upcoming years, with prevention as a priority. However, actual prevention practices are lacking. Dijkgraaf & Gradus (2019) mainly discuss the separation of waste and its history. Waste prevention is mentioned in regards to unit-based pricing systems and their effects on waste sorting. The four systems are volume-, frequency-, bag- and weight-based pricing systems (Dijkgraaf & Gradus, 2014). However, other instruments that influence waste prevention, such as communicative and infrastructural, are absent from this research. Additionally, the research is slightly outdated since the study of Dijkgraaf & Gradus (2019) is based on data from 1999 until 2017. The first VANG program (2015–2020) had not finished at that time and for instance, data regarding the effects of the increased incineration tax of 2018 was not measured yet. Therefore, it remains relatively unexplored how municipalities within the Netherlands can now achieve waste prevention, taking new measures and data into account.

Other scientific literature is based outside of the Netherlands. Ferrera & Missios (2014) performed a study on consumption and waste patterns at the household level in various countries. It examined the impact of socioeconomic or demographic variables of households on the behavioural decisions of waste disposal, recycling and prevention. The study lacks focus on specific policies of governments and the instruments they use, and how this is perceived, especially in the Netherlands. Finally, the last studies that will be discussed are most close to the research that will be performed due to the discussed possibilities and limitations. Cox et al. (2010) conducted a study on household waste prevention in England, focusing on consumers' behaviour change. It discussed the possibilities and limitations of prevention behaviour from a consumer's perspective. Corvellec (2016) performed a study in Sweden on waste prevention initiatives and their three core actions which will be used in this research.

Thus, it can be argued that there is a small number of scientific literature on prevention measures outside the Netherlands. Because of the differences in waste management practices, it is difficult to compare this data to research conducted in the Netherlands. Therefore, this research contributes to the literature regarding the instruments of waste prevention policies, the ways they are used by municipalities in the Netherlands, and insights into these instruments' possibilities and limitations.

## **Chapter 2      Literature review and theoretical framework**

This chapter provides an explanation of the descriptive typologies of the waste hierarchy. Subsequently, it will become apparent why these typologies are related to waste prevention. Furthermore, it presents a brief overview of the existing literature on the achievement of waste prevention and the mentioned possibilities and limitations of these measures. Last, it describes the theory that will offer a framework for understanding the waste prevention practices of the involved stakeholders.

### **2.1      Review of the academic literature**

#### **2.1.1 Household waste and local strategies**

The United Nations (1997) defines waste as follows:

Materials that are not prime products (that is products produced for the market) for which the generator has no further use in terms of his/her own purposes of production, transformation or consumption, and of which he/she wants to dispose. Wastes may be generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, and other human activities. (United Nations, 1997, glossary)

These products can be categorised into different types of waste (Lehmann, 2012; Hannon & Zaman, 2018). As mentioned before, this research will focus on the type of household waste.

In 2019, 489 kilograms of household waste, including 325 kilograms of separated raw materials, were collected per inhabitant in the Netherlands (NVRD et al., 2020). Municipalities are obliged to collect residual waste, organic waste, paper, plastic packaging, glass, textiles, small chemical waste and bulky household waste (Dijkgraaf & Gradus, 2014). Additional information about the waste streams and the latest data (2019) can be found in appendix 2. Moreover, municipalities have the political freedom to organise waste collection. Therefore, the payment plans differ. They can be a fixed rate per household or a unit-based pricing system. This research will refer to the latter as a pay-as-you-throw system. According to Dijkgraaf & Gradus (2014), the four systems are volume-, frequency-, bag- and weight-based pricing systems. These systems are vital in the process of reducing waste. In practice, frequency, the amount of time the waste is collected or presented, is combined with the other systems. Volume and frequency is a combined system where the payment depends on the number of times that waste is collected and the container's size. Weight and frequency differs because the volume is even more refined using the weight of the waste. Lastly, bag and frequency is a system where residents can only present their waste in a bag purchased from the municipality. Thus, the less frequently the waste is presented, the less costly it will be.

#### **2.1.2 Waste hierarchy and waste prevention**

The waste hierarchy, which consists of several principles of waste management, is a vital aspect of waste. It was developed in the EU as a political concept regarding waste and resource policy and has served as a framework to support decision-making for waste management systems at a national or local level (Lazarevic et al., 2010). In 1978, the Netherlands established a fundamental framework, Lansink's Ladder, which includes the concepts of landfilling, incineration, energy, recycling, reuse, and prevention. It was initiated due to space limitations for landfills and because waste prevention would be more efficient in the long term. This framework has led to the current practices. Lansink's Ladder is shown in figure 1. Despite the framework and priority of prevention, residents of the Netherlands are recycling more waste per person, but the totality of waste is stagnating. Recycling is an integral part of waste management; however, it is preferable to prevent waste creation (Lindfield & Steinberg, 2012).



Figure 1. Waste hierarchy (Kemp & Van Lente, 2011)

According to the Organisation for Economic Co-operation and Development (OECD) & Harjula (2004): “Waste prevention aims at reducing the amount, the risk to the environment and human health and energy content of products or materials before they enter the waste stream” (p.67). Prevention consists of three components (OECD & Harjula, 2004):

1. Strict prevention (SP): “the complete avoidance of waste generation by the elimination of substances, or by reducing material or energy intensity in production, consumption and distribution” (p.67);
2. Reduction at source (R@S): “minimising the use of hazardous substances and/or minimising material or energy consumption” (p.67);
3. Product reuse (RU): “the multiple uses of a product in its original form, for its original or alternative purpose, with or without reconditioning” (p.67).

This definition excludes all forms of waste management efforts beneath the categorisation of reuse of the waste hierarchy, meaning landfill, incineration, energy recovery and recycling. Waste prevention directly influences the total quantity of waste produced by households and handled by the waste sector. Therefore, reuse is part of waste prevention, while recycling, which does not directly influence the total quantity directly, is not. Recycling and energy recovery are included in the broader concept of waste minimisation, shown in figure 2.

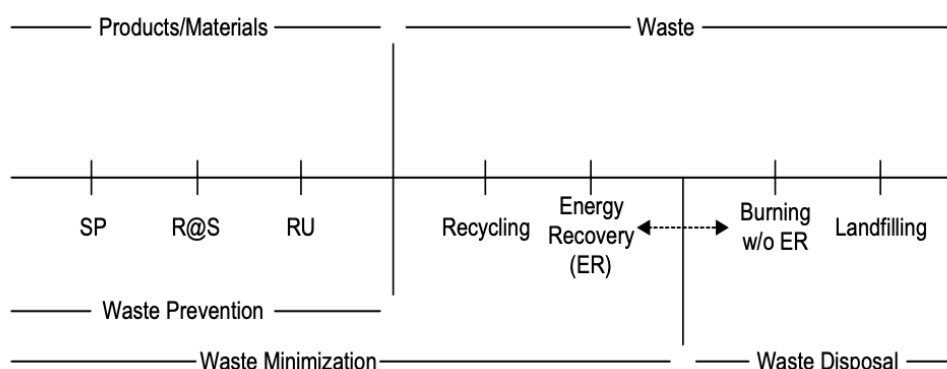


Figure 2. Types of waste prevention (OECD & Harjula, 2004, p.67)

Prevention of waste can be performed in different steps of a product’s life cycle. As stated before, this research will only focus on the prevention actions of Dutch municipalities in conjunction with the national government and consequently on the reduction of waste outputs. It is complicated to extract from the literature how prevention is achieved since guidelines and goals are poorly discussed and the practices will differ per location and scale. Even though the study of Corvellec (2016) is based in Sweden, it is still a valuable source since it applies the definition of OECD & Harjula (2004) as



discussed earlier, and the content corresponds with Dutch waste reports. Therefore, it can be used to explain the three core types of action to achieve waste prevention. According to Corvellec (2016, p.6), the three types are: “raising awareness about the need to prevent waste, increasing material efficiency, and developing sustainable consumption”.

The first core type, raising awareness, consists of creating a social narrative that addresses the current state of waste management and the environmental and material issues that come with it. It informs people that prevention is the highest step of the waste hierarchy and lays the foundation for a change in the norms and values of people. Often this is executed through communicational means such as campaigns, competitions and exhibitions to create interest in the topic. This is in line with Dutch actions according to the National Waste Prevention program. It mentions informing and communication as an essential incentive executed mainly by the waste sector (Rijkswaterstaat, 2021). This will be explained in more detail further in the research.

The second core type is increasing material efficiency. This can be accomplished in production by optimising production processes and matching this with the use of products. In the Netherlands, this is taken into action by the national government and the new guidelines for producers further explained in chapter 5. Rijksoverheid, 2021). This indirectly influences municipalities by affecting their waste streams. Another practical way for prevention is the last core type: promoting sustainable consumption patterns such as shifting towards the use of products with lower energy and material intensities. It serves as a guide that spreads the norm to refuse, reduce, and reuse, as OECD & Harjula (2004) stated. Promoting is done by introducing people to sustainable infrastructure such as repair shops and secondhand stores and encouraging people to rent or share products. In the Netherlands, this is promoted by the VANG and voluntarily applied by municipalities (VANG-HHA, 2014).

This research will examine the possibilities and limitations of waste prevention practices. Therefore, it is crucial to discuss what is already mentioned in available documents. Because this is mostly location- and time-specific, the possibilities and limitations discussed are retrieved from reports of the Dutch national government and its execution organisations and supported with academic literature when available.

### *Possibilities*

The possibilities of waste prevention are hardly discussed in Dutch literature. The ones mentioned on the website of the VANG-HHA (2020) are of practical nature focused on the implementation of the three core types of Corevellec (2016). Examples are implementing a circular upcycle centre, promoting washable diapers and applying new policies for paper advertising. This focuses on facilitating measures to implement the new social narrative of refuse, reduce, reuse. It is therefore socially focussed.

Another socially-focused possibility of the core types is communication. According to the NVRD (n.d.-b), municipalities have the opportunity to spread information about waste prevention among their residents. This is confirmed in the article of Cox (2010), where communication and campaigns are seen as a possibility for the increase of visibility and promotion of prevention and reuse.

The last possibility is of economic nature and is mentioned in Van Raak et al. (2014). Waste prevention can cause financial savings for municipalities and their residents. Cox (2010) confirms this benefit from the consumer's perspective by discussing the potential to avoid food waste, home composting, and lifestyle adjustments to consume less packaging with the added benefit of economic savings. It is not addressed in terms of the business case of the municipality.

### *Limitations*

The limitations of waste prevention practices for organisations are thus far scarcely discussed in two reports of Van Raak et al. (2014 & 2019). The first limitations mentioned by Van Raak et al. (2014) are of political focus. According to Van Raak et al. (2014), the national government has chosen a distant role in coordinating municipalities regarding waste. This is stated as a limitation because it



negatively influences the joint coordination of municipalities because of the significant freedom in diversity.

Van Raak et al. (2019) also state a legal limitation, namely the absence of jurisdictional incentives for prevention, reduction and reuse. On the one hand, this influences the possibility for verifiable and tangible targets that can be monitored. On the other hand, this affects the speed of adopting these measures within the municipality because they are non-compulsory. This corresponds to the following political limitation since the measures will fall more quickly into the soft governance category: *“a policy that rests on individual initiatives rather than on national or international incentive schemes or means of coercion”* (Corvellec, 2016, p.8). This is not a substantial limitation. However, it could lead to slow adoption of best practices.

An additional limitation is that waste prevention, by definition, lies outside the waste system (Van Raak et al., 2019). It is a private and somewhat invisible action making it difficult to develop a social norm. Cox (2010, p.214) confirms this by explaining the following: “Waste prevention is usually a very personal behaviour, done imperceptibly (e.g. when shopping) or out of the sight of others (at home), so that there is no descriptive social norm to support it – as there is now with widespread recycling”.

In conclusion, the possibilities and limitations subtracted from the literature have different dimensions: political, economic, socio-cultural, and legal. This can be translated to the PESTLE framework used in the theoretical framework to classify the possibilities and limitations of the results in the same framework. As described, prevention is thus far a poorly discussed subject in the available literature in the Netherlands. That is why explorative research is needed to further investigate whether additional possibilities and limitations can be presented.

## **2.2 Theoretical framework**

Policy instruments are purposive tools viewed as “a set of techniques by which governmental authorities wield their power in attempting to ensure support and effect (or prevent) social change [assembled into a predefined policy goal]” (Bemelmans-Videc et al., 2003, p.21; Borrás & Edquist, 2013, p.1515). This definition stresses the purposive nature of the instruments because they induce or discourage change when used. According to Bemelmans-Videc et al. (2003), policy instruments can be divided into three large categories:

1. Regulatory instruments, the ‘sticks’;
2. Economic and financial instruments, the ‘carrots’;
3. Soft instruments, the ‘sermons’.

These categories will function as the base of the framework which will be explained in this chapter by using the literature of Bemelmans-Videc et al. (2003), Borrás & Edquist (2013), Hood (1986) and Howlett & Ramesh (2003). The following section offers a content overview of the instrumental categories and subcategories. The categorial overview can be found in figure 3.

### **2.2.1 Regulatory instruments**

Regulatory instruments are strongly associated with ‘government’. These tools are expressed in the legitimacy of legal or official power such as laws, rules and directives, which set obligatory boundaries where actors must act within, also known as ‘rules of the game’ (Hood & Margetts, 2007; Vabo & Røiseland, 2012). When rules are disobeyed or surpassed, negative sanctions are to be used. The type of sanction will depend on the content of regulation. Sanctions include fines and other economic sanctions or a temporary withdrawal of rights (Borrás & Edquist, 2013). According to the NATO typology of Hood (1986), this instrument has multiple subcategories, shown in figure 3.

The subcategories of regulatory instruments are command and control, self-regulation, standard-setting and delegated regulation, and advisory committees and consultations. The advantages of this instrument are the low costs and low information requirements about the subject because only a

standard needs to be established when implementing regulation. The established standard is a predictable measure that leads to better coordination and planning and more political appeal when needed for immediate action. Advisory committees also have the additional strength to be focused on stakeholder consultations aimed at reaching a consensus (Howlett & Ramesh, 2003).

The disadvantages are that enforcement can lead to high costs for investigation and prosecution, and self-regulation can bring high costs for society. Other disadvantages are that restrictions can weaken voluntary or private-sector activities, and price regulations can promote economic inefficiencies. Regulations can hinder innovation and technological progress by providing market security to existing businesses and limiting experimentation opportunities. Additionally, regulatory instruments are inflexible by not considering personal circumstances. Moreover, it is impossible to set regulations for every unwanted activity due to the capacity within an organisation (Howlett & Ramesh, 2003). The committees and consultations have additional disadvantages; there is a chance that societal actors provide advice to governments that only reflect the government's aims, and it is difficult to identify the stakeholders (Howlett & Ramesh, 2003).

### **2.2.2 Economic instruments**

Economic and financial instruments involve economic means in cash or kind which provide incentives such as encouraging and promoting specific actions and behaviours. They differ from regulatory tools because a person is not obliged to act according to the promoted measures (Bemelmans-Videc et al., 2003). The instruments can be subsidies, cash transfers or loan guarantees which are economical means in cash. Other types are economical means in kind, such as goods, services and vouchers. Economic means can also provide disincentives such as discouraging and restraining certain activities, which include taxes, charges, fees and tariffs (Borrás & Edquist, 2013). Grants and loans and interest groups creation and funding, are positive incentives with several advantages: First, they are flexible instruments with low implementation and regulation costs since the individual decides to reap the benefits. Second, receiving subsidies encourages innovation. Third, they are politically acceptable because the costs are divided among many people (Howlett & Ramesh, 2003).

A disadvantage is that they can be challenging to establish via the formal budgetary process due to competition with other programs in need of funding. Furthermore, their effects are only noticeable in the long term, and information-gathering costs are high. When behaviour already occurs, these instruments could be redundant. The interest groups have another disadvantage: the government's activity in them can be viewed as boundary-spanning that can question objectivity. This is reinforced if only groups favourable to the government receive funding (ibid.).

User charges and taxes are disincentives that discourage unwanted behaviour. Firstly, they are easy to establish from an administrative standpoint and do not require much time and effort. Secondly, they can manage market failures. Thirdly, taxes promote innovation as businesses will attempt to find cheaper solutions to avoid them. Furthermore, the government can easily adapt these instruments by adjusting their rates. Lastly, fewer regulation and enforcement activities are required because the responsibility lies with the individual or business (ibid.)

One disadvantage is that taxes require exact information to be correct. Moreover, they are ineffective during a crisis because an immediate response is not possible, and the administrative costs are high when rates are incorrectly set. Furthermore, compliance can be stymied when people pay taxes and are not motivated to change their behaviour (Bouwma et al., 2015; Howlett & Ramesh, 2003).

### **2.2.3 Soft instruments / Information**

Soft instruments are tools unlike the ones mentioned above. They are characterised by voluntary and non-coercive means, mostly in expertise and information, which are therefore not subject to obligatory measures by the government. In most societies, governments are large institutions and therefore can dispense more information and expertise than other societal actors (Vabo & Røiseland, 2012). They provide recommendations, voluntary agreements and contractual relations, and public

and private partnerships. These tools have changed the role of the government from provider and regulator to coordinator and facilitator, which has been termed ‘governance’ (Borrás & Edquist, 2013; Hood, 1986).

A critique of the trichotomy of Bemelmans-Videc et al. (2003) is that it only covers instruments for modifying behaviour or enforcing policies or rules and does not include information-gathering tools (Hood, 2007). Bouwma et al. (2015) subdivided soft instruments into two different typologies to include the information-gathering aspect: one-way communication and two-way communication.

Bouwma et al. (2015) refer to one-way communication tools as ‘information and communication instruments’, which influence the behaviour of certain actors by disseminating information. They will target their audience using tools such as campaigns, education programs or product-related information through certification (labelling). The subcategories of this instrument, proposed by Hood (1986), are information collection and release. It is a one-way communication instrument when there are only collection or release tools, and knowledge exchange does not occur. Other subcategories are advice, exhortation and advertising (ibid.). An advantage of this instrument is that it is effective in tackling problems with absent solutions. It is easy to establish and has low costs due to little enforcement and financial commitment. Lastly, exhortation is consistent with the standards of democracy, which value debate and personal freedom (Howlett & Ramesh, 2003). Bouwma et al. (2015) mentioned that a disadvantage is the voluntary nature of the tool, which leads to non-compliance. The instrument also has a limited public reach because it might be challenging to reach and/or include non-interested parties who are not searching for information. Howlett and Ramesh (2003) argue that there is another disadvantage. They state the instrument can be considered weak when the government can use immediate results to show it is acting on the problem when its response is insufficient.

The second typology is the two-way communication tool, ‘knowledge and innovation instruments’, which are similar to information and communication instruments because both provide information. However, the difference between the two instrument types lies in the two-way communication factor, in which the aim is to share knowledge between actors by releasing in combination with gathering, and thus promoting innovation. Examples of such instruments are workshops, pilots and learning communities that exchange best practices (Howlett & Ramesh, 2003).

One subcategory of this instrument is information collection and release, which is a two-way communication instrument when these tools are combined and knowledge exchanged. Other subcategories are commissions and inquiries (Hood, 1986). Bouwma et al. (2015) mentioned the advantage of the learning ability of actors, and that policy measures have a higher rate of succeeding because of the cooperation between actors. Commissions and inquiries also have the advantage of removing the subject from the debate. However, this favourability depends on the capability of the involved. These instruments should lead to increased and shared knowledge, not a ‘knowledge fight’ between different communities. Another disadvantage could be when an inquiry undermines their legitimacy when it is stated that they are merely delay tactics (Howlett & Ramesh, 2003). Lastly, it is difficult to include people outside the community; only those who are already interested will benefit.

Another critique is that not all tools can be classified under the trichotomy of carrot, sticks and sermons. An essential tool is organisation which involves “the physical structuring of environments so as to shape behaviour that does not accept anything outside a pre-set range of responses” (Hood, 2007).

#### **2.2.4 Infrastructure / organisation**

Organisational tools can achieve policy objectives by relying on formal organisational structures (Knill & Tonsun, 2012). With these tools, the government acts on its subjects, property or environment by directly providing public goods or services; the use of family, community and voluntary organisations; market creation and government reorganisation (Hood, 1986). For this research, this instrument will be divided into two typologies. Organisation can mean the government

itself or a needed agency. Primary examples stated by Hood (1986) include national defence and public or state-owned enterprises. Another type of organisation is infrastructure, such as road construction mentioned by Hood (1986). The literature of Howlett & Ramesh (2003) offers the advantages and disadvantages of these subcategories.

### *Organisation*

The subcategory of family, community and voluntary organisations has the following advantages: the government has no costs for this instrument, and it has comprehensive political support in most societies. However, this instrument can be considered weak when tackling complex economic issues, and it is inequitable because not many people can rely financially on their community (Howlett & Ramesh, 2003). The market creation subcategory has the advantage of being an efficient way to deliver goods valued by society, as reflected in the individual's willingness to pay for the goods. A disadvantage is that markets cannot provide public goods and common-pool goods. Furthermore, it is an inequitable instrument since only the people who can pay will benefit from or access the goods. Howlett & Ramesh (2003) did not mention any advantages of government reorganisation. This subcategory is not mentioned in the interviews and will therefore be excluded.

### *Infrastructure*

The subcategories of this instrument – direct provision of goods, services and public enterprises – have many advantages. First, the required information threshold is low because the government can do as it pleases. The instruments have economic advantages because costs are minimised through the internalisation of transactions, and the profits of public enterprises can be added to public funds. Furthermore, in large organisations, existing resources, skills and information can be used. Finally, problems of indirect provision, such as negotiations, are avoided; those types of problems could distract from focusing on the results (Howlett & Ramesh, 2003).

Howlett and Ramesh (2003) also mention disadvantages. They state that political control can lead to meddling to strengthen re-election prospects, which could lead to confusing directives due to governments' conflicting pressures. This instrument is economically inefficient due to a lack of competition, and public enterprises cannot go bankrupt. Lastly, it is a monopolistic environment where inefficiency costs can be passed on to customers (Howlett & Ramesh, 2003).

The operationalisation of the instruments will be conducted using the subcategories of Hood (1986) with the inductive addition shown in figure 3 below.

| <b>Regulatory instruments</b>             | <b>Economic instruments</b>         | <b>Soft instruments</b> |                                    | <b>Organisational instruments</b> |   |
|---|-------------------------------------|-------------------------|------------------------------------|-----------------------------------|---|
| Command and control regulation            | Grants and loans                    | One – way communication | Information collection and release | Infra-structural                  | Direct provision of goods and services and public enterprises |
| Self-regulation                           | User charges                        |                         | Advice, exhortation, advertising   |                                   | Use of family, community, and voluntary organisations         |
| Standard-setting and delegated regulation | Tax and tax expenditures            | Two – way communication | Information collection and release | Organisational                    | Market creation   |
| Advisory committees and consultations     | Interest group creation and funding |                         | Commissions and inquiries          |                                   | Government reorganisation                                     |

Figure 3. Policy instruments, based on: Hood (1986)

### **2.2.6 Instrument mixes**

Policy instruments are generally not used independently but as part of an instrument mix to achieve a predefined policy goal. This mix results from the interactions and interdependencies between different policies (Flanagan et al., 2011). To achieve a particular mix, a selection of specific instruments is chosen. The selection, predominately made with a degree of customisation to fit the changing needs of the system and the capacities of the (local) government, occurs in three steps (Borrás & Edquist, 2013). The first step is the categories provided by the NATO typology of Hood (1986): regulatory, economic, soft, and organisational instruments. The next step is to design or customise the instruments to fit the context in which they perform. The municipalities can use the subcategories of the NATO typology to further develop detailed tools. They can then design the complementary policy instruments to address the problems identified (Borrás & Edquist, 2013). The specific selection of the instruments will influence how waste prevention practices will be manifested in each case study. This will become apparent in the results of this research.

### **2.2.7 Choice of theory**

The instrument policy theory is appropriate for analysing and explaining the complexity of the chosen policy mix. The created typology enables the classification of various tools practised by governments to better understand the complexity of such tools and to offer guidance in comparing them in different policy fields both in time and location. Because of these various fields, every policy instrument mix will have a unique composition that influences the suitability of the prevention policies. The suitability is determined by the possibilities and limitations subtracted from the SWOT analysis, explained in the next section.

## **2.3 SWOT analysis**

A SWOT analysis will be used to offer insight into the suitability of a municipal policy mix. SWOT is an acronym for strengths, weaknesses, opportunities and threats (Sarsby, 2016). The diagram distinguishes between four aspects: helpful, harmful, internal and external. It will be used as a guide to allocate the internal and external possibilities and limitations of waste prevention policies of the selected municipalities and the national government. The possibilities found in this research are based on the strengths and opportunities. The limitations are based on the weaknesses and threats. Firstly, this section explains the insights of the acronym. Secondly, it presents an additional framework to provide a more in-depth application of the SWOT.

### **2.3.1 Insights of the SWOT**

Strengths are viewed as internal and helpful characteristics, in this case, of the policy. They will add value to the properties and capacities and make it more advantageous when compared to other policies or organisations (Gürel, 2017; Sarsby, 2016). Weaknesses are viewed as internal and harmful characteristics of the policy, and they amplify its shortcomings. Weakness at the policy level refers to the properties and disabilities of a policy and its weaker outcome compared to other policies. For the concerned municipalities, it is vital to identify the weaknesses of a policy because it shows what needs to be improved and offers guidance for building a strategy. When acted on, weaknesses have the potential to foresee potential problems or long-term limitations (ibid.).

Opportunities are helpful conditions in the external environment or in the future that are convenient in time or situation and can support the organisation achieve or exceed its strategic goals (Daft, 2003). In this context, the policy should be able to yield positive results. Opportunities can take advantage of the strengths, overcome weaknesses, and neutralise external threats (Harrison & John, 2007). Threats are harmful circumstances in the external environment or in the future that may hinder the organisational achievement of strategic goals. This context jeopardises the policy's success and may cause unrecoverable damages (Gürel, 2017; Harrison & John, 2007). Figure 4 presents this in a diagram.



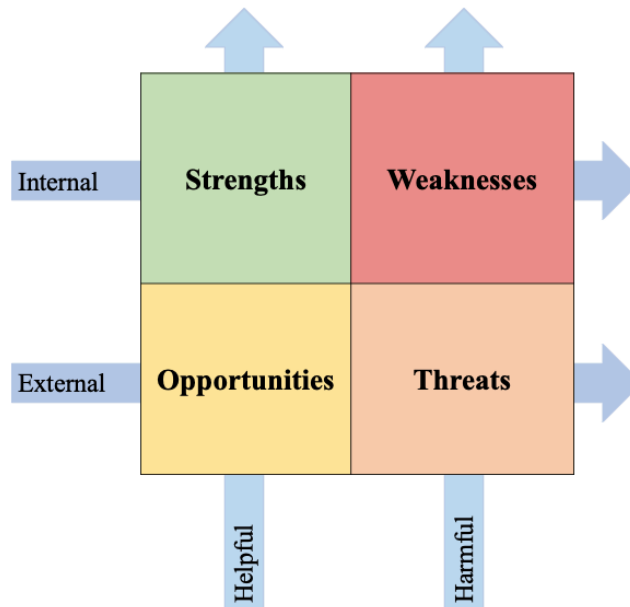


Figure 4. SWOT diagram based on: Sarsby (2016, p.11)

### 2.3.2 PESTLE framework

As demonstrated in the literature review, the general possibilities and limitations of waste prevention take different forms. The advantages and disadvantages of the instruments stated by Hood (1986), Howlett and Ramesh (2003) and Bouwma et al. (2015) in the previous section were initially used to operationalise this. However, these are remarkably general and therefore not applicable to the substantive elaboration of the SWOT in the context of waste. In order to still elaborate on the possibilities (strengths and opportunities) and limitations (weaknesses and threats) based on existing Dutch literature, the PESTLE framework was applied to provide a more in-depth understanding of the SWOT and a better ability for comparison. PESTLE stands for political, economic, social-cultural, technological, legal, and environmental and is used initially to examine external factors (Sarsby, 2016). However, since these variables can also be used to identify internal factors (which will be explained below), it has been decided to use the PESTLE framework for both external and internal factors.

**Political** factors are strategies and actions that governments may implement to influence the external effects of the policy (Perera, 2017). This category includes political stability and instability, policy direction and the policy impact. This category includes (Sarsby, 2016):

- Policy direction: “the intention and opinion of governments and their view of how a nation functions, and its role within the community (local, national and global)” (p.41).
- Law-making: “the type and style of laws that a government promotes and introduces” (p.41).
- Taxation: “the principles of government revenue collection” (p.41).
- Budgetary: “how the government intends to spend tax revenue” (p.41).

Political will also refer to internal political decisions of the government. This links to support, cooperation, debates and competitions internally and towards other governments.

**Economic** factors are related to all elements connected to the economy. These factors are influenced by the government, such as economic growth, interest and inflation rates, demand and supply trends, and national debt. Furthermore, they also can exist within an organisation, such as the internal costs and budgetary processes of staff, providing information, investigation and prosecution. This factor will then influence the capacity, financial commitments and ways that government measures can influence market forces (Raak et al., 2019).

**Social-cultural** factors relate to the public in education, healthcare, demographic distributions and cultural trends. Cultural trends are expressed in traditions, norms and religious beliefs and in ethical

values and perceptions (Perera, 2017). According to Perera (2017), most people show resistance to changes in the social-cultural environment that need to be clarified to act upon when introducing goods and services. It can also address the internal norms a government can create. Examples are learning abilities, inclusivity, legitimacy, equitability and predictability.

**Technological** factors are about technological trends and include innovative processes mostly linked to IT in critical operational processes, which are becoming more prominent in our daily lives (Sarsby, 2016). Factors such as technical infrastructure and technical competency should be considered here. This may also apply to technological progress of organisation to improve the effectiveness of specific tasks or to processes of the organisation on the external environment that they affect (Perera, 2017).

**Legal** factors include laws, regulations, principles and guidelines that may affect the policy's implementation and outcome. All acts should include legal considerations. Adhering to legal conditions usually leads to an advantage for the organisation but may also create obstacles during innovation practices (Sarsby, 2016; Perera, 2017).

**Environmental** factors include ecological concerns such as climate, nature and air quality and also include laws and products related to the environment. These factors are becoming more critical with increasing pressure regarding global warming, negative environmental impacts and sustainability concerns (Sarsby, 2016; Perera, 2017).

Figure 5 presents the additional information in a new SWOT diagram which will be used in chapter 7 of the research.

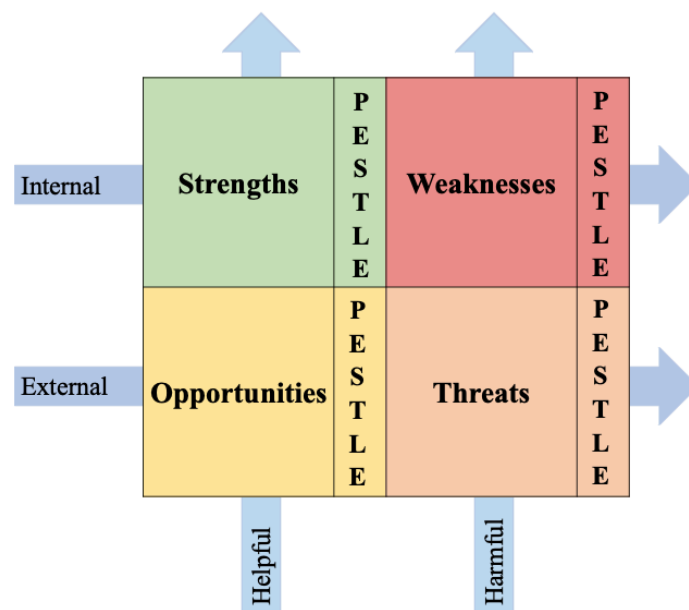


Figure 5. Adjusted SWOT diagram based on: Sarsby (2016, p.41)

## 2.4 Conceptual framework

The combined typologies from the categorisation and the SWOT analysis form the basis of this conceptual framework, shown below in figure 6. The research will begin with an explanation of the governmental visions on waste management and preferably prevention. Research will examine the extent that the government will influence the policy mix of municipalities and provide instruments to achieve the set goals. Because the degree of influence is indistinct, a dashed line is used. A

municipality will design a policy mix, based on the existing governmental objectives, from tools within the four categories: regulatory instruments, economic instruments, soft instruments, and organisational instruments. The municipality's unique policy mix will be evaluated on its strengths, weaknesses, opportunities and threats. The strengths and opportunities will provide the basis for the possibilities and the weaknesses and threats provide the foundation for the limitations. This analysis will lead to an understanding of the most appropriate policy mix for waste prevention within municipalities.

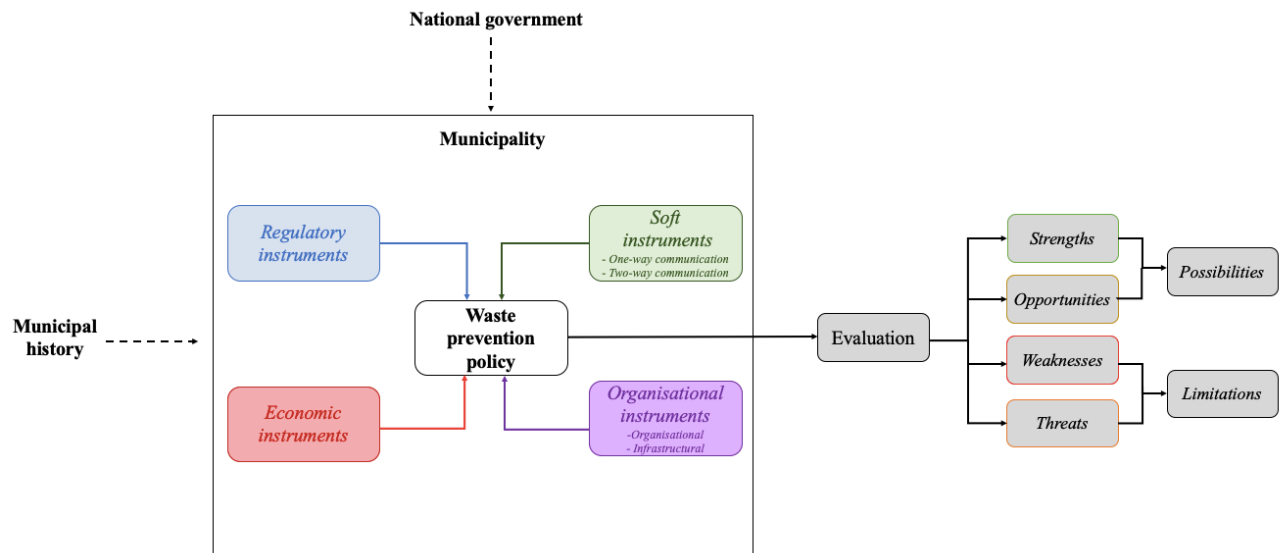


Figure 6. Conceptual framework



## **Chapter 3    Methodology**

This chapter elaborates on the methodological choices of the research. It offers insight into the research strategy, provides an extensive explanation of the case selection, followed up with information on the research methods, data collection and data analysis. Last, the reliability, validity and ethical considerations are discussed.

### **3.1      Research strategy and philosophy**

In order to answer the research question, qualitative research in the form of a case study is to be performed within the given timeframe. A case study is a detailed analysis of one or more cases (Bryman, 2012). As this research focuses on the evaluation of waste preventing policy mixes in different municipal settings, it can be considered a multiple-case study. An analysis of similarities, differences and patterns across the chosen cases will research how and why programs and policies regarding the prevention of household waste succeed or fail to work. The cases are homogeneous in terms of high-rise class, the progress of the VANG objectives and reduction of the totality of waste. This ensures the municipalities are comparable and are acting on preventing waste. The cases are heterogeneous in terms of prevention practices to discover different best practices. The case selection will be further explained in part 3.2.

Research philosophy and the role of theory plays an integral part in social research. “A research philosophy refers to a system of beliefs and assumptions about the development of knowledge” (Saunders et al., 2015, p.124). For this research, the chosen framework is constructivism. Therefore, the ontological nature, the construction of reality, of this research is relativism, which means that there are multiple understandable realities within processes, experiences and practices (Guba & Lincoln, 1994; Saunders et al., 2015). The epistemological nature of this research, the acquisition of knowledge, is transactional and subjectivist, meaning that the researcher and the object of research are connected. Hence, findings are created as the investigation proceeds. Furthermore, the research focuses on different perceptions and interpretations and contributes to social science with new understandings (Guba & Lincoln, 1994; Saunders et al., 2015). Therefore, the philosophy of this research connects with municipalities and their different strategies and interpretations of the VANG objectives.

The role of theory in this research will be expressed in a deductive approach, meaning that testing an existing theory will guide this research (Bryman, 2012). Multiple existing policy instrument theories, such as the trichotomy of Vedung (1998) and the NATO typology of Hood (1986), will serve as a base for the explanation of the problem statement and drive the process of gathering data (Van Thiel, 2014).

### **3.2      Overview of selected municipalities**

#### **3.2.1 Case selection**

As stated before, a selection of well-performing municipalities will be made to derive best practices of waste prevention that may be used by other municipalities when achieving the upcoming VANG objectives.

JMA will provide information about municipalities with well-performing waste prevention strategies. Furthermore, the CBS figures for 2017, 2018 and 2019 will be considered in locating which municipalities are reducing their total amount of household waste. To select comparable municipalities, it is necessary to select municipalities around the same high-rise class because this determines performance, costs and amount of waste (Starreveld, 2019). The degree of high-rise cannot be influenced directly, but it does determine the strategies of waste collection. Hence, the municipalities are compared by the benchmark in high-rise classes. Four classes are distinguished: class A: 50 to 100 percent high-rise; class B: 30 to 49 percent high-rise; class C: 20 to 29 percent

high-rise; and class D: 0 to 19 percent high-rise buildings. Municipalities within the same class are retrieved from the following website: <https://www.benchmarkafval.nl/vang-tools/vang-kaart/>.

The selection of municipalities is initially based on two indicators: their performance on the VANG objectives and their reduction of the totality of waste. As mentioned previously, the goal of 2020 was to reduce the residual waste to 100 kg per person. In 2019, about 60 municipalities were below this number, which shows they are actively working on the objectives. However, prevention of waste is highlighted in the numbers of the total household waste and therefore should also be included by examining a decline over the years. Moreover, this research will focus on the high-rise classes of B and C because those are most comparable in terms of performance and costs, shown in figure 7 (Starreveld, 2019). Considering all these factors, the selection will be reduced to 15 municipalities. All 15 have a recycling centre to dispose bulky waste within the municipality except for Valkenburg aan de Geul, who shares this with two adjacent municipalities.

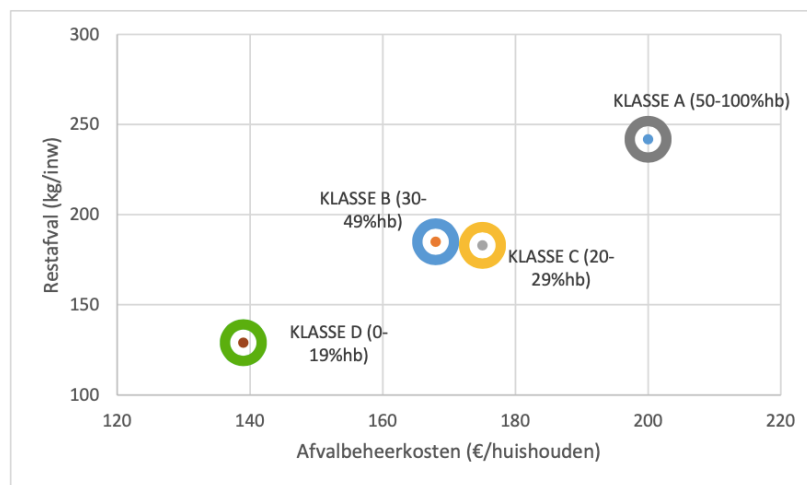


Figure 7. Average amount of residual waste and management costs per high-rise class (in Dutch) (Starreveld, 2019, p.22)

Table 1. Selection based on VANG and reduction of waste (in Dutch) (CBS, 2020)

|                        |                            | Hoeveelheid huishoudelijk afval |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        |        |        |
|------------------------|----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|
| Regio's ▼              |                            | 2001                            | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017** | 2018** | 2019** |
| Afvalsoort ▼           |                            | kg per inwoner                  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |        |        |        |
| Apeldoorn              | Totaal huishoudelijk afval | 631,2                           | 540,9 | 519,4 | 469,6 | 458,7 | 459,0 | 469,8 | 468,3 | 475,1 | 461,4 | 466,3 | 451,8 | 435,9 | 442,3 | 447,8 | 442,2 | 431,0  | 431,6  | 430,7  |
|                        | Huishoudelijk restafval    | 314,9                           | 242,2 | 231,0 | 205,1 | 206,0 | 205,5 | 210,4 | 206,0 | 178,9 | 165,6 | 161,7 | 152,2 | 144,7 | 142,6 | 137,1 | 131,8 | 123,3  | 115,1  | 89,3   |
| Bunschoten             | Totaal huishoudelijk afval | 741,3                           | .     | .     | 710,2 | 645,2 | .     | .     | 686,7 | 680,2 | 629,9 | 663,9 | 692,0 | 624,3 | 643,0 | .     | 595,0 | .      | .      | .      |
|                        | Huishoudelijk restafval    | 217,6                           | 224,4 | .     | 216,4 | 219,5 | 216,5 | 217,7 | 221,0 | 220,1 | 197,6 | 211,8 | 208,9 | 200,3 | 191,6 | 209,4 | 182,8 | 30,8   | 39,0   | 38,0   |
| Cuijk                  | Totaal huishoudelijk afval | 518,1                           | 569,5 | .     | 604,8 | .     | 605,7 | .     | 672,4 | 593,2 | 587,1 | 592,2 | 561,8 | 543,4 | 565,5 | 566,5 | 584,1 | 582,8  | 573,7  | 508,8  |
|                        | Huishoudelijk restafval    | 88,5                            | 89,3  | 88,6  | 101,6 | 97,3  | 76,8  | 77,3  | 75,4  | 64,5  | 57,5  | 56,3  | 54,2  | 53,9  | 55,3  | 49,3  | 43,7  | 33,6   | 32,1   | 29,8   |
| Culemborg              | Totaal huishoudelijk afval | 536,7                           | 501,0 | 478,8 | 502,5 | 534,6 | 539,6 | 541,7 | 529,9 | 519,0 | 518,3 | 466,8 | 462,2 | 436,9 | 395,7 | 413,0 | 421,2 | 436,6  | 431,9  | 417,2  |
|                        | Huishoudelijk restafval    | 245,1                           | 244,9 | 239,5 | 243,3 | 240,8 | 234,4 | 239,9 | 236,4 | 225,6 | 219,1 | 195,8 | 204,0 | 187,7 | 116,8 | 117,6 | 118,7 | 120,6  | 120,4  | 94,8   |
| Deventer               | Totaal huishoudelijk afval | 571,8                           | 486,0 | 454,7 | 488,6 | 483,6 | 508,8 | 521,3 | 523,5 | 509,3 | 503,0 | 504,8 | 485,3 | 400,0 | 406,8 | 412,4 | 388,4 | 374,1  | 374,5  | 376,7  |
|                        | Huishoudelijk restafval    | 273,2                           | 233,9 | 217,1 | 216,0 | 217,6 | 213,7 | 214,7 | 214,3 | 210,7 | 204,3 | 204,5 | 186,4 | 113,6 | 105,2 | 99,3  | 80,1  | 75,3   | 74,0   | 73,2   |
| Doesburg               | Totaal huishoudelijk afval | 648,2                           | 694,6 | 669,6 | 690,1 | 584,3 | 581,4 | 584,1 | 573,2 | 526,8 | 530,5 | 515,0 | .     | .     | .     | 444,4 | 458,1 | 456,5  | 396,1  | 369,8  |
|                        | Huishoudelijk restafval    | 184,2                           | 172,4 | 177,4 | 191,7 | 169,7 | 165,9 | 177,7 | 160,9 | 184,5 | 165,7 | 165,5 | 173,9 | 112,7 | 114,6 | 121,9 | 114,9 | 114,2  | 111,4  | 61,2   |
| Hengelo (O.)           | Totaal huishoudelijk afval | 588,6                           | .     | 510,7 | .     | 594,8 | 593,9 | 628,6 | .     | .     | 572,1 | 561,2 | 489,7 | 481,9 | 488,1 | 476,2 | 477,8 | 500,3  | 447,3  | 440,5  |
|                        | Huishoudelijk restafval    | 265,1                           | .     | 252,4 | .     | 262,3 | 262,9 | 265,4 | .     | .     | 236,6 | 231,7 | 168,9 | 159,3 | 158,0 | 145,3 | 128,4 | 120,5  | 96,6   | 75,1   |
| Oosterhout             | Totaal huishoudelijk afval | 724,3                           | 711,0 | 699,0 | 699,6 | 706,5 | 699,1 | 702,9 | 663,6 | 644,7 | 626,3 | 632,3 | 610,9 | 541,0 | 585,4 | 602,8 | 603,2 | 583,1  | 576,6  | 574,3  |
|                        | Huishoudelijk restafval    | 222,8                           | 220,7 | 221,0 | 223,4 | 224,4 | 221,1 | 200,7 | 200,3 | 198,7 | 192,7 | 197,6 | 183,2 | 86,8  | 89,2  | 87,1  | 83,3  | 68,5   | 72,5   | 69,7   |
| Tiel                   | Totaal huishoudelijk afval | 559,4                           | 509,2 | 510,4 | 546,1 | 533,9 | 539,6 | 541,3 | 529,8 | 519,0 | 518,3 | 526,9 | 497,4 | 476,9 | 441,6 | 458,3 | 432,8 | 445,7  | 435,8  | 421,9  |
|                        | Huishoudelijk restafval    | 244,4                           | 245,8 | 239,5 | 242,7 | 240,1 | 234,4 | 239,7 | 236,3 | 225,6 | 219,1 | 236,4 | 232,9 | 219,1 | 143,6 | 144,3 | 127,6 | 129,9  | 121,7  | 99,5   |
| Tubbergen              | Totaal huishoudelijk afval | .                               | .     | 439,7 | 447,8 | .     | 523,2 | .     | .     | .     | .     | 451,1 | 435,1 | 431,2 | 437,9 | 459,1 | .     | .      | .      | 496,8  |
|                        | Huishoudelijk restafval    | 231,5                           | 228,5 | 211,7 | 216,2 | 214,7 | 214,1 | 219,0 | 217,3 | 215,9 | 197,2 | 198,8 | 195,2 | 189,6 | 192,4 | 197,4 | 69,7  | 62,9   | 65,4   | 63,9   |
| Valkenburg aan de Geul | Totaal huishoudelijk afval | 530,7                           | 559,6 | 494,4 | 509,8 | 518,4 | 533,7 | 570,5 | 545,0 | 548,4 | 530,9 | 554,2 | 533,2 | 500,4 | 514,0 | 521,9 | 529,3 | 520,9  | 515,7  | 491,3  |
|                        | Huishoudelijk restafval    | 102,1                           | 108,6 | 111,1 | 110,8 | 108,9 | 110,5 | 114,8 | 116,4 | 114,7 | 101,1 | 98,3  | 100,2 | 95,1  | 95,1  | 94,7  | 81,1  | 79,1   | 77,2   | 71,8   |
| Vught                  | Totaal huishoudelijk afval | 610,7                           | 603,2 | 562,2 | 540,7 | 527,5 | 506,4 | 611,9 | 456,7 | 412,5 | 409,6 | 418,2 | 386,0 | 377,4 | 375,1 | 376,5 | 400,6 | 380,5  | 375,8  | 373,8  |
|                        | Huishoudelijk restafval    | 255,1                           | 224,7 | 203,5 | 179,1 | 156,9 | 159,3 | 142,6 | 145,0 | 153,2 | 114,6 | 116,9 | 115,0 | 113,5 | 115,9 | 117,1 | 114,5 | 90,6   | 90,7   | 87,9   |
| Waalwijk               | Totaal huishoudelijk afval | 419,0                           | 407,1 | 403,9 | 390,9 | 390,1 | 397,7 | 396,9 | 391,3 | 386,7 | 414,4 | 430,4 | 416,0 | 395,3 | 390,2 | 380,4 | 403,1 | 421,5  | 406,5  | 356,1  |
|                        | Huishoudelijk restafval    | 157,2                           | 159,7 | 158,0 | 157,6 | 160,7 | 167,5 | 168,1 | 173,2 | 160,3 | 154,8 | 146,0 | 152,2 | 141,1 | 144,1 | 110,0 | 97,2  | 93,7   | 92,4   | 90,9   |
| Zoeterwoude            | Totaal huishoudelijk afval | 365,7                           | 352,8 | 353,1 | 366,9 | 381,2 | .     | .     | 367,8 | .     | .     | .     | .     | 412,5 | 377,7 | 355,7 | 363,0 | 408,9  | 417,6  | 398,9  |
|                        | Huishoudelijk restafval    | 109,5                           | 114,0 | 116,8 | 125,1 | 120,7 | 119,8 | 116,8 | 122,8 | 127,3 | 125,0 | 162,7 | 111,1 | 109,3 | 111,0 | 101,4 | 82,4  | 78,2   | 65,4   | 41,1   |
| Zuidplas               | Totaal huishoudelijk afval | .                               | .     | .     | .     | .     | .     | .     | .     | .     | 500,7 | 544,5 | .     | .     | 453,9 | 452,7 | 454,7 | 464,5  | 456,7  | 454,7  |
|                        | Huishoudelijk restafval    | .                               | .     | .     | .     | .     | .     | .     | .     | .     | 174,0 | 179,1 | .     | 109,9 | 98,4  | 97,9  | 96,1  | 95,8   | 97,1   | 96,5   |

Because this selection is thus far only based on numerical indicators, and it is not possible to directly derive the body of thought from this, the selection also has considered the indicator of municipalities with progressive policies about waste reduction. Examples of municipalities with progressive policies are Heerenveen, Ooststellingwerf, Horst aan de Maas and Zuidplas (mentioned in the first selection); they have introduced DIFTAR +, a Pay-As-You-Throw (PAYT) system for residual waste that includes a charge per kilogram. This is a policy in which the ‘polluter pays principle’ is implemented strictly, which leads to demonstrably improved waste performance (VANG-HHA, 2015). Other examples which introduced a circular upcycle centre are Almere, Amersfoort, Arnhem and Bergen; Uitgeest; Castricum; Heiloo (BUCH), Goeree-Overflakkee, Hengelo (mentioned in the first selection), Hoekse Waard, Maastricht, Meersen, Valkenburg aan de Geul (mentioned in the first selection), Tilburg and Zwolle. A circular upcycle centre is a place where products are reused and ‘waste’ is converted into new products. For example, unnecessary disposal of (raw) materials is prevented by connecting a thrift store, a repair shop, the recycling centre and an educational institution (Gemeente Almere, 2021b). When including the selection criteria of high-rise classes B and C, this will result in the following municipalities.

Table 2. Selection based on progressive ideas (in Dutch) (CBS, 2020)

|                        |                            | Onderwerp ▼                     |       | Perioden ▼ |       |       |       |       |       |       |       |       |       |       |       |       |       |        |        |        |  |  |
|------------------------|----------------------------|---------------------------------|-------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--|--|
|                        |                            | Hoeveelheid huishoudelijk afval |       |            |       |       |       |       |       |       |       |       |       |       |       |       |       |        |        |        |  |  |
| Regio's ▼              |                            | 2001                            | 2002  | 2003       | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017** | 2018** | 2019** |  |  |
| Afvalsoort ▼           |                            | kg per inwoner                  |       |            |       |       |       |       |       |       |       |       |       |       |       |       |       |        |        |        |  |  |
| Almere                 | Totaal huishoudelijk afval | 569,3                           | 567,4 | 548,8      | .     | 522,6 | 561,9 | 540,5 | 529,3 | 522,7 | 469,3 | 494,4 | 500,6 | 472,4 | 480,4 | 485,4 | 490,0 | 482,4  | 452,8  | 426,1  |  |  |
|                        | Huishoudelijk restafval    | 296,1                           | 295,7 | 297,9      | .     | 287,8 | 256,4 | 260,7 | 251,8 | 251,6 | 207,4 | 213,6 | 219,0 | 203,4 | 191,5 | 180,4 | 179,5 | 184,6  | 170,9  | 159,9  |  |  |
| Arnhem                 | Totaal huishoudelijk afval | 533,9                           | .     | 531,8      | 555,5 | 566,1 | 579,5 | 584,4 | 549,4 | 548,3 | 532,4 | 533,6 | 514,4 | 494,9 | 495,2 | 484,8 | 480,3 | 483,8  | 488,9  | 471,7  |  |  |
|                        | Huishoudelijk restafval    | 270,9                           | 263,3 | 256,5      | 259,2 | 260,4 | 268,7 | 270,1 | 247,7 | 259,0 | 243,4 | 244,4 | 243,6 | 241,4 | 224,9 | 217,4 | 208,0 | 203,6  | 209,5  | 200,7  |  |  |
| Bergen (NH.)           | Totaal huishoudelijk afval | .                               | 687,3 | 659,0      | 692,9 | 714,1 | 718,5 | 752,9 | 730,4 | .     | 605,1 | 665,7 | 613,7 | 609,7 | 616,0 | 591,6 | 591,9 | 601,3  | 600,3  | 622,4  |  |  |
|                        | Huishoudelijk restafval    | .                               | 226,5 | 223,3      | 241,4 | 242,8 | 247,6 | 251,9 | 243,2 | 226,6 | 193,6 | 239,1 | 243,3 | 245,1 | 243,8 | 222,6 | 210,4 | 211,2  | 208,5  | 199,0  |  |  |
| Castricum              | Totaal huishoudelijk afval | 655,1                           | 608,5 | 588,8      | 579,5 | 590,5 | 607,0 | 594,6 | 612,6 | 587,6 | 568,0 | 557,5 | 548,0 | 528,5 | 535,1 | 539,6 | 539,9 | 543,8  | 530,8  | 519,6  |  |  |
|                        | Huishoudelijk restafval    | 223,4                           | 228,5 | 227,2      | 228,1 | 232,7 | 233,9 | 231,4 | 234,1 | 221,6 | 216,5 | 214,8 | 207,3 | 209,1 | 205,9 | 195,7 | 202,1 | 200,4  | 199,0  | 187,0  |  |  |
| Heerenveen             | Totaal huishoudelijk afval | 567,0                           | 557,1 | 543,4      | 534,2 | 555,1 | 568,4 | .     | 653,5 | 628,6 | 603,6 | 617,9 | 601,3 | 574,9 | 574,3 | 618,2 | 611,2 | 549,3  | 556,6  | 561,2  |  |  |
|                        | Huishoudelijk restafval    | 200,1                           | 196,6 | 197,5      | 204,1 | 195,2 | 188,4 | 193,3 | 200,4 | 193,9 | 191,1 | 192,4 | 188,8 | 178,7 | 168,8 | 167,5 | 149,9 | 139,3  | 153,2  | 121,4  |  |  |
| Heiloo                 | Totaal huishoudelijk afval | .                               | 543,0 | 565,1      | 589,1 | 594,5 | 599,9 | 600,3 | 600,2 | 584,5 | .     | 591,5 | 551,1 | 551,5 | 550,8 | 546,0 | 547,9 | 536,4  | 538,0  | 551,6  |  |  |
|                        | Huishoudelijk restafval    | 201,0                           | 195,3 | 201,3      | 205,6 | 202,7 | 204,1 | 208,0 | 204,1 | 204,7 | 200,9 | 195,8 | 188,7 | 186,5 | 186,1 | 175,4 | 180,0 | 181,4  | 180,3  | 171,9  |  |  |
| Maastricht             | Totaal huishoudelijk afval | 488,0                           | 527,3 | 461,4      | 474,1 | 476,3 | 479,1 | 487,9 | 485,5 | 470,4 | 454,8 | 466,0 | 445,5 | 418,8 | 409,8 | 402,1 | 412,4 | 405,8  | 378,9  | 382,8  |  |  |
|                        | Huishoudelijk restafval    | 109,1                           | 115,3 | 115,3      | 130,3 | 132,4 | 131,1 | 134,2 | 137,9 | 130,4 | 124,0 | 119,5 | 114,5 | 106,4 | 107,7 | 109,7 | 109,9 | 104,2  | 99,8   | 97,9   |  |  |
| Oss                    | Totaal huishoudelijk afval | 673,5                           | 654,5 | 639,2      | 650,1 | 671,5 | 651,2 | 664,7 | 658,0 | 682,8 | 659,4 | 642,7 | 641,6 | 630,2 | 626,5 | 598,2 | 602,6 | 598,6  | 631,4  | 675,4  |  |  |
|                        | Huishoudelijk restafval    | 231,2                           | 226,5 | 225,2      | 231,6 | 235,4 | 232,0 | 231,9 | 224,5 | 216,2 | 217,0 | 214,1 | 213,9 | 211,8 | 205,6 | 167,5 | 167,2 | 167,0  | 167,7  | 160,8  |  |  |
| Tilburg                | Totaal huishoudelijk afval | 573,5                           | 549,4 | 536,4      | 556,0 | 559,4 | 534,6 | 538,1 | 466,7 | 462,5 | 458,6 | 485,1 | 462,0 | 435,2 | 428,5 | 420,6 | 418,0 | 424,7  | 407,8  | 423,4  |  |  |
|                        | Huishoudelijk restafval    | 258,8                           | 261,0 | 255,4      | 258,1 | 279,4 | 257,5 | 269,6 | 265,9 | 254,5 | 253,7 | 245,8 | 231,9 | 221,6 | 203,7 | 180,4 | 156,0 | 138,5  | 126,2  | 123,5  |  |  |
| Uitgeest               | Totaal huishoudelijk afval | 516,6                           | 630,2 | 519,9      | 485,7 | 560,1 | 554,0 | 582,4 | 571,9 | 559,8 | .     | .     | 507,6 | 501,1 | 537,7 | 516,4 | 516,6 | 505,8  | 498,9  | 512,6  |  |  |
|                        | Huishoudelijk restafval    | 222,1                           | 221,0 | 215,3      | 207,4 | 227,9 | 228,7 | 226,8 | 236,0 | 224,8 | 201,8 | 213,1 | 214,9 | 204,3 | 210,6 | 205,9 | 203,9 | 193,0  | 193,4  | 193,4  |  |  |
| Valkenburg aan de Geul | Totaal huishoudelijk afval | 530,7                           | 559,6 | 494,4      | 509,8 | 518,4 | 533,7 | 570,5 | 545,0 | 548,4 | 530,9 | 554,2 | 533,2 | 500,4 | 514,0 | 521,9 | 529,3 | 520,9  | 515,7  | 491,3  |  |  |
|                        | Huishoudelijk restafval    | 102,1                           | 108,6 | 111,1      | 110,8 | 108,9 | 110,5 | 114,8 | 116,4 | 114,7 | 101,1 | 98,3  | 100,2 | 95,1  | 95,1  | 94,7  | 81,1  | 79,1   | 77,2   | 71,8   |  |  |

To determine the final selection, there are pragmatic reasons that need to be mentioned, such as the dependency on the available information and connections of JMA. JMA has been working with various municipalities in the Netherlands for at least 30 years and has gained much knowledge about waste management by conducting research and assisting policymaking. This information can determine whether a municipality is relevant enough for research. Subsequently, it has been examined which municipalities JMA has recently collaborated with. This resulted in the following selection: **Hengelo** (Overijssel), a municipality with a residual waste number below 100 kg, a decrease in the total amount of waste and a PAYT reverse waste collection. JMA performed a policy evaluation and research for post-separation in 2019. **Heerenveen**, a municipality with a residual waste number of around 100 kg and a progressive idea of waste management using post-separation and PAYT. Currently, JMA is performing a feasibility study for a circular upcycle centre. **Vught**, a municipality with a residual waste number below 100 kg with a classic PAYT system. In 2017, JMA investigated the possible outsourcing of the recycling centre. And **Almere**, a municipality above 100 kg residual waste but with a firm decrease in the total amount of waste and a circular upcycle centre. In 2020, JMA supported the municipality of Almere with the final report on possible post-separation (J. Coeleveld, personal communication, February 23, 2021).

### 3.2.2 Basic elements selected municipalities

Table 3. Basic information selected municipalities (CBS (2021), VANG Benchmark (n.d.), documents of JMA, interviews (2021))

| Municipality  | Vught  | Heerenveen                                      | Hengelo<br>(Overijssel province)                | Almere   |
|---|--|---|---|--|
| High rise class                                       | C (24%)  | C (25%)   | B (30%)   | C (27%)  |
| Number of inhabitants<br>(2020)                       | 31,697 (2021)                                  | 50,493  | 81,140  | 211,893  |
| Waste connections                                     | +/- 11,000                                     | +/- 22,000                                      | +/- 38,000                                      | +/- 87,000                                     |
| Total waste numbers<br>in kg<br>(2015, 2018, 2019)    | 2015: 376.5<br>2018: 375.8<br>2019: 373.8      | 2015: 618.2<br>2018: 556.6<br>2019: 561.2       | 2015: 476.2<br>2018: 447.3<br>2019: 440.5       | 2015: 485.4<br>2018: 452.8<br>2019: 426.1      |
| Residual waste<br>numbers in kg<br>(2015, 2018, 2019) | 2015: 117.9<br>2018: 90.7<br>2019: 87.9        | 2015: 167.5<br>2018: 153.2<br>2019: 121.4       | 2015: 145.3<br>2018: 96.6<br>2019: 75.1         | 2015: 180.4<br>2018: 170.9<br>2019: 159.9      |
| Waste separation<br>percentage (2019)                 | 73%  | 80%   | 80%   | 64%  |
| Current waste system                                  | Post separation: NO<br>Reversed collection: NO | Post separation: YES<br>Reversed collection: NO | Post separation: NO<br>Reversed collection: YES | Post separation: NO<br>Reversed collection: NO |
| Frequency residual<br>waste collection                | Every 4 weeks                                  | Every 2 weeks                                   | N/A   | Every 2 weeks                                  |
| Residual waste rate<br>system                         | Volume & Frequency and<br>household size       | Weight & Frequency                              | Volume & Frequency                              | Fixed rate                                     |

### 3.3 Research methods, data collection and data analysis

#### 3.3.1 Research methods and data collection

Regarding methods, content analysis will be used to interpret the content of scientific literature and policy documents of the chosen municipalities and the national government to gather information about the VANG objectives and waste practices of the authorities. The documents will be provided by the JMA internship organisation or the respondents, scientific databases or websites of the Ministry of Public Works, or the VANG database.

The second method consists of interviews to gain a more complete understanding of why and how choices regarding waste prevention are made (Bryman, 2012). The units of analysis for this research are respondents primarily in the field of policymaking such as employees working at the national government or its executive organisations. Furthermore, employees working for the municipalities of Hengelo, Heerenveen, Vught or Almere are also interviewed.

The chosen sampling strategy is non-probability sampling, which will start with a purposive selection of the units of study. For this research, the abovementioned employees within the field of waste and with a connection to JMA are chosen. Further interviews may be obtained through snowball sampling, in which respondents refer to others within the field of waste management (Van Thiel, 2014). The interviews will be semi-structured, meaning a topic list is used as a guideline to keep a structure in the conversation and to track covered topics. This information can be found in appendix 3. Table 4 below shows all the interview respondents, including information about their workplace and position and information about their interviews. Two respondents wished to remain anonymous and are referred to as ‘the respondent’ throughout the research.

Table 4. List of respondents

| Respondent number | Respondent name      | Respondent function   | Interview type            | Language | Date of interview |
|-------------------|----------------------|---|---------------------------|----------|-------------------|
| R1                | Marijn Teernstra     | Project leader and consultant, Rijkswaterstaat                                  | Semi-structured via Teams | Dutch    | 13-04-2021        |
| R2                | Addie Weenk          | Advisor Waste and Circularity, Rijkswaterstaat                                  | Semi-structured via Teams | Dutch    | 14-04-2021        |
| R3                | Koos van Dael        | Freelancer, NVRD  | Semi-structured via Teams | Dutch    | 15-04-2021        |
| R4                | Maarten Goorhuis     | Senior policy officer, NVRD   | Semi-structured via Teams | Dutch    | 20-04-2021        |
| R5                | Mark van Waas        | Senior policy officer, VNG  | Semi-structured via Teams | Dutch    | 28-04-2021        |
| R6                | Anonymous respondent | Policy officer, municipality of Vught   | Semi-structured via Teams | Dutch    | 29-04-2021        |
| R7                | Yfke Hoogland        | Policy director sustainability and waste collection, municipality of Heerenveen | Semi-structured via Teams | Dutch    | 30-04-2021        |
| R8                | Henkjan Fikken       | Policy officer, municipality of Hengelo   | Semi-structured via Teams | Dutch    | 06-05-2021        |
| R9                | Hede Razoky          | Account manager, Upcycle centre Almere  | Semi-structured via Teams | Dutch    | 10-05-2021        |
| R10               | Anonymous respondent | Employee, Ministry of Infrastructure and Water Management                       | Semi-structured via Teams | Dutch    | 17-05-2021        |
| R11               | Leontine Westerik    | Freelancer, municipality of Almere  | Semi-structured via Teams | Dutch    | 04-06-2021        |

### 3.3.2 Data analysis

After conducting the interviews, they will be transcribed and coded using Atlas TI to be analysed correctly. The codes are based on the concepts of the NATO typology of Hood (1986) and the added subdivision discussed in chapter 2: Theoretical framework and the categories provided by the SWOT analysis. The frames of reference are missing for the coding of the SWOT analysis because Howlett & Ramesh (2003) have not been able to provide for the elaboration of the SWOT. In order to still provide a deeper understanding, it was decided to use the PESTLE framework. Furthermore, the answers of the interviewed respondents will shape the basis for considering strengths, weaknesses, opportunities and threats in an explorative way. The chosen categories of the coding scheme that will guide the data analysis are shown in table 5.



Table 5. Codes and subcodes

| Code category  | Subcodes   |
|--|--|
| Regulatory / Authority                                 | <ul style="list-style-type: none"> <li>- Command- and control regulation</li> <li>- Self-regulation</li> <li>- Standard setting and delegated regulation</li> <li>- Advisory committees and consultations</li> </ul> |
| Economic / Treasure                                    | <ul style="list-style-type: none"> <li>- Grants and loans</li> <li>- User charges</li> <li>- Taxes and expenditures</li> <li>- Interest group creation and funding</li> </ul>  |
| Soft instruments / Nodality –<br>One-way communication | <ul style="list-style-type: none"> <li>- Information collection or release</li> <li>- Advice and exhortation</li> <li>- Advertising</li> </ul>   |
| Soft instruments / Nodality –<br>Two-way communication | <ul style="list-style-type: none"> <li>- Information collection and release</li> <li>- Commissions and inquiries</li> </ul>  |
| Organisation –<br>Internal / external organisation     | <ul style="list-style-type: none"> <li>- Use of family, community and voluntary organisations</li> <li>- Market creation</li> </ul>  |
| Organisation –<br>Infrastructure                       | <ul style="list-style-type: none"> <li>- Direct provisioning of goods and services</li> <li>- Public enterprises</li> </ul>  |
| Indirect   | <ul style="list-style-type: none"> <li>- Indirect measures</li> </ul>  |
| Strengths  | <ul style="list-style-type: none"> <li>- Political</li> <li>- Economical</li> <li>- Socio-cultural</li> <li>- Technological</li> <li>- Legal</li> <li>- Environmental</li> </ul>                                     |
| Weaknesses   |  |
| Opportunities  |  |
| Threats  |  |

### 3.4 Reliability, validity and ethical considerations of the research

#### 3.4.1 Reliability

According to van Thiel (2014), “A measurement instrument is reliable if – under similar conditions – it shows the same results every time it is used (repeatability)” (p.185). This reliability will be harder to achieve for social research since people serve as sources of information and/or units of study. To increase reliability, replication must be assured by documenting the steps taken in detail so that this procedure can be repeated in the future. Each interview was recorded and transcribed, except for the Ministry of Infrastructure and Water Management interview. Additionally, the same topic list was used and explained carefully to the respondents for each interview to ensure the same interpretation of the questions. This topic list will be shared so the interviews can be repeated the same way if necessary. An essential comment is the interpretation of the SWOT analysis. This analysis relies upon the respondents’ opinions on what they think about the organisations’ performance and the researcher’s interpretation when coding the interview.

### **3.4.2 Validity**

Validity can be separated into internal and external validity. Internal validity focuses on the question of how the intended data is measured. For qualitative research, this can be arranged by gathering data using multiple sources of information, which is also known as triangulation. This research combines academic literature with policy documents and interviews and uses the same coding to ensure a correct understanding of the data.

External validity describes the generalisation of results in a broader context for other people, institutions and situations (Van Thiel, 2014). This is more difficult to organise when performing qualitative research because the context can differ. Part of the generalizability issue is overcome by choosing municipalities within the same high-rise class (percentage of high-rise buildings in the municipality) and comparable progress regarding the VANG objectives.

### **3.4.3 Ethical considerations**

To take the moral principles of research into account, the ethical principles mentioned by Van Thiel (2014) and Bryman (2012) must be applied. These principles are beneficence, minimising the risk of harm to participants and making sure they are not exploited; and obtaining informed consent by providing enough information so the selected respondent can decide whether to participate. Furthermore, the research protects privacy by asking if the person wants to be named or to remain anonymous; stays veracious by avoiding deception, and assure confidentiality of information. Part of the ethical considerations can be managed by having respondents fill out an informed consent form about the process and the research. This will reduce the risk of adapting answers, yielding socially desirable answers or withholding information from respondents (Van Thiel, 2014).



## Chapter 4 VANG Program

This chapter seeks to understand the vision of the VANG objectives regarding waste prevention. It attempts to answer the question: What is the vision of the VANG objectives regarding waste prevention? This chapter will not cover all the measures provided within the VANG program but only the ones that are related to the municipalities and their authority.

### 4.1 The establishment of the current VANG program

Different multi-scalar decisions have been made in the prelude to forming the VANG program and waste prevention strategies. An essential measure of waste prevention was Article 10.4 of the Environmental Management Act (*Wet Milieubeheer*) in 1973. The article established the waste hierarchy which indicates the order of priority in waste management for national, provincial and local governments, with prevention as the highest priority (NVRD, n.d.-a).

Since the beginning of this century, EU member states have been obligated to form a National Waste Management Plan (*Landelijk Afvalbeheer Plan: LAP*), which establishes objectives to prevent waste, or when this is not possible, to process waste. Following the Environmental Management Act, this plan must be revised every six years in the Netherlands (Kraakman, 2016). The first LAP was implemented in 2003. However, pre-LAP programs implied specific changes, such as shifting the waste from landfill to incineration and the separate collection of glass, paper and, in some cases, organic waste from households (Bergsma et al., 2014). LAP1 and LAP2 were guiding factors to improve these practices.

Another influential decision was made in 2008 when the EU implemented the Waste Framework Directive with the following goal:

To protect the environment and human health by preventing or reducing the negative impacts of waste generation and management, by reducing the overall impacts of resource use and by improving the efficiency of such use, which is crucial for the transition to a circular economy and for ensuring the long-term competitiveness of the Union. (EU, 2008, article 1)

The key term of this directive was the end-of-waste criteria meaning that waste material is no longer referred to as waste but takes the status of a product or secondary raw material when it has undergone a recovery procedure such as recycling or when it complies with the criteria of article 6.1 and 6.2:

The substance or object is commonly used for specific purposes;  
There is an existing market or demand for the substance or object;  
The use is lawful (substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products);  
The use will not lead to overall adverse environmental or human health impacts. (EU, 2008, article 6.1 & 6.2)

This directive influenced the movement towards a circular economy in the Netherlands. In 2013, the national government initiated the Green Growth Strategy, which led to significant challenges and opportunities within eight domains to achieve an economy without waste, where the performance is dependent on reusable raw materials (VANG-HHA, 2014). To realise these ambitions, the following stakeholders created the VANG program: the council of ministers and the Public Framework the Infrastructure and Water Management, the Department of Waterways and Public Works, the Association of Dutch Municipalities (VNG) and the Royal Association for Waste and Cleaning Management.

## **4.2 The composition of the VANG program**

### **4.2.1 Lines of action**

The operational goals within the VANG program are executed within the structure of the Public Framework and consist of four lines of action covering prevention, waste separation and recycling due in the year 2025.

1. “Municipalities formulate ambitious targets for waste prevention, waste separation, reduction of household residual waste, recycling of household waste, commit to this and are motivated to work on this” (VANG-HHA, 2014, p.14).

The implementation program of VANG guides municipalities to formulate and implement new ambitious household waste policies, which is complemented with guidelines for the amount of residual waste for municipalities within the same high-rise class. Additionally, their performance is made visible to everyone on the benchmark website of VANG, and well-performing municipalities or innovative practices are provided public attention.

2. “Municipalities are able to work towards their own policy objectives and have the necessary knowledge, skills and tools” (VANG-HHA, 2014, p.15).

The program also emphasises knowledge-sharing in various forms. The VANG program provides access to knowledge via its database, benchmarking, a digital knowledge guide and a knowledge platform. This is supplemented with workshops, connections with experts from similar municipalities and an introduction to specialised organisations and consultancies to promote knowledge exchange. Furthermore, a form of financial support is being developed, which mainly applies to general funds for research and advice which serve as instruments for municipalities (R3 & R4, Interview, 2021).

3. “Residents are motivated to contribute to waste prevention and waste separation” (VANG-HHA, 2014, p.15).

The national parties involved will examine the usefulness and feasibility of new national communication regarding waste prevention or separation and the possible effort of municipalities in this effort. Moreover, there will be greater use of behavioural knowledge in existing national campaigns and waste education. Nevertheless, national information provision about waste separation is more difficult because of municipalities’ many different collection methods.

4. “Stakeholders such as producers, retailers, consumers, residents, recycling companies and (other) governments cooperate to close certain chains” (VANG-HHA, 2014, p.15). Problematic chains intertwined with household waste will be identified and analysed to create an approach for those chains to achieve chain closure. Experiences from other chains are used so that lessons learned can be drawn. Collaboration between different parties is required because of their dependence. This is also mentioned in the interview with Teernstra (translated):

The idea is to work more closely with all kinds of organisations such as Milieu Centraal, who also play an active role in communicating with residents. We have collaborated extensively with processors to ensure that there is less pollution in the waste stream. Such as the association of waste companies but also processors themselves to see how we can ensure that municipalities and processors work together. We want to apply such a model for prevention projects and use relevant chains to highlight a specific topic. So you have more power to also correct. (R1, Interview, 2021)

### **4.2.2 Focus points of the program**

The national government’s vision regarding the VANG objectives is to inform, facilitate and stimulate the necessary involved parties in the chain. The most important subjects are explained in depth to provide a better understanding.

### *Waste prevention*

Waste prevention relates to various activities at different places in the chain. It comprises strict avoidance of waste generation; qualitative and quantitative reduction at the source, which means that higher quality items do not end up in the waste stream and reducing the number of items; and reuse of products (Zorpas & Lasaridi, 2013). According to the NVRD, this chain consists of the following phases: “production (design, manufacture, transport, distribution), consumption (purchase, use and reuse) and disposal (separate collection, recycling, recovery and disposal)” (n.d.-b).

Following the waste hierarchy, prevention has the highest priority and contributes to the realisation of the set target. It is viewed as more persistent than recycling (R3, Interview, 2021). This is incorporated in all LAPs and the national Waste Prevention program, to which the VANG program is linked as much as possible. A point of criticism that stakeholders and Teernstra (R1, Interview, 2021) mention in evaluating LAP1 and LAP2 is that these plans have made little contribution to the stimulation of prevention and product reuse in past years (Bergsma et al., 2014). According to Weenk and van Dael (R3, Interview, 2021), prevention is mainly quantitative and, therefore, weakly incorporated in the VANG goals. The program stipulates a reduction of 20 percent from an average of 500 kilograms of waste, which means a reduction of 100 kilograms. However, it has several drawbacks, making it challenging to achieve the target. First, it is difficult to define and thus measure prevention, and with the economic growth of recent years, the average and starting point of the reduction, 500 kilograms, fluctuates (R3, Interview, 2021; Zorpas & Lasaridi, 2013). According to Van Dael (R3, Interview, 2021), it is, therefore, more useful to work with percentage targets than an actual number. Second, the instruments that municipalities can work with are limited and have a limited impact, according to Teernstra (R1, Interview, 2021). This could be a reason why there is less attention given to prevention and more to recycling, which will be elaborated on in the following chapters of the research.

Teernstra and Goorhuis (R1 & R4, Interview, 2021) state that this attention will be increased in the upcoming VANG program. The current program ran until last year, 2020. However, with the formation of the new government and state secretary, the implementing organisations of the national government are now working on a continuation of the program. More information cannot be provided because it has yet to be approved by the steering committee.

### *Waste separation*

The program emphasises the separation of household waste as a form of waste management. For 2020, the goal was 75 percent waste separation and 100 kg of residual household waste. The next goal for 2025 is 90 percent separation and 90 kg of residual waste. Municipalities have been designated as the central stakeholder when achieving more source and post-separation of fine household and bulky household waste (VANG-HHA, 2014).

### *Post-separation technology and eco-design*

Most municipalities have collection schemes at the curbside, although there is an increased interest in the post-separation technology of household waste, which municipalities plan to further explore. It is intriguing from an environmental point of view because, in some instances, it can lead to a higher yield of raw materials – mainly plastics – subtracted from household waste (VANG-HHA, 2014). This technology can also be beneficial from a financial perspective because home separation of plastic waste is expensive due to the separate collection infrastructure, low-density volumes and storage (Dijkgraaf & Gradus, 2020). The improvement of this technology will not be part of the action program of VANG; however, it will influence the outcome of the set goals (VANG-HHA, 2014). The same applies for eco-design developments. They will not be part of the action program because they will not directly improve waste separation or prevention, but they indirectly contribute to the set goals.

## Chapter 5 Governmental instruments

This chapter describes the roles of the government regarding waste management and analyses the possible tools offered by the national government and the executing organisations. It attempts to answer the question: What are the national and local government roles regarding waste prevention and what tools are offered by the national government and executing organisations to achieve this goal?

### 5.1 Roles of governments

#### 5.1.1 National government and executing organisations

The Ministry of Infrastructure and Water Management (I&W) formulates policy, regulations and programs, such as VANG, regarding the waste target set by the EU. Rijkswaterstaat (RWS) is the executive party of the government and the facilitating and motivating party for municipalities. Thereby, RWS forms an intermediate party that advises both national and local governments. Their activities regarding waste management contain the execution of the LAP and the VANG program and creation of cooperation between relevant stakeholders, such as the association of waste companies and waste processors (R1, Interview, 2021). The Royal Association for Waste and Cleaning Management (NVRD) is also an executing party for the VANG program and serves as the branch organisation for waste collectors to represent their interests (R3 & R4, Interview, 2021). Furthermore, they facilitate and provide knowledge and research to municipalities. The last relevant organisation is the VNG, which is not a direct executive party but an umbrella organisation representing Dutch municipalities' interests. It has a lobbying role and, therefore, enters discussions with the ministry about national regulations.

#### 5.1.2 Municipalities

Although the national government has set the VANG objectives, the law views the municipality as the primarily responsible stakeholder for cleaning up, collecting and processing household waste (R4, Interview, 2021). Municipalities implement their waste policy according to the waste hierarchy, which means acting first on prevention. Different actors within a municipality and its area are actively involved in determining the direction of this goal. These actors include administrators, policymakers, producers, waste companies, waste processors and, above all, residents (VANG-HHA, 2014).

Municipalities' roles consist of informing, facilitating and motivating their residents to change behaviour (R2, Interview, 2021). VANG offers a step-by-step plan that helps develop and implement behavioural change to stimulate waste separation in the home and outdoor areas (D&B, 2016). This plan is based on Poiesz's Triad Model (1999), and according to Weenk (R2, Interview, 2021), this can also be used for waste prevention measures. The Triad model distinguishes three preconditions for desired behaviour, namely, motivation, capacity and opportunity. All three determinants should be present to enable behavioural change (Bogaerts & Poiesz, 2007).

##### *Motivation*

Motivation is divided into two types, intrinsic and extrinsic motivation. Intrinsic arises from factors that originate within the person, such as desires, while extrinsic are factors outside the person, such as a reward (Bogaerts & Poiesz, 2007). Municipalities can respond by creating motivation for specific behaviour.

##### *Capacity*

Capacity involves personal skills and knowledge but also the availability and applicability of resources. People need to understand how to act in the desired behaviour and must have necessary knowledge (D&B, 2016).

##### *Opportunity*

People must have sufficient opportunities to prevent household waste and not be hindered by circumstances from outside or personal situations. Opportunities can be in the form of time and space but also in guidance from the municipalities (D&B, 2016).

With this in mind, instruments can be developed with waste prevention as a result. The instruments that the national government provide are explained below, and the instruments that the municipalities create are explained in chapter 6.

## **5.2 The tools for municipalities provided by the national government**

Municipalities are the first to be approached to develop instruments that influence the prevention behaviour of their residents, but national governments can also help by providing specific instruments. Weenk (R2, Interview, 2021) stated that the national government wants municipalities to act a certain way for waste prevention or waste separation. The Triad Model of Poiesz (1999) should also be applied to municipalities to change their behaviour into preventing waste. Therefore, national governments provide different tools that influence the waste management of municipalities. Furthermore, the national government also provides instruments to involved parties, such as producers, leading to more waste prevention, separation and closing material chains (VANG-HHA, 2014).

### **5.2.1 Regulatory instruments**

The interviewed organisations did not mention any instruments such as laws or regulations that serve as obligatory boundaries to assure prevention practices of municipalities. This is also not mentioned in any Dutch waste reports. Therefore, it can be concluded that the national government does not use regulatory instruments for waste prevention.

### **5.2.2 Economic instruments**

The national Waste Prevention program specifies different economic instruments to provide incentives for various stakeholders. The ones that can be applied to municipalities are as follows:

1. “Charges and restrictions on landfill and incineration of waste to encourage waste prevention and recycling, with landfilling remaining the least beneficial option for waste management” (Rijksoverheid, 2021, p.24).

Landfilling and waste incineration within municipalities are discouraged through waste taxes. Since 2015, State Secretary Eric Wiebes of Finance and Wilma Mansveld, State Secretary for Infrastructure and the Environment, have indicated that taxes will be levied on landfilling waste and waste incineration as part of the VANG policy (Trouw, 2014). The rate was set at 13.21 euros per tonne for landfill and incineration, including a landfill ban for combustible waste. According to Weenk (R2, Interview, 2021), waste incineration eventually became cheaper than organic waste processing due to the vacancy of incinerators. Therefore, to correct this market failure and as an incentive to incinerate less waste, it was decided to increase incineration costs to the current amount of 33.51 euros in 2021 (NVRD, 2021).

2. “Economic incentives for regional and local authorities, in particular, to promote waste prevention and impose stricter separate collection schemes, while avoiding landfill and incineration” (Rijksoverheid, 2021, p.24)

This relates to the waste collection charges in their totality. Municipalities are motivated to keep prices low because they are passed on to residents or paid from internal funding (R10, Interview, 2021).

3. “Thorough planning of investments in waste management infrastructure, including through Union funds” (Rijksoverheid, 2021, p.24)

Union funds are resources from the EU that can support countries through subsidies in their investments in waste management plans and necessary infrastructure. This applies indirectly to municipalities when the Netherlands applies for this funding (R10, Interview, 2021).

An economic instrument that indirectly influences municipalities is the deposit on PET bottles. Currently, there is a deposit of 25 cents on PET bottles larger than one litre. In July 2021, this will be



expanded with a deposit of 15 cents on PET bottles smaller than one litre (Rijksoverheid, 2020). The goal is to reduce plastic litter in the environment. Van Dael and Weenk (R2 & R3, Interview, 2021) also mentioned that this instrument could be stated as a prevention measure that affects the waste stream of the municipalities because it will not end up in the plastic, metals, drinking cartons (PMD) stream.

Another economic instrument that indirectly influences municipalities is the extended producer responsibility, which means producers become responsible for the entire cycle of their products. Hence, responsibility includes not only production but also the collection and recycling of products (Rijkswaterstaat, 2020; van Raak et al., 2014). The VNG is part of the negotiations and attempts to influence the regulations to be attractive to the municipality (R5, Interview, 2021). The instrument serves as an economic incentive by incorporating external costs that affect profit-making and, hopefully, stimulate producers to design products that are more recyclable or prevent waste because they will also bear the costs for the waste phase. This preferred outcome is highly dependent on the implementation. It can be in the form of a legal obligation to organise reuse and recycling themselves, or in a financial form where producers pay for the waste disposal of municipalities (Raak et al., 2014). For municipalities, this primarily affects the waste streams of electrical and electronic appliances and packaging.

Van Dael mentioned that this could be further extended.

In fact, you should say that if the residual waste consists of 20 percent packaging, then the producers also have to pay the incineration costs of that waste because then you are also responsible for the final processing and not only for what is collected separately. (R3, Interview, 2021)

Weenk (R2, Interview, 2021) also mentioned an expansion planned for July 2021, a producer responsibility for single-use plastics (the EU guideline SUP). The guideline is based on the 10 plastic products most commonly found on European beaches (Ministerie van Algemene Zaken, 2021). Some items will be banned, such as plastic cutlery and straws; some will be marked using an icon of a turtle; and some product groups will be subject to extended producer responsibility. The turtle icon will be used to identify whether a product contains plastics and makes consumers aware of it to possibly adjust their actions. This makes producers responsible for the waste of some of their products. These concerns include light plastic bags, drink and food packaging, drinking cups, tobacco products (with filters), wet wipes and fishing gear. Producers must assume responsibility of the collection, transport and processing of those plastic products and also promote consumer awareness (R2, Interview, 2021). The incentive here is market competition. A producer can choose to increase the price of the product to cover the increased external costs. However, a competitive producer that chooses to make its product more sustainable has a competitive advantage (R2, Interview, 2021). Hence, the market forces will hopefully influence the change in materials, which will benefit municipal waste streams.

### **5.2.3 Soft instruments**

#### *One-way communication*

According to the Ministry of I&W, effective communication is essential to raise public and community awareness about prevention and recycling (Rijkswaterstaat, 2020). This is mainly done through “public information campaigns, particularly on separate collection, waste management and litter reduction, and to make these issues an integral part of education and training” (Rijksoverheid, 2021 p.24).

There is also a form of one-way communication towards municipalities by providing information about waste systems, residents’ behavioural influence and former inquiries in the form of factsheets and reports (R4, Interview, 2021). These can all be found in the databank of VANG-HHA. Another way to urge municipalities to do more for waste prevention is to use naming and shaming. Every year, a map of the Netherlands is published that indicates which municipalities have or have not achieved

the objectives. In response, the executing organisations of the national government contact the municipalities to discuss points for improvement to motivate them. Naming is done by sharing success stories on the website of VANG (R2, Interview, 2021).

#### *Two-way communication*

The government promotes an ongoing dialogue with all stakeholders, including the public's engagement, to provide feedback on collection methods, financial savings and environmental quality (Rijkswaterstaat, 2021). The dialogue with municipalities is mainly conducted through courses, VANG support and the benchmark.

A budget has been made available from the ministry so that municipalities can register for courses, conferences and symposiums. For example, a seminar on behavioural influence demonstrates that a municipality should inform by utilizing a waste calendar and urging residents to perform the proper behaviour (R3, Interview, 2021). RWS also assists in establishing circular upcycle centres in the form of advice at the municipal level and at conferences (R1, Interview, 2021).

Another two-way communication tool is VANG support, which is developed within the VANG program. It is created as a short-term advice process that municipalities can use when they have a question, need advice on a policy plan or prepare a council proposal. An advisor within VANG can spend 32 hours on that question at the expense of the VANG program (R4, Interview, 2021). Several JMA advisors are also equipped to perform VANG support. Another tool is to bring the same high-rise class municipalities into contact to share knowledge.

As part of the VANG program, the NVRD and Rijkswaterstaat initiated an advanced waste tracking and monitoring system to support the enforcement of the goal targets. Everyone can view this on the comparison tool, which provides insight into the performance of the VANG objectives, as well as the method of waste collection and the collection frequency for every high-rise class. Moreover, municipalities can apply for benchmarking based on more detailed elements of waste management performance, such as environment, costs, services and skills (NVRD et al., 2018). These elements are predominant because of their interdependence and their controllability. The purpose of the benchmark is to provide insight into the own functioning and functioning of others in the field of policy strategies, such as pricing or acceptance, and operations, including the choice of the collection method. Furthermore, it can offer tools for improvement and support for enforcement. Prior to the benchmark are four meetings, two of which are work meetings where selected topics are discussed among the present municipalities. This is a guided way to learn and develop new ideas (R4, Interview, 2021).

#### **5.2.4 Organisational instruments**

The interviewed organisations have not mentioned any organisational instruments that influence policymaking or actions of the government. Furthermore, they do not provide any infrastructural instruments within municipalities. This means that this set of instruments is not utilised.

## Chapter 6      Municipal waste strategies and prevention instruments

The following chapters will elaborate on the variables of the research. Chapter 6 discusses the independent variables, the instruments, and chapter 7 discusses the dependent variables, namely the SWOT analysis. This chapter examines the instruments the municipalities utilise to achieve waste prevention by looking at their historical and current actions and categorising them in the selected instrument framework. It attempts to answer the following question: Which policy instruments and tools are proposed in municipalities a,b,c,d regarding waste prevention?

### 6.1      Vught

#### 6.1.1 General information

Vught is a municipality of 60.3 square kilometres located in the province North Brabant. It consists of the districts of Vught, South-Vught and Cromvoirt and, since 2021, Helvoirt. The municipality grew as a result of the new district to 31,697 inhabitants (Gemeente Vught, 2021). The municipality has 13,256 waste connections and 77 percent is low-rise and 23 percent high-rise, meaning this municipality is a C class (R6, Interview, 2021). About 60 percent of the population of Vught lives in highly or moderately urban areas.

#### 6.1.2 Current waste strategy

*VANG data, 2019*

Compared to other C municipalities in the Netherlands, Vught scores above average. The total waste numbers were still slowly decreasing to 373.8 kilograms in 2019. Besides this low quantity, the residual waste numbers (including large waste) are outstanding with 100 kg in 2019, which compares to the 175 kg average of a C municipality. The separation percentage is 73 percent, compared to the 68 percent average. Vught has achieved the national target of 100 kilograms and set a municipal target of 75 kilograms, but that was not achieved due to COVID-19. As a result of the virus, people have worked more from home, and waste usually discarded in the office is now disposed of at home (R6, Interview, 2021).

#### *Current waste system*

The current waste system of Vught is performed chiefly with the old-fashioned wheelie bin for the following waste streams: residual waste, organic waste, paper and cardboard. Plastic, metal and drinking cartons are collected via the Plastic Hero bag at the municipality, and glass is also collected at home in a designated crate. However, a PAYT system has applied to residual waste in volume and frequency since 2002. For each emptying of the container, a chip is scanned in the residual waste container. This data is registered at the municipality and the waste materials service Brabant Water, after which they send invoices to the residents. The residual waste container is emptied every four weeks and the other waste streams every two weeks. There is a fixed rate based on a single household, 170.64 euros, or non-single household, 266.29 euros, combined with the differentiation rate per litre, depending on how often the container is offered at the street. For a 40-litre container, the rate is 4.30 euros. For 140 litres, it is 9.85 euros, and for 240 litres, it is 15.85 euros (Gemeente Vught, n.d.-a).

Vught now has two recycling centres: one in Vught itself and the other in the village of Haaren. As stated previously, the municipality of Haaren split into two parts, one of which went to Oisterwijk and the other to Vught. Vught's residents are allowed to use the recycling centre in the village of Haaren, meant as a service for the residents of Helvoirt, because the location in Vught is almost at its maximum capacity. Some waste streams can be disposed of for free, and others cost 15 cents per kilo, shown in table 6 below.



Table 6. Division of waste disposal at the Vught recycling centre (Gemeente Vught, n.d.-b)

| Free                                 | Paid                              |
|--------------------------------------|-----------------------------------|
| Asbestos                             | Car and motorcycle tires          |
| Leaves                               | Impregnated garden timber         |
| Cans                                 | Carpeting, pillows and curtains   |
| Electrical and electronic appliances | Construction and demolition waste |
| Frying fat                           | Roofing felt                      |
| Glass                                | Gas bottles                       |
| Textiles (only clothes and shoes)    | Plaster                           |
| Small hazardous waste (batteries)    | Turf / Grass                      |
| Plastic                              | Large household waste             |
| Diapers and incontinence material    | Soil                              |
| Metal                                | Wood (A,B,C)                      |
| Paper and cardboard                  | Hard plastic                      |
| Prunings                             | Mattresses                        |
| Tempex (styrofoam)                   | Debris                            |

### 6.1.3 Instruments

#### *Regulatory instruments*

The respondent (R6, Interview, 2021) indicated policies that enforce the residents to prevent waste are absent. This means regulatory instruments that assure the prevention of waste are lacking at this municipality.

#### *Economic instruments*

An economical instrument of the municipality is a user charge in using a PAYT Volume & Frequency system. This system provides an incentive for improved separation behaviour or even waste prevention. Another instrument is the increased waste incineration tax for residual waste. This influenced the fixed rate based on the recyclables stream instead of the differentiated rate based on the residual waste stream. The desired result of the measure can therefore be questioned.

#### *Soft instruments*

The municipality currently works only with a one-way communication platform, namely the municipality's website. Articles often are posted on how to best separate waste and sometimes about preventing food leftovers because 34 kilograms of food per inhabitant per year is discarded. Changes in waste policy are communicated by letter, the Klaverblad local newspaper and social media. However, more information on waste prevention has not been released.

In 2017, Vught organised a 100-100-100 challenge in which 100 households attempt to be 100 percent waste-free for 100 days. This serves as a two-way communication instrument that creates a community to share tips and perform weekly assignments. The respondent (R6, Interview, 2021) addressed its success and creation of awareness. Due to the community aspect, it can also be categorised as an organisational instrument. Because the measure occurred in 2017, the effect is no longer valid.

### *Organisational instruments*

The last instruments are the recycle centre, the secondhand store Vincentius and the repair shop, promoting reuse. These serve as infrastructural instruments because they are placed in the environment of the municipality. Moreover, the last two also serve as an organisational instrument because it is a voluntary organisation in which all income is donated to charity (R6, Interview, 2021).

## **6.2 Heerenveen**

### **6.2.1 General information**

Heerenveen is a municipality in the province of Friesland that consists of the following districts: Boarnsterhim, Skarsterlân, North Heerenveen, Jubbega, Hoorsterzwaag, Heerenveen and Oranjewoud. It counted 50,493 inhabitants at the start of 2020 and has about 22,000 waste connections (CBS, 2021). Furthermore, the municipality is a C class.

### **6.2.2 Current waste strategy**

#### *VANG data, 2019*

Heerenveen scores above average regarding the VANG objectives about residual household waste and the waste separation percentage. The residual waste, including bulky household waste, was 113 / 121.4 kilograms per inhabitant compared to 175 kilograms per inhabitant in 2019. This is a low number since the residual waste of Heerenveen includes PMD, which is separated after the waste collection process. The separation percentage was 80 compared to 68 in 2019. However, the average number of kilograms of organic waste and paper is higher, namely 131 kilograms of organic waste per inhabitant, compared to 111 kilograms. Paper and cardboard consistent of 68 kilograms per inhabitant, compared to 58 kilograms (NVRD et al., n.d.). The reason for this is not directly more waste, but Heerenveen can also aim at improved separation. Therefore, the weight of the recyclable waste streams is higher. Additionally, the total amount of waste per inhabitant (561.2 kilograms) has been slightly stagnating in recent years.

#### *Current waste system*

The current waste system of the municipality of Heerenveen has a history, starting with the year 2000. PAYT Volume & Frequency was introduced that year, jointly with the neighbouring municipalities of Oostellingwerf and Opsterland. Since 2002, there has been a post-separation plant in Friesland managed by Omrin<sup>2</sup>, removing improperly separated organic waste, such as kitchen waste and garden waste, from the residual container. This was fermented and converted into green gas. Furthermore, the sand, minerals and pebbles are shaken out, which is used in road construction, and metal was removed by using a magnet. In 2009, the national Plastic Hero campaign started, whereby the Dutch also had to collect plastic separately. Omrin decided to convert the post-separation plant so that plastic and drink cartons could also be removed from the residual waste and did not have to be collected separately by the residents of Friesland. In 2017, an attempt was made to reduce the collection frequency of residual waste, hoping that this would lead to improved organic waste separation. It changed from every two weeks to every three weeks. Unfortunately, the organic waste separation did not increase substantially, and the residual waste containers became overfilled with the result of blown-away garbage and nuisance from birds. Therefore, it was reversed a year later. Hoogland (R7, Interview, 2021) did indicate that it has remained on the agenda because of the cost savings. However, because of COVID-19 this year and people producing more waste at home and probably continuing to work more from home, she decided not to implement it again. Additionally, PAYT Weight & Frequency was introduced in 2017, jointly with the municipality of Oostellingwerf, which led to the current waste strategy (ibid.).

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<sup>2</sup> Omrin is a circular processor of household waste for Friesland, North Groningen and the North Veluwe region.

In Heerenveen, a low-rise household has three wheelie bins for residual waste, organic waste and paper and cardboard. The fixed rate is 173 euros per household, with the differentiation rate of 1 euro call-out charges and 0.35 cents per kilo of residual waste (Wielinga, 2021). The fixed rate is the same for a high-rise household, but it has a joint underground container that is paid per waste bag and therefore by volume, which costs 2.05 euros. Organic waste and paper are collected for free. Other waste streams, such as glass and textiles, are collected for free at containers near supermarkets, at the recycling centre or twice per year at home.

PAYT Weight & Frequency and the post-separation plant have resulted in a high separation rate. Because all other waste streams are free of charge, it creates an incentive to separate waste as best as possible because it leads to lower costs. The separation plant can be adjusted to different degrees using infrared techniques. Therefore, the plastic that the plant will separate is very clean and has no chance to be rejected and burned at the incineration plant.

As mentioned previously, Heerenveen has a recycling centre which is intended for residents from the municipalities of Heerenveen, Harlingen, Leeuwarden, Opsterland, Ooststellingwerf and Waadhoeke (Omrin, n.d.-b). All recyclable waste streams are free of charge for residents of Heerenveen, except for bulky household waste, construction and demolition waste and car tires. For bulky household waste and construction and demolition waste, a cost calculation by car applies, where a passenger car is 9.00 euros and a car tire is 5.00 euros apiece. For the other places, the rates as stated in the relevant municipality apply. Hoogland (R7, Interview, 2021) explained that the municipality works with these prices because these waste streams are burned at the incineration plants and apply to the VANG objectives. This creates an incentive for residents to hand in separated streams that can be recycled better.

### **6.2.3 Instruments**

#### *Regulatory instruments*

Hoogland stated the following (translated):

From a legal point of view, the municipality has a duty of care for household waste and that duty of care, which consists of responsible collection and processing, has no prevention component. In principle, an inhabitant may produce as much waste as they wish and the municipality must ensure that it is disposed. So, there is actually no legal basis in the municipality to do prevention (R7, Interview, 2021).

#### *Economic instruments*

PAYT Weight & Frequency was implemented as an incentive improved from PAYT Volume & Frequency. According to Hoogland (R7, Interview, 2021), the latter leads to cramming waste into the container because that ensures lower costs for the household, but it does not target prevention. Furthermore, the national target is also measured by weight, and all other costs that a person pays for have a PAYT system, such as gas, electricity, water, groceries and a call bundle. Therefore, Heerenveen saw it as a logical step to implement the current system. This system combined with the rates at the recycling centre is identified as an economic incentive to ensure the prevention of waste.

When using a PAYT system, it is logical for a municipality to implement a deviant regulation for diapers because this will lead to more costs due to high volume or high weight. Most municipalities arrange an additional waste collection strategy which causes all residents to pay indirectly. Hoogland indicated that this conflicts with the principle of 'the polluter pays'. Heerenveen has decided not to implement this because there is a sustainable alternative, namely washable diapers. The residents who choose to use disposable material pay in advance for the product and afterwards for the disposal. This is not the case with incontinence material because there is no sustainable alternative yet, and nothing can be done about it. The same applies to colostomy bags and dialysis waste.

Another economic instrument is the increased incineration tax, an instrument passed on to the residents of the municipalities via the fixed and PAYT waste rate. Hoogland views this as a perverse

but effective stimulus, which will be further explained in chapter 7. It increases the costs and has to be calculated for the residents because the waste budget is closed.

#### *Soft instruments*

The municipality of Heerenveen has multiple one-way communication instruments mainly related to information release. On May 4, a news article was released regarding the VANG targets, complimenting the residents about the almost achieved 100-kilogram target this year and last year. This way of communication positively motivates the residents to continue this behaviour (Gemeente Heerenveen, 2021).

Another one-way communication instrument is the Omrin waste app. This app has several features: a reminder when waste is collected, the waste calendar, a registration option for the recycling centre, a separation index, valuable tips, and the option to view the amount of waste offered each time (Omrin, n.d.-a). The app has a campaign with celebrities from the Netherlands, who are originally from Friesland, to promote healthy waste behaviour and to share tips. Furthermore, it shows the per-household amount of waste offered every two weeks, so residents have a short feedback loop and are hopefully inspired or motivated to further reduce their residual waste.

The benchmark is a two-way communication instrument for most municipalities because they can collect and share knowledge about their process and learn from each other. However, Hoogland stated that during these gatherings, she observes that Heerenveen is doing well as a municipality. Therefore, she is only releasing her knowledge instead of collecting it, and this can be stated as a one-way communication instrument focusing on other municipalities instead of residents.

Washable diapers were previously mentioned as an economic instrument. They also serve as a two-way communication instrument due to the pilot that Heerenveen has executed twice in collaboration with Kaatje Katoen. The first pilot was with 30 families and a trial period of eight weeks. The families received a package worth 700 euros for a small contribution containing washable diapers, washable wipes, a diaper bucket and a washing net (Heerenveense Courant, 2019). Eight thousand disposable diapers were saved within eight weeks. According to Hoogland, all families have continued using them. The second time, there were fewer participants because their contribution was slightly higher, and almost all participants continued.

Heerenveen also has a litter program called *schoon beloont* (clean rewards), which is part of the greener one by one program. Every organisation, foundation or school can adopt one or more school sites in the area. The groups receive 750 euros per year, and in return, they must voluntarily organise a cleanup action at least once a month and have the assignment to share this information in a newsletter, on their website or via social media. Aside from the benefit of a clean area, it also has an educational purpose, serving as a one-way communication instrument, leading to more waste awareness.

#### *Organisational instruments*

The organisation instruments used by the municipality of Heerenveen are mainly in the category of infrastructural instruments. PAYT Weight & Frequency was previously mentioned as an economic instrument. This instrument should also be arranged in the environment to achieve the desired result. During the introduction of PAYT Weight & Frequency, the collection vehicles had to be converted to weigh the container and register the chip. The containers are weighed twice before and after they are emptied. Therefore, the net weight of the residual container is charged.

Heerenveen has multiple independent secondhand stores with no municipal involvement, which serve as an infrastructural instrument. Hoogland stated that they exist mainly because of market demand (R7, Interview, 2021). Moreover, the city of Heerenveen has had a repair shop since 2013. It is open twice a month and staffed by volunteers. The volunteers repair household appliances (with a maximum size of an oven), toys, utensils except telephones, computers, bicycles and clothing. There are no costs associated with the repairs that they execute and the advice they give. New materials, such as cables, plugs and fuses, must be paid for by visitors of the repair shop (Repair Cafe

Heerenveen, n.d.). The shop states that 80 percent of the products brought in are repaired, which contributes to waste prevention.

An organisational instrument is the shareholding of Heerenveen with the waste processor Omrin. Thus, when Omrin makes a profit, the municipality will receive part of the dividend, which can be invested in the residents' benefit.

## **6.3 Hengelo**

### **6.3.1 General information**

Hengelo is a municipality in the province of Overijssel which had 81,140 inhabitants in 2020 (CBS, 2021). It consists of the following districts: Slangenbeek, Hasseler Es, Woolde, Hengelose Es, Noord, Binnenstad, Groot Driene, Wilderinkshoek, Berflo Es and the outer area. The municipality has 38,000 waste connections, of which 10,000 are high-rise class, making it a class B municipality (R8, Interview, 2021).

### **6.3.2 Current waste strategy**

*VANG data, 2019*

The municipality of Hengelo has an excellent VANG score compared to the other selected municipalities and others in high-rise class B. The residual waste, including bulky household waste, was 86 kilograms per inhabitant compared to the 185 kilograms per inhabitant average in high-rise class B in 2019 (NVRD et al., n.d.). Furthermore, the separation percentage was 80 compared to the national average of 62, which is high for Hengelo, considering it does not use a post-separation plant. The average number for organic waste is 95 kilograms per inhabitant compared to 87 kilograms, for paper and cardboard is 58 kilograms compared to 48 kilograms, and for PMD is 55 kilograms compared to 22 kilograms (however, approximately 50 per cent of the latter is rejected for recycling due to pollution of the waste stream). These high numbers could showcase show that the municipality produces more waste than average; however, due to the residual waste results and the decrease to an average of 440.5 kilograms per inhabitant in 2019 (Table 1), it is more likely that the separation process leads to higher recyclable streams (NVRD et al., n.d.). Together with all municipalities in Twente, Hengelo committed to only having 50 kilograms of residual waste by 2030.

#### *Current waste system*

According to Fikken (R8, Interview, 2021), the current waste system was created by four crucial actions in the past. First, Hengelo became a shareholder of its waste collection service, Twents Milieu, and waste processor, Twence, in 2005. Hence, Hengelo has a say in certain aspects of business operations, such as waste rates, a contribution to sustainability objectives, and an annual dividend that can be used to benefit its residents. A collective decision made separation at the source the starting point of the system. Fikken (translated) identified the following principle: "the separation occurs where the waste is created, so in principle at home" (R8, Interview, 2021). Second, in 2012, PAYT Volume & Frequency was introduced as a financial incentive to comply with the polluter pays principle. Third, to lower the service factor of the municipality, it started a reverse collection for residual waste in 2018. Last, the municipality conducts all types of experiments and research to examine whether it can influence its residents' behaviour in other ways regarding waste separation and prevention.

An example is Twence's current research into a post-separation plant and whether it can be profitable to reach a higher and cleaner PMD waste stream. Fikken (R8, Interview, 2021) states that a post-separation plant has its drawbacks. First, there is a much lower compensation by Nedvang<sup>3</sup>, which could lead to a higher waste tax for residents of the municipality. Furthermore, Fikken stated that a specific volume of PMD waste is required to make a post-separation plant profitable, which is more

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<sup>3</sup> Nedvang is an organisation responsible for collecting and processing packaging waste and plastic in thirteen municipalities in Twente.

than all municipalities in Twente collect. Therefore, municipalities from outside this area should also switch to post-separation.

A household in Hengelo pays a fixed rate of 179.50 euros and a differentiation rate for residual waste, which is 1.30 euros per opening of the underground container and is tracked with a pass. A political compromise during the introduction of PAYT allows residents to keep their container for residual waste, and 10 percent of the residents still use theirs. Hence, it is discouraged by high collection costs and a low collection frequency of once a month. For a 240-litre container, the cost is 24 euros a year plus 16.50 euros per waste collection, and for a 140-litre container, it is 24 euros a year plus 9.50 euros per waste collection (Gemeente Hengelo, 2021; R8, Interview, 2021). The collection of organic waste is also a paid waste stream in Hengelo. For a 240-litre container, the cost is 2 euros per collection, and for a 140-litre container, it is 1.20 euro per collection, which only applies to low-rise buildings. High-rise buildings do not separate organic waste. Paper and cardboard waste and PMD are collected for free in blue and orange containers at home. Other waste streams, such as textiles and glass, are collected for free in containers distributed in Hengelo or the recycling centre.

Residents of Hengelo or Borne can dispose of all types of waste at the recycling centre with a pass to access the waste collection point. Some waste streams can be disposed of for free, and others cost 1.50 euros per 10 kilograms.

*Table 7. Division of waste disposal at the Hengelo recycling centre (Twente Milieu, 2021)*

| Free                                 | Paid                            |
|--------------------------------------|---------------------------------|
| Asbestos                             | Car and motorcycle tires        |
| Large garden waste                   | Impregnated garden timber       |
| Electrical and electronic appliances | Large household waste           |
| Frying fat                           | Roofing felt                    |
| Glass                                | Gas bottles                     |
| Tempex (styrofoam)                   | Plaster                         |
| Small hazardous waste (batteries)    | Wood (A,B,C)                    |
| Plastic                              | Hard plastic                    |
| Metal                                | Mattresses                      |
| Paper and cardboard                  | Garden wood                     |
|                                      | Carpeting, pillows and curtains |
|                                      | Diapers                         |
|                                      | Textiles                        |

### 6.3.3 Instruments

#### *Regulatory instruments*

Fikken (R8, Interview, 2021) did not mention any laws or regulations when discussing prevention policies. All initiatives provided by the municipality are of voluntary nature. Therefore, regulatory instruments for prevention are missing.



### *Economic instruments*

Hengelo has one economic instrument in effect: the instrument for waste separation and potential prevention is PAYT Volume & Frequency, which falls in the subcategory of user charges. Furthermore, the increased incineration tax as an economic instrument for municipalities has not been passed on to the residents of Hengelo. What ultimately led to an increase in costs are the new agreements of the PMD assessment protocol from the Chain Agreement between VNG and Waste Fund (VNG et al., 2020). Based on this protocol, a load of PMD may contain a maximum of 15 percent contamination; otherwise, it will be partially or entirely rejected and result in residual waste. Fikken (R8, Interview, 2021) has indicated that this is not yet feasible for Hengelo in the long term and has led to an unwanted increase in the waste tax because it could not be paid from other municipal funds.

### *Soft instruments*

Hengelo uses different one-way communication instruments, mainly in the subcategory of information release, to share positive messages of residents and their ideas about waste separation and prevention. The most prominent of these is the 'Afvalklepper', an annual newsletter about the waste tax with a separation guide and personal stories of Hengelo residents (Gemeente Hengelo et al., 2021). Other ways of one-way communication are social media such as Facebook, a page in Hengelo's free weekly specifically about waste, and Twents Milieu, the waste collection service. Fikken indicated that using as many communication channels as possible draws attention to the current waste policy and shares positive messages, tips and tricks with the residents.

As a form on two-way communication, the municipality of Hengelo participated in the benchmark meetings of VANG. Fikken indicated that if a particular theme is topical, then knowledge exchange is always beneficial. However, these types of meetings are the first to be deleted from the agenda when time or personnel is limited. Another form of two-way communication is the diaper challenge. Hengelo was one of the first municipalities to perform a washable diaper challenge in collaboration with Kaatje Katoen in 2015. In the past, the diaper collection of Hengelo was separate, but due to the lack of usefulness of the raw material, it decided to pause this collection in anticipation of new techniques. Hengelo started the diaper challenge because it was the most sustainable option so far. Fifty families sampled the washable diapers for 100 days, received a diaper package from Kaatje Katoen and were provided with instructions and tips during these days. After the trial, an evaluation concluded that more awareness of an emptier bin has a positive effect on the separation of the remaining waste. Moreover, if a method to process diapers in an environmentally friendly way becomes available in the future, the municipality can always revise its policy.

### *Organisational instruments*

The organisational instruments used in Hengelo are mainly infrastructural. In the interview, Fikken (R8, Interview, 2021) stated that Hengelo performs multiple experiments to improve its waste system and policy. An example is the Food Bicycle. As previously mentioned, high-rise buildings in Hengelo do not have organic waste containers. Therefore, this type of waste ends up in residual waste containers. As a solution, Hengelo invented the Food Bicycle, a cargo bike that collects food scraps for free three times a week. Residents of Hengelo who want to participate can pick up a green bucket at the Food Bicycle and receive an instruction card on proper usage and the times that the bicycle is near the building (Gemeente Hengelo, n.d.). The material that is collected is processed into compost using the rocket composter. In this way, a practical application for the material is created and waste is prevented.

Another example is the Waste Desk. Besides its recycling centre, Hengelo also has a Waste Desk, where at different places and times, people can bring various types of waste that do not belong in the (underground) container. The service is free, and the items must be small. The municipality aims to offer an added service and hopefully an incentive to separate large waste. A smaller experiment is the Bokashi Bucket, a small plastic bucket where food residues are deposited and fermented. Through this process, the waste does not rot and therefore does not smell. After the process is completed, the residue is placed in the garden's soil for compost.



Hengelo is currently investigating a potential circular upcycle centre. In collaboration with an internal project manager, Twente Milieu and the local secondhand store, the municipality is developing a business case after winning the national competition in 2019. In the design of the recycling centre, a site was reserved for a potential upcycle centre. The purpose is recycling waste flows, thereby improving the separation result and reducing waste. According to Fikken (R8, Interview, 2021), there would be an additional benefit if the secondhand stores and repair shops could be connected to the site. However, the actual placement depends on the business case.

Before COVID-19, Hengelo had a repair shop where repairs were performed voluntarily by experts. Repairs now are mainly done by the visitors themselves, with any necessary help from experts. It is open once a month for three hours and organised as an event. A person can bring electrical appliances, clothing, furniture, crockery, utensils, bicycles, and toys. Anything that is broken, and can be transported to the repair shop, is an item that can be repaired (Repair Cafe Hengelo, n.d.). Besides the recycling centre, Hengelo also has a secondhand store, 'van het Goed'. Fikken indicated that the municipality stopped subsidising the store, and therefore surveillance, a few years ago because of cutbacks. This has led to a stricter policy at the store's gate, which means more goods are wasted. Because of the voluntariness of the tool, it serves as organisational and infrastructural instruments.

## **6.4 Almere**

### **6.4.1 General information**

Almere is a municipality in the province of Flevoland of 248.8 square kilometres with 211,893 inhabitants (CBS, 2021). It consists of the following districts: Almere Buiten, Almere Stad, Almere Pampus, Almere Poort, Almere Hout and Almere Haven. It is a C Class municipality with 87,000 waste connections (R11, Interview, 2021).

### **6.4.2 Current Waste Strategy**

*VANG data, 2019*

The municipality of Almere has the highest amount of residual waste of the selected municipalities. The residual waste, including bulky household waste, was 153 kilograms per inhabitant compared to the average of 175 kilograms in a C-class municipality in 2019 (NVRD et al., n.d.). The separation percentage is also lower than the selection and the national averages, at 64 percent compared to 68 percent for the C class. The waste numbers of organic waste, paper and PMD are all lower than the selection and the national averages. Furthermore, the total waste number is comparable with the selection (426.1 kilograms) and decreases every year (ibid.).

#### *Current waste system*

The current waste system is in the midst of change. At the beginning of June, a proposal was submitted to the council of Almere about changes in the waste system, which, according to Westrik (R11, Interview, 2021), is outdated and fragmented. For low-rise buildings, there is a duo container where residual waste and organic waste must be collected. There is also a PMD container and an optional paper container which is used by 75 percent. Currently, the facilities for high-rise buildings are fragmented. Most residents bring their waste to containers in public areas. However, not all waste streams are facilitated, are not clustered in one place, do not look the same for each waste stream, and are different in usage. Some are opened with a pass, and some without. Glass and textiles can be collected next to the supermarkets, which applies to all households in Almere.

A household pays a fixed rate of 377.68 euros. This rate is independent of the number of people living at the address and the amount of waste that is created. According to the municipality: "Research has shown that the majority of the costs of collecting and processing household waste are fixed costs and therefore do not depend on the amount of waste presented" (Gemeente Almere, 2021a).

In June, it was proposed to the council for the low-rise building to facilitate residual and organic waste, as well as PMD, in separate containers. A container for paper and cardboard will remain optional to ensure a maximum of three or four containers in a household. The containers are provided with chips to monitor the amount of waste and to respond when necessary. For high-rise buildings, there will be underground containers for the mentioned waste streams. These can only be accessed by using a pass to prevent illegal disposal by non-payers.

Additionally, Almere has two recycling centres and one circular upcycle centre where residents can dispose of their bulky waste for free. Items that are not disposable at the centres can be brought to another location or address to which any other costs may apply. Almere created the first circular upcycle centre in Europe. The centre opened in 2018, with plans dating back to 2012. The recycling centre in Almere Haven was outdated and in need of replacement. This replacement was planned for 2012, but due to construction of the highway A6, there was no place for it anymore, and the recycling centre had to be moved to another location. This new location, Floriade, will host its world horticultural exhibition until 2022. The seventh edition was presented as a living lab about Growing Green Cities and the urgent issues associated with global urbanisation, such as food supply, climate change and energy production (Competitie Upcycle City, n.d.). Hence, Almere decided to transform the recycling centre into a circular upcycle centre both because the building itself is circular and also the activity within the upcycle centre. Razoky (R9, Interview, 2021) explained that the centre has three components: bringing in raw materials, providing a place for three entrepreneurs and their upcycling processes and offering education practices. The latter will be explained in the subchapter of instruments. The raw materials and bulky residual waste can be disposed at the recycling centre for free, except for car parts, industrial waste, gas bottles and boilers. Additionally, tree trunks, construction and demolition waste, roof gravel, roofing felt and contaminated soil can be brought to the recycling centre in Almere Buiten for a charge.

#### **6.4.3 Instruments**

##### *Regulatory instruments*

Waste prevention measures are of voluntary nature in Almere. There are no obligatory boundaries that enforce the act of prevention. Therefore, the regulatory instruments do not apply.

##### *Economic instruments*

Almere does not have a PAYT system. Therefore, the only economic instrument in force at the municipality is the increased incineration tax, which creates an incentive to incinerate fewer raw materials than are currently found in residual waste by seizing opportunities for an improved waste system (Hoek, 2021).

##### *Soft instruments*

According to Westrik (R11, Interview, 2021), Almere does not have many regular communication instruments, besides the communication on the website and waste calendar. However, for the future, there are many improvements and ideas which are discussed in chapter 6. The circular upcycle centre provides a one-way communication instrument, which is educational programs in collaboration with City & Nature <sup>4</sup>(Stad & Natuur). The educational programs are intended for primary education through secondary education and are connected to the in-place entrepreneurs to create awareness about waste recycling and prevention. The centre aims to include higher education, such as universities, using internships to provide support for possible long-term issues of entrepreneurs and the centre itself. An example of a current issue is the extraction of gold and copper from electronic devices in a sustainable way without using chemical baths that damage the environment. A two-way communication instrument is the benchmark that Almere returned to this year. The reason to attend again was the room for improvement in the development and professionalisation of the organisation and the availability of knowledge at VANG (R11, Interview, 2021).

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<sup>4</sup> City and Nature is a centre of expertise in the field of education for nature, the environment and sustainability.

### *Organisational instruments*

The most prominent infrastructural instrument is the circular upcycle centre and the additional raw material extraction for the three start-ups. The current entrepreneurs are Laura Meijering, a fashion designer of Unravelau, who makes zero waste collections; Joos Bosker and Erik Fakkeldij of 3-Cycle, who upcycle plastic into new products with the self-developed shredder bicycle; and Isolde de Ridder-Le Creurer, a goldsmith who makes circular jewellery of small metals and disposed electronics (Gemeente Almere, 2021b). Razoky (2021) explained the process of separating materials for entrepreneurs. This is done with platform employees assigned to set aside wanted materials before making deposits in the containers. This way, the entrepreneurs do not have to search the containers, which is not allowed by safety and law. When an item is placed in the container, it is legally labelled as waste and it is forbidden to re-enter the circular chain.

The upcycle centre has criteria that every start-up should use different raw materials to sustain different processes in the chain and receive a different view on raw materials and the upcoming issues. Thus, the centre and the visitors also learn about new processing possibilities of the submitted items. For additional stimulus, the centre chose to offer the entrepreneurs a contract of one and a half years with a possible extension of half a year to build their business case. A pilot has started to facilitate entrepreneurs of raw materials after the end of their contract. As a temporary solution, the entrepreneurs who left received an extension for another year to use the raw materials. A formal solution has been sought to release raw materials legally. Because as soon as materials have passed the threshold of the upcycle centre, they are labelled as waste, which then requires a legally complex processing permit.

The municipality currently has multiple secondhand shops. There is a shop two blocks from the recycling centre, but there is no cooperation between them yet. Razoky (R9, Interview, 2021) mentioned that this is desirable as quality items are brought to the upcycle centre as waste or raw materials instead of a reusable product. A collaboration is being investigated to prevent items from going to waste and offering them a second life. Almere is observing other municipalities in the Netherlands which are collaborating with secondhand shops that work with designated bins at the recycling centre, where people can place items to be collected and used by the secondhand shops. Besides the secondhand shops, several voluntary repair shops were open in Almere once a month on different days and times. Small electrical appliances, clothing or toys could be brought there for repairs. However, due to COVID-19, they are now closed (Repair Café Almere, 2021).

Lastly, Almere has a shareholding with HVC<sup>5</sup> jointly with all other municipalities in Flevoland (R11, Interview, 2021). This is a public enterprise and can therefore be categorised as an infrastructural instrument.

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<sup>5</sup> HVC is an organisation responsible for the sustainable waste management of 44 municipalities in the Netherlands.

## 6.5 Sub-conclusion

Table 8. Overview of instrument use in selected municipalities

|                                      | Vught | Heerenveen | Hengelo<br>(Overijssel province) | Almere |
|--------------------------------------|-------|------------|----------------------------------|--------|
| <b>Regulatory instruments</b>        | 0     | 0          | 0                                | 0      |
| <b>Economic instruments</b>          |       |            |                                  |        |
| Pay-As-You-Throw system              | +     | ++         | +                                | 0      |
| Increased incineration tax           | -     | +          | -                                | +      |
| <b>Soft instruments</b>              |       |            |                                  |        |
| <b>One-way communication</b>         |       |            |                                  |        |
| Municipal news outlets               | +     | +          | +                                | +      |
| Waste apps                           | 0     | ++         | 0                                | 0      |
| Educational programs                 | 0     | +          | 0                                | ++     |
| <b>Soft instruments</b>              |       |            |                                  |        |
| <b>Two-way communication</b>         |       |            |                                  |        |
| Prevention programs                  | -     | +          | +                                | 0      |
| VANG Benchmark                       | 0     | ++         | +                                | +      |
| <b>Infrastructural instruments</b>   |       |            |                                  |        |
| Secondhand / repair stores           | +     | +          | +                                | +      |
| Recycling centre                     | +     | ++         | +                                | +      |
| Circular upcycle centre              | 0     | +          | +/-                              | ++     |
| Additional prevention infrastructure | 0     | 0          | ++                               | 0      |
| <b>Organisational instruments</b>    |       |            |                                  |        |
| Shareholding waste processor         | 0     | ++         | +                                | +      |

Table 8 provides an overview of the main similarities and differences in instrument use presented in this chapter.

- 0 means the instrument or tool is non-existent;
- means the instrument is (nearly) present but unimportant;
- + means the instrument is (nearly) present and important;
- ++ means the instrument is present and very important.

Immediately noticeable is the lack of regulatory instruments for all municipalities. The following chapters will provide a more detailed explanation for this. The economic instruments best implemented in Heerenveen by the use of the PAYT Weight & Frequency. This instrument is present in Vught and Hengelo with PAYT Volume & Frequency but is missing in Almere. Heerenveen is also a frontrunner in the use of soft instruments because of the commitment to the benchmark and the waste app. Nevertheless, all municipalities are succeeding in their one-way communication through municipal news outlets.

Concerning infrastructural instruments, every municipality has a recycling centre and a second-hand and repair shop. Since there is no involvement with the latter, but the effects for prevention are important, the received score is a +. The difference lies mainly in the additional prevention infrastructures, shown in the table, where a circular upcycle centre is reviewed separately because of the additional prevention effect.

Specific instruments have a slight overlap with organisational instruments discussed in the text but are omitted from the table for simplicity. The most essential organisational instrument is the shareholding with the waste processors, which operates best in Heerenveen because of the active collaboration.

## **Chapter 7     SWOT analysis**

This chapter examines the strengths, weaknesses, opportunities and threats (SWOT) of the selected municipalities' waste prevention policies and actions. It answers the following question: What are the strengths, weaknesses, opportunities and threats of the current waste prevention policies of municipalities Vught, Heerenveen, Hengelo and Almere? The SWOT analysis is based on respondents' answers from the municipalities as well as the national government and its implementing organisations. The PESTLE framework will be used to determine whether an element of the SWOT is political, economic, socio-cultural, technological, legal or environmental.

### **7.1     Vught**

#### **7.1.1 Strengths**

The described strengths of the municipality of Vught are in the first instance related to its waste separation policies. The respondent (R6, Interview, 2021) indicated that a strength is that the PAYT system has been in force for an extended period. This means the system's result is achieved, and there is little resistance due to the system's familiarisation.

The last strength is political, referring to the active conversations in the local council about the future of the waste policy last January. After the summer, the municipality will start using citizen participation to influence its decision-making, reflecting the political sensitivity and awareness of Vught.

#### **7.1.2 Weaknesses**

A mentioned weakness of the municipality, which is related to its separation policies, is the shelf life of the current PAYT system. Because it has been in force for a long time, the total weight of waste is no longer decreasing. The policy officer of Vught indicated that the municipality's residual waste numbers have remained at 100 kilograms per person, and little has changed in recent years. Thus, to decrease this number, something in the waste policy has to change.

Another weakness is related to the increased incineration tax. This is not mentioned as an instrument because it has not affected Vught's waste streams. This result may stem from the fact that Vught has been working with a PAYT system since 2002, and this rate has remained unchanged after the implementation of the tax. The Vught policy officer indicated that the municipality had difficulty communicating the increase of the fixed rate to its residents because it does not align with the superior waste numbers of Vught and could demotivate the residents.

The following weakness is related to additional waste prevention measures. The 100-100-100 challenge of 2017, which raised waste awareness among the participants and eventually created its own ambassadors who promote prevention among the neighbourhood, has not been repeated in recent years despite its success. This means there are no current active prevention programs. The respondent identified communication as a strength because the municipality is capable of reaching many people. Nevertheless, the communication is more about waste separation and litter than waste prevention. Therefore, the possibilities of communication are not fully exploited, which is stated as a weakness.

The last weaknesses are associated with the infrastructural instruments, particularly the repair shop and the secondhand store. The municipality indicated that it had no involvement with either, which shows low political support in communication and funding. The respondent (R6, Interview, 2021) indicated that the products are being viewed critically due to a lack of space. This means that the store does not have to sell everything, and residents are asked to bring their items to the recycling centre. For the repair shop, this affects the opening times because the shop depends solely on volunteers. The resident who wants to use this infrastructure, in turn, is affected. Minimal opening hours can be demotivating.

### 7.1.3 Opportunities

An opportunity is the further expansion of communication campaigns. The policy officer stated that the municipality often posts articles on its website about waste separation and cleanup days. Even though the municipality's role was described as communicative to motivate residents positively, it was also stated that little is being done for waste prevention. An example of communication is the potential for the repair shop to promote the reuse of products.

Another opportunity is the extended producer responsibility. It could be an opportunity when it influences the municipality's waste streams. Vught indicated that this hope is present.

### 7.1.4 Threats

The threats of the municipality are all related to economics. The increased incineration tax does not influence the waste streams of Vught and has been mentioned in the weaknesses. This can change into a threat if the costs continue to rise and the residual waste does not decrease because the burden will eventually be borne by the residents of Vught. Another economic threat is the PAYT paradox. If people keep separating waste better and producing less, they offer less to the container, which reduces the yield and, therefore, the municipality's income to cover the cost of collecting and processing waste. At some point, this can lead to people separating better but paying more to cover the municipality's costs. The last economic threat is the market mechanisms for processing waste. The policy officer stated that market prices fluctuate and will likely increase in the future. One example is textiles. The market for this product collapsed, and the municipality no longer received any compensation for it, which increased the municipality's costs. Therefore, even with improved waste separation, there is a strong chance that the costs will still increase due to these economic threats.

| Strengths                            | PESTLE | Weaknesses   | PESTLE |
|--------------------------------------|--------|--|--------|
| Internal political support           | P      | Low political support repair shop and second-hand stores | P      |
| Long working PAYT system             | S      | Shelf-life PAYT  | S      |
|                                      |        | Communication incineration tax                           | S      |
|                                      |        | No additional prevention measures                        | S      |
|                                      |        | Communication prevention                                 | S      |
| Opportunities                        | PESTLE | Threats  | PESTLE |
| Expansion of communication campaigns | S      | Increased incineration tax                               | E      |
| Producer responsibility              | L      | PAYT paradox   | E      |
|                                      |        | Market mechanisms  | E      |

Figure 8. SWOT analysis for Vught

## 7.2 Heerenveen

### 7.2.1 Strengths

Heerenveen has multiple strengths regarding its waste policies. First, the polluter pays principle is deeply integrated in the municipality's actions. This is reflected at the recycling centre, in that only the non-recyclable streams should be paid, and in the non-separated diaper disposal strategy. If there is a sustainable option, it is promoted. The promotion is executed via multiple lines of communications and programs named in the previous chapter. This is mostly in accordance with motivating the residents and providing them with a short feedback loop.

A strength of its waste strategy is related to the post-separation plant and therefore waste separation. This technique leads to an unpolluted waste stream because it removes materials from the waste and can be adjusted precisely to meet the requirements set by the waste processors further down the chain.



The residents themselves cannot achieve this degree of separation. However, it leads to less awareness about PMD waste among the residents.

A financial and political strength is the shareholding with Omrin, the waste processor in Heerenveen. As mentioned previously, the received dividend provides funding for the municipality which can be invested for the residents' benefit. It also offers Heerenveen the authority to participate in decisions about waste matters in the municipality. The last strength is political, which is an alderman who is concerned about the subject of waste. Political support in the top layer of the municipality helps to implement desired plans.

### **7.2.2 Weaknesses**

The PAYT Weight & Frequency is a vulnerable technology that requires accuracy from both the systems and the driver of the vehicle. Hoogland mentioned that there is always a spare vehicle, so the collection can continue. Nevertheless, it must also be articulated that the container should only be lifted once; otherwise, the administration is disrupted. This awareness is an effective starting point for improvement.

The second weakness is the missing cooperation with surrounding municipalities. The municipality of Smallerland is not part of Omrin and has a different waste strategy where PMD is collected separately. This has the disadvantage that residents of Heerenveen can dispose of their PMD waste in Smallerland, which saves weight and volume in the residual container. During the former PAYT system using volume and frequency, this was a lucrative action. Hoogland indicated that Heerenveen is not aware of the current data with the PAYT Weight & Frequency.

Another example is the recycling centre in Buitenpost, which made all waste flows free of charge. The entering process at the gate was reasonably simple, which attracted much waste from surrounding municipalities. Hoogland (translated) mentioned the following: "You should just have the same thing everywhere. It is possible that your rate differs, but completely free so that you create a suction effect after all, you really have to avoid that" (R7, Interview, 2021).

The last weakness is low political support for the repair shops and secondhand stores in the area. Hoogland stated that the municipality is not involved in these practices, but they are placed there because of market forces. It is considered a weakness because opportunities for improved prevention are therefore not available.

### **7.2.3 Opportunities**

The increased incineration tax pressured the waste budget of the municipality. Heerenveen indicated that it does not want to pass that on completely to its residents and instead seeks to help them. Hoogland mentioned the tax as a perverse incentive because it is the only sanction for not realising the VANG objectives and making the municipality realise it has to change its policy to achieve the target. Despite the tax being perverse, she mentioned its effect. Therefore, it can be categorised as a strength.

Hoogland instinctively stated that there is an environmentally conscious trend. People have more awareness and knowledge about a subject such as litter, which can be beneficial for the municipality. This is connected to the government's movements. Nevertheless, Hoogland stated that the national government could do more in the field of awareness.

Hoogland also mentioned the desire for a national waste policy, which is most likely to communicate on a national level to everyone about the same rules of waste separation. The municipal communication also has an opportunity for improvement. Heerenveen would like to communicate more easily and frequently via social media to share tips so that residents can make more sustainable choices. Hoogland is aware that this form of communication will not reach everyone and will not be adopted by everyone. Nevertheless, she is attempting to present the image that the municipality is actively working on it. This opportunity correlates with the weakness of missing cooperation with surrounding municipalities. The municipality of Leeuwarden will switch to PAYT Weight &



Frequency next year. Hoogland hopes that the rest of Friesland will follow in order to have the same waste system. This would simplify communication lines between municipalities and prevent the avoidance behaviour of residents as described above.

The following opportunity is related to the municipality's current waste system and the potential improvement in high-rise buildings. An improvement is a weighing instrument in the underground container so these residents can also be part of the PAYT Weight & Frequency system. Currently, they pay using PAYT Volume & Frequency. This could be improved, but it is a very costly and vulnerable technique.

The last opportunity is the future circular upcycle centre. Heerenveen received a 50,000-euros subsidy from the Ministry of Infrastructure and Water Management and Rijkswaterstaat together with the NVRD, VNG, BKN and the Repair Café Foundation on Circular Upcycle Centres (*Nieuwe prijsvraag voor opzetten circulair ambachtscentrum gelanceerd*, 2020). JMA initiated the first meeting with job boards, educational institutions, the recycling centre and Omrin to examine the possibilities and business case. When entering the recycling centre, the craftsmen first view the items to select reusable raw materials before depositing them as waste in the recycling centre. With this instrument, the municipality hopes to reduce bulky household waste, which influences the VANG target, prevents waste and creates awareness.

Another opportunity is called Circulair Valley. Heerenveen region has decided to become a place where less virgin material goes in, and less waste comes out to create more circularity. Hoogland indicated that this mainly lies with the entrepreneurs in the area. The municipality can serve as a knowledge base, but this has not yet been established.

#### **7.2.4 Threats**

As mentioned previously, Heerenveen has a different waste system than most municipalities in the Netherlands. The national communication about waste, therefore, does not always apply to Heerenveen. An example is the Plastic Hero campaign promoted to separate PMD in designated bags or orange containers. This does not apply to the municipality because it post-separates PMD, and people can add this waste to their residual waste bin. This mainly causes confusion among residents.

Another threat is the privacy law. Due to privacy rights, Hoogland is not allowed to link the municipal personal record database with how many people live in an apartment and how much waste they produce. Therefore, she has no insight into the different waste streams of low- versus high-rise buildings, which could be valuable information. The producer's responsibility is perceived as a changemaker for litter and trash cans. Hoogland also hopes it will influence the total amount of waste but is sceptical since products will be replaced with other materials. For example, plastic forks will be replaced with forks of bamboo. This is more sustainable but will not influence the amount of waste. It is therefore perceived as a threat.

| Strengths  | PESTLE | Weaknesses   | PESTLE |
|--|--------|--|--------|
| Internal political support                           | P      | Missing cooperation with surrounding municipalities      | P      |
| Shareholding with Omrin                              | E      | Low political support repair shop and second-hand stores | P      |
| Polluter pays principle                              | S      | PAYT Weight & Frequency is vulnerable technique          | T      |
| Communication strategies                             | S      |  |        |
| Pilots and programmes                                | S      |  |        |
| Post separation                                      | T      |  |        |
| Opportunities  | PESTLE | Threats  | PESTLE |
| Identical waste system in surrounding municipalities | P      | National communication                                   | S      |
| Increased incineration tax                           | E      | No insights in data                                      | L      |
| Environmentally conscious trend                      | S      | Producer responsibility leads to other waste             | E      |
| Communicating more frequently                        | S      |  |        |
| Circular upcycle centre                              | S      |  |        |
| Circular Valley                                      | S      |  |        |
| PAYT Weight & Frequency for apartments               | T      |  |        |
| National waste policy                                | L      |  |        |

Figure 9. SWOT analysis for Heerenveen

## 7.3 Hengelo

### 7.3.1 Strengths

A strength of Hengelo is its progressiveness towards experiments to improve its waste policy. The municipality has had several programs and pilots to prevent waste. Examples include the washable diaper program, the Bokashi Bucket, the Waste Desk and the organic food bike. Not all of those ideas have been workable, but they show an intention for improvement.

The second strength is the joint cooperation with 14 surrounding municipalities with the shareholding efforts of Twence. This provides the municipality with decision-making powers regarding waste processes in the area. Furthermore, Hengelo is actively communicating using newsletters, social media and the Twents Milieu collection service to draw attention to the policy.

### 7.3.2 Weaknesses

A weakness is time and capacity. Indirectly, the municipality does not always have time to attend meetings such as the benchmark. These are the first activities that are cancelled for the agenda. Nevertheless, the information collection was still mentioned as an essential value.

Another weakness is low policy support for secondhand stores and repair shops. They are both viewed as private initiatives. A couple of years ago, the secondhand store was provided with a subsidy and surveillance. However, due to budgetary cutbacks, the municipality could not support this service any longer. This has led to a stricter policy at the gate, which negatively affects the cycle of products.

### 7.3.3 Opportunities

A significant opportunity for Hengelo would be a potential circular upcycle centre; an area at the recycling centre is already being reserved for this centre. As previously mentioned, this plan is dependent on the business case that is pending. Hengelo is considering accommodating the repair shop and secondhand stores into the circular upcycle centre, which could significantly affect waste prevention.

### 7.3.4 Threats

A significant threat is the new agreements with Nedvang. A load of PMD may contain a maximum of 15 percent contamination; otherwise, it will be partially or entirely rejected and end up as residual waste. In this case, the municipality has to pay the incineration tax, which has also increased recently. A solution would be post-separation, but it comes with multiple disadvantages. The municipalities of Twente do not have enough waste for the post-separation plant to function. Hengelo would receive a lower reimbursement for its PMD waste, and the move would undercut the municipality's recent investments in creating awareness among its residents.

Returning to the increased incineration tax, Fikken (R8, Interview, 2021, translated) is sceptical about the waste prevention effect. The increased incineration tax as an economic instrument for municipalities has not been passed on to the residents of Hengelo. Fikken (translated) noted:

"I personally am sceptical about that. I think it was more of a flow of funds to the government, but I have my doubts about waste prevention as to whether it has been effective" (R8, Interview, 2021). He called it a rudimentary stimulus and did not believe it will result in behavioural change at the local level. Furthermore, it causes irritation when passed on to residents and applies pressure on accepting the waste policy. For this reason and the fact that it did not significantly influence the costs due to low residual waste numbers, Hengelo decided to cover the costs from other funds. According to Fikken, this could enforce the PAYT paradox and will challenge the legitimacy of the policy.

Another threat is the dependency on the commodities market. The raw materials of the municipality are marketed after collection. Fikken indicated considerable fluctuations in the rates in recent years, which can negatively influence the municipality and pressure it to increase waste rates annually.

| Strengths                                   | PESTLE | Weaknesses   | PESTLE |
|---|--------|--|--------|
| Cooperation with surrounding municipalities | P      | Low political support repair shop and second-hand stores | P      |
| Shareholding with Twence                    | E      | Time and capacity  | E      |
| Communication strategies                    | S      |  |        |
| Experiments in prevention infrastructure    | S      |  |        |
| Opportunities                               | PESTLE | Threats  | PESTLE |
| Circular upcycle centre                     | S      | New agreements Nedvang                                   | E      |
|   |        | Increased incineration tax                               | E      |
|   |        | Market mechanisms  | E      |

Figure 10. SWOT analysis for Hengelo

## **7.4 Almere**

### **7.4.1 Strengths**

A strength of Almere is its thinking on innovation and improvement. The municipality is constantly attempting to find new ways to tackle problems and change the social narrative towards improved waste management. An example is the pilot of the upcycle centre. After one and a half to two years, an entrepreneur has to leave the location. However, the upcycle centre still wants to reuse raw materials and offer them to people who can use them effectively. This pilot has started to support this effort, and Almere is seeking a formal solution in line with jurisdiction.

Another example is the new proposed measures for the waste system explained in chapter 5. The municipality is very focused on the time sequence of these measures. Implementing them incrementally increases their acceptance (R11, Interview, 2021). According to Westrik (translated), an additional strength is internal political support:

We have a GroenLinks alderman on this file, and he is in a coalition with the VVD. This means that the focus is really on less residual waste and lower costs. Coincidentally, that goes hand in hand. That means there is definitely real support. (R11, Interview, 2021)

An additional vital aspect of the upcycle centre is the visibility and tangibility of the process. Razoky explained that it wants to stimulate the visitors' senses by understandably explaining the benefits of a circular world and by dealing with waste differently by showing what people can make of it. This is incorporated into the building in all types of aspects. If it comes to life for people, communication will be better utilised. This strength also positively influences the education programs that the upcycle centre develops.

Another strength mentioned by Westrik (R11, Interview, 2021) is the collaboration between the VNG, NVRD and the municipalities. This strength is to jointly have conversations with producers about the responsibility of packaging design and the compensation that municipalities receive for their collection.

### **7.4.2 Weaknesses**

A weakness of Almere is the unclarity of the municipality's waste system. It mostly leads to social problems such as dumping of waste and more residual waste than necessary. Low(er) social cohesion due to a growing municipality with significant people movement could have an additional effect. Almere's service level could improve to eradicate these problems.

Another weakness cited by Razoky and Westrik is the municipality's communications (R9 & R11, Interview, 2021). They pointed to missed opportunities to promote effective initiatives and the lack of goal-oriented communication. The team concludes that they should have communicated more about some projects and initiatives to gain more attention. However, this awareness is a step forward.

### **7.4.3 Opportunities**

The council proposes improvement for enforcement, participation and communication (Hoek, 2021). An integrated campaign will be launched to raise awareness about the prevention of residual waste. There will also be communication for separate waste streams on social media ads, websites and local newsletters. The latter is undesirable in terms of waste but is effective because residents of Almere are very involved in their neighbourhoods (R11, Interview, 2021). According to Westrik (ibid.), studies have shown that communication and enforcement alone can reduce 5 to 10 percent of residual waste and encourage separation. Hopefully, this effect could be more prominent when incorporating cooperation with residents. Westrik (ibid.) foresees an opportunity here, but it still requires a learning process to ensure not only one-way communication but two-way communication in the form of co-creation.

There are also multiple opportunities for the circular upcycle centre. One example is a pre-separation station, which would process items before disposal, so there can be complete control over what enters the centre as waste and what can be reused. Another opportunity is the new mission and vision of the upcycle centre. The centre identified four different roles for residents. The first role is consumer, and the centre wants to make people more aware of their purchasing behaviour. The second role is provider, which indicates someone who knows how to correctly separate waste. The next role is creator, which links to the entrepreneurs of the upcycle centre. The last role is inspirer, which are the people working at the centre. The centre needs to make people aware of their roles and urge them to taking conscious ownership of those roles.

The upcycle centre has an ambition for branding, which it is attempting with social media attention. This effort could be improved and extended with the ideas of a logo. An entrepreneur's design could improve visibility and reinforce that the product comes from the upcycle centre and is sustainable. This could better position the centre and communicate its message even more.

Another opportunity is the possible effect of the producer responsibility. According to Westrik (R11, Interview, 2021), the effect is very positive from a waste perspective because it is the only jurisdictional instrument. However, the focus is still primarily on recycling and not prevention.

The last opportunity is the increase of the incineration tax. It is stated as a negative incentive, also known as a stick, but is a positive instrument to create a business case for raw materials, recycling and prevention. It makes an obligation to recycle unnecessary (ibid.).

#### **7.4.4 Threats**

A threat mentioned by Westrik (R11, Interview, 2021) is the absent jurisdictional basis for waste prevention. Therefore, there is also a lack of national funding for innovative projects. Due to the lack of funding, municipalities are not stimulated to take innovative measures because everything that a municipality wants to do in this area should be paid from its own funding, and they cannot close their business case in this way. Another threat is the market forces that influence the costs for the processing of waste and, therefore, the business case of the municipality. Almere has not made any further statements about this issue.

A threat for the circular upcycle centre is legislation in the Netherlands. Razoky (R9, Interview, 2021) mentioned The Hague's grand ambitions and Almere's effort to achieve those objectives. However, all types of rules and laws present setbacks to improve and upscale. As previously mentioned, the upcycle centre cannot release raw materials because when they are labelled as waste, they cannot re-enter society. This issue will become a threat if it stays unresolved.

| Strengths                           | PESTLE | Weaknesses               | PESTLE |
|-------------------------------------|--------|--------------------------|--------|
| Internal political support          | P      | Current waste system     | S      |
| Focus on time-sequence              | S      | Low(er) social cohesion  | S      |
| Visibility of process               | S      | Communication            | S      |
| Collaboration with VNG and NVRD     | S      |                          |        |
| Innovation and improvement measures | S      |                          |        |
| Opportunities                       | PESTLE | Threats                  | PESTLE |
| Increased incineration tax          | E      | Lack of national funding | E      |
| Communication                       | S      | Market forces            | E      |
| Participation with inhabitants      | S      | Legislation              | L      |
| New mission and vision              | S      |                          |        |
| Branding                            | S      |                          |        |
| Pre-separation station              | T      |                          |        |
| Producer responsibility             | L      |                          |        |

Figure 11. SWOT analysis for Almere

## 7.5 Sub-conclusion

What immediately becomes clear is that the social factors of the PESTLE framework occur the most in all municipalities. However, it differentiates in the placement of the SWOT diagram. Furthermore, the economic and political factors also occur frequently. The economic factors are mostly placed as threats and are external, while the political factors are more scattered. The next chapter will elaborate on these most critical findings of the SWOT analysis in terms of possibilities and limitations.

## Chapter 8     Similarities, differences and lessons learned

This chapter discusses the combined possibilities and limitations of the different policy mixes of Vught, Heerenveen, Hengelo and Almere based on the SWOT analyses and the added information from the interviews with RWS, NVRD and VNG. The most critical findings have been used, of which the majority of the selected municipalities has made a statement, to substantiate that elements of the policy mixes are either deemed a possibility or a limitation. To recapitulate, the strengths and opportunities will guide the possibilities, and the weaknesses and threats will drive the limitations. Furthermore, the PESTLE framework will serve as a framework for improved interpretation of these factors. It will answer the following sub-question: What lessons can be drawn of the possibilities and limitations from the selected municipalities for a more suitable waste prevention strategy for other Dutch municipalities?

### 8.1     Possibilities

The results illustrate that possibilities are dominated by the socio-cultural factors of the PESTLE framework. The literature review predicted that social factors would be part of the possibilities. According to the reports used for the literature review, these are primarily communicative and facilitating executed by using soft instruments. However, research has shown additional possibilities performed with multiple instruments, occasionally combined with other factors that will be explained below.

One-way communication is the first possibility. It is solely of social nature and mentioned in the literature. One-way communication is considered essential by all municipalities and as one of the most critical instruments to create motivation, capacity and opportunity according to RWS, NVRD and VNG. Some municipalities are more committed to communication than others, hence there are different ways of execution. Vught works with a local newspaper and its website to mainly communicate about waste separation. In this research, this is considered a weakness because waste prevention has not been addressed in these communication tools. However, due to room for improvement and because Vught is able to reach many people, it still fits into the category of possibilities. Hengelo works with a local newspaper, social media and an annual newsletter about waste. Heerenveen has the most advanced channels to reach its residents: news releases on motivation, the Omrin app to directly access monthly waste numbers and the ‘clean rewards’ educational program. Almere currently has no targeted communication besides its website but it does have a larger focus on educational programs through the circular upcycle centre. After approval of the council proposal, the municipality will start a campaign and spread it on multiple channels. All stakeholders consider the implementation of one-way communication as an opportunity to disseminate information about prevention and eventually change the social narrative, as stated in the literature review. Therefore, one-way communication is categorized as a possibility.

The second possibility, is also socially-focused and mentioned in the literature review as practical. This research has found multiple facilitating measures using two-way communication instruments and infrastructural instruments. Two-way communication instruments are the VANG Benchmark and prevention programs. The commitment for these instruments differs per municipality. Currently, Vught has not applied to the VANG Benchmark and is not executing any pilots or programs to promote improved waste behaviour. Almere has resumed to attending the benchmark this year to access useful knowledge but has not mentioned any programs regarding prevention. Heerenveen attends the benchmark to spread information to other municipalities about its methods and occasionally organises a washable diaper program. Hengelo only enters the benchmark when the capacity is sufficient and the subject is relatable. However, despite this time and capacity weakness, Hengelo is the municipality with the most vital prevention initiatives. For the two-way communication instruments, they were the first municipality to initiated the washable diaper project as the first municipality in the Netherlands. With regard to infrastructural instruments, Hengelo is working with the food bicycle for organic waste separation in apartments, a waste desk as an accessible alternative for the recycling centre and the bokashi bucket for an at-home compost practice.



Another infrastructural instrument of social value is the circular upcycle centre. To a certain extent, all municipalities are interested in a circular upcycle centre to different degrees. Vught has expressed its interest, however primarily indicated the many challenges that need to be considered. Hengelo is working on a business case and has reserved a space at the recycling centre to do so. After receiving a subsidy, Heerenveen will cooperate with JMA to make a business case and start communication with necessary stakeholders to realise an upcycling centre. Almere is the only selected municipality that already has realised a centre. A limitation is that the implementation is primarily dependent on the government's start-up capital, which can be challenging to establish due to the competition with other municipalities, as confirmed by Howlett and Ramesh (2003). Nevertheless, it serves as the most tangible infrastructural instrument in terms of material impact with a possibility to change the social narrative to refuse, reduce and re-use. The elaboration of these instruments are all possibilities that are related to social value because it creates waste awareness whilst simultaneously lowering the effort required to prevent waste.

The third social possibility is, in contrast to other social possibilities, actually an economic incentive called Pay-As-You-Throw system. This economic instrument is portrayed as a social possibility because it influences the norm towards a new waste system. Most municipalities have established this system as an incentive to improve separation and prevent waste. Almere has several reasons for being the only municipality with a waste system without PAYT. Almere has a more metropolitan character than the other municipalities. Research has shown that implementing a PAYT system can lead to various adverse effects when basic infrastructural elements are not in place. Combating these effects could lead to a significant increase in costs for residents. Furthermore, there is no support yet for PAYT among the residents of Almere (Hoek, 2021). The difference for the other three municipalities lies in the fact that they have applied a different implementation. Heerenveen is the only municipality to have a system based on weight and frequency instead of volume and frequency, which has both advantages and disadvantages. The advantage of weight is that it prevents stuffing the container, which could occur with a volume-based system. However, as previously mentioned, a weight-based system is a vulnerable technology and this has not yet been implemented for apartments, so they still work with a volume-based system. The municipalities with a volume-based system have both mentioned the threat of the PAYT paradox as discussed earlier. It is unclear if these matters are connected to the volume-based waste system. Due to the overarching potential, it is categorised as a possibility.

The fourth possibility is of both economic and political value, namely the shareholding with the waste processor. Three out of the four municipalities are shareholders with multiple financial and political benefits in decision-making power. The economic possibilities mentioned in the literature review applied to financial savings for municipalities and consumers.

The fifth possibility is about internal political support and therefore politically-focused, according to the theory of Sarsby (2016). This is not directly related to the instruments; however, they do influence the implementation of it. All municipalities are fairly optimistic about this aspect. Vught has a PVDA / GroenLinks alderman working on the subject of public space (Gemeente Vught, n.d.-c). The respondent stated that there have been active discussions on the council's request about its future waste policy. Hengelo previously had a GroenLinks alderman working on waste, which is now an alderman of a local party, Pro-Hengelo. Therefore, the directions have become more conservative and focused on post-separation. Almere also has a GroenLinks alderman in a coalition with the VVD. Therefore, the focus is on less residual waste and lower costs, which works well together and showcases political support. Heerenveen has a VVD alderman who is very committed to waste in his portfolio. According to Hoogland (Interview, 2021), his view aligns with the polluter pays principle, which helps greatly with the introduction of PAYT Weight & Frequency.

The sixth possibility is political cooperation between municipalities. It is not an instrument, but it affects the way the instruments perform through the chosen policy direction. Therefore, it is also important to mention. Hengelo has a strong cooperation with the surrounding municipalities in Twente, which is shown in their common goals. Heerenveen also has strong cooperation with other

municipalities in Friesland but acknowledged the weakness of municipalities missing in this cooperation, allowing residents to dispose their waste in neighbouring municipalities and circumvent the system. Vught has not mentioned this, and Almere stated it did not have an institutionalised partnership, except for provinces and municipalities working with HVC. The possibility is shown by addressing the theory in which Bouwma et al. (2015) stated that policy measures have a higher success rate because of the cooperation between actors. This is confirmed by van Dael, who explained the advantage of cooperating municipalities and the ability to spread one message, such as Omrin in Friesland and ROVA in Overijssel.

The final possibility is of legal value, namely the producer responsibility. This is perceived differently by the selected municipalities and executive organisations of the national government. Vught and Almere view this instrument as an opportunity when it affects the waste streams of the municipality. RWS, NVRD and VNG agreed when mentioning the participation in the negotiations with the ministry. Hengelo is sceptical about the producer responsibility when it relates this to the PMD problems in the municipality. Heerenveen views it as an acceptable instrument because the municipality receives funding for the waste collection of those products. However, the threat arises when banned products or materials are replaced by other products, the amount of waste does not decrease. Moreover, Teernstra (R1, Interview, 2021) mentioned the threat of it only serving as a financial incentive, which should be avoided. It is categorised as a possibility because the most achievable effect lies at the start of the production chain. Van Dael (R3, Interview, 2021) mentioned that it should be extended further to serve as the right incentive. Producers now only pay for what is recycled, but a different incentive could be to also pay for a percentage of the incineration costs when packaging in residual waste is found. This increases the responsibility for the final process and not just the separate collection.

## **8.2 Limitations**

The results present that limitations are often matters that are beyond the power and instruments of a municipality. This is also indirectly discussed in the limitations of the literature review, which will be discussed below.

A political limitation mentioned in the literature was the distant role of the national government and the additional political freedom for municipalities to choose their own methods. Van Raak et al. (2014) stated it negatively influenced the possible set targets and the speed of adopting prevention measures. The results present that this political freedom is accepted by most municipalities and therefore does not categorise as a limitation. Teernstra from RWS cites the integrated polder culture, and VNG views policy freedom as having paramount importance. Furthermore, the research shows that the distant role of the government is not the main reason for the weak target setting, as stated in the literature review. Additionally, a regulating set of instruments regarding waste prevention is absent, which provides the reason for weak target setting and lack of sanctions when the available targets are unachieved. This is confirmed by Van Raak et al. (2014) and appointed as the first limitation. The absence of legal obligations on waste prevention are seen as a large legal limitation with multiple consequences. Almere actively identified this as a setback regarding funding. Moreover, a municipality's efforts towards prevention are expected to be financed by the municipality itself, limiting the pace of adaptation of prevention measures as stated before. This is also an explanation for the extensive use of soft instruments, which is mentioned as an insubstantial limitation in the literature review and theoretical framework since it is dependent on voluntary compliance.

The second political limitation, indirectly connected to the distant role of the national government, is the lack of political support regarding secondhand stores and repair shops. While they are located in all municipalities, none of them is actively cooperating with the shops. Nevertheless, the municipalities stated that its communication could increase and that they wish to incorporate this more into their future circular upcycle centres. The latter is not immediately changed into a possibility, because the municipality is dependent on funding and capacity. The opportunity is therefore not fully utilised and fits into the category of limitations.

The third limitation is of economic nature, and not classified as a direct instrument, namely the market forces. This is perceived as an economic limitation because it is stated as a threat by all except Heerenveen, which did not mention it. The threat of the market forces has different perspectives among the stakeholders. Vught, Hengelo and Almere mentioned the uncertain market for processing waste that affects the municipality's compensation. Prices fluctuate, so the municipality cannot adjust its rate quickly enough. RWS also mentioned this issue regarding the prices of incineration. Due to empty incinerators, prices of residual waste dropped below the price of organic waste, which was an incentive to introduce an increase in the incineration tax to somewhat reverse market forces. This was supplemented with the argument of the recyclables market. This market is still very limited in terms of processing PMD. The NVRD mentioned other market forces. First of all, virgin material prices are widely fluctuating but generally still lower than recyclable materials, which does not improve the use of these materials. Secondly, the supermarkets are primarily interested in maximising profit. Therefore, products that are more expensive but more recyclable are not a priority when fewer are sold. The VNG agrees with this point.

An instrument that is received differently by the interviewed respondents is the increased incineration tax. This is the only indirect sanction when not achieving the VANG objectives. Heerenveen, Almere and RWS agree with the possibility of this incentive while also agreeing with the weaknesses of the instrument. Vught and Hengelo categorise it as a financial threat when residual waste does not decrease in a certain amount of time. The threat is mainly for the residents of the municipality who eventually have to pay more waste tax. Van Waas (VNG) (R5, Interview, 2021) also agrees with the negative aspects of the instrument. The fact that the tax is increasing while some municipalities still have high rates can damage the base of support for the respective waste policy. It can be frustrating for municipalities to be penalised with higher incineration rates while also investing in improving the waste system. Furthermore, it is mainly focused on waste minimisation and not directly on prevention. Therefore, it is stated as the fourth limitation.

The last limitation mentioned in the literature review is the fact that prevention is an invisible action taking place privately at home which makes it difficult to influence the social narrative. This is not directly confirmed by the municipalities. However, Teernstra (NVRD) (R1, Interview, 2021) mentioned prevention is difficult to measure in quantities because it is unclear by which elements the waste numbers are influenced by. For recycling this is easier to measure because the actions take place within the waste circuit. It is therefore executable by the national government in terms of setting strong targets and regulations.

### **8.3 Sub-conclusion**

To conclude, this chapter shows that prevention is weakly instrumentalised for multiple reasons; there is an absence of regulating instruments, the policy instruments that influence prevention are indirect and do not apply to the policies of municipalities, and limitations are external and cannot be solved by municipalities themselves since they are dependent on the national government.

The possibilities of this research show that, despite the missing legal framework, it is possible to act on prevention. The best practices of the municipalities are mainly dependent on the application of the widest possible range of social possibilities using soft instruments, small infrastructural instruments and possibly a PAYT system. The possibilities of a positive political climate and producer responsibility are helpful in this regard.

The present limitations are a serious issue because it causes multiple effects on the outcome and use of instruments explained in this research. Prevention is therefore solely dependent on the own motivation and funding of municipalities. If prevention were to be implemented seriously, the government would have to solve limitations that affect the municipalities, set tangible targets and assist municipalities to achieve those.

## Chapter 9 Conclusion and reflection

### 9.1 Conclusion

Waste is an important topic in the Netherlands. It is a crucial element of the circular economy with the aim of closing the chains and reducing the independency or dependency on depleting resources. The criticism of the NVRD and RWS provided the basis for this research. In addition to waste separation, prevention is essential, as the top of the waste hierarchy. This study has investigated how Dutch municipalities can contribute on this issue and what the best practices and obstacles are. This research has answered the following research question: **What are the possibilities and limitations of the current mix of policy instruments used by Dutch municipalities for household waste prevention, and could these strategies lead to possible opportunities for other municipalities in the Netherlands?**

The first sub-question contributed to the understanding of the establishment and composition of the VANG waste program. The second sub-question explained the roles of the governments and the instruments provided by the national government and its implementing organisations. The roles are related to creating capacity, opportunity and motivation to execute the waste program as desired. The provided tools were mainly economic incentives and disincentives, communication tools in the form of one- and two-way communication and indirect economic instruments such as the deposit on PET bottles and producer responsibility, which indirectly affects the waste streams of municipalities.

The third sub-question provided an overview of the waste systems and prevention instruments of the four selected municipalities. The results were as follows: Vught and Hengelo both have a PAYT Volume & Frequency system. Vught has used this system since 2002 with minor adjustments. Besides the waste system, it has few additional interventions to stimulate prevention, which is primarily performed voluntarily without any interference from the municipality. In addition to the PAYT, Hengelo has a reversed collection pattern for residual waste and is the municipality with the most innovative pilots and programs to stimulate prevention. However, Hengelo has difficulty regarding to the separation of PMD and a potential PAYT paradox. Heerenveen has a significant focus on waste awareness, and the ‘polluter pays principle’ is reasonably integrated. Compared to the selected municipalities, it has a unique PAYT system, including a charge per kilogram. Almere is the only municipality without a PAYT system. Furthermore, it is unique in its circular upcycle centre, which creates waste awareness for its residents.

The fourth sub-question was devoted to the SWOT analysis. The chapter overviews the strengths, weaknesses, opportunities and threats of the current mix of municipal instruments and their influences. The fifth sub-question elaborates on this analysis by discussing this in terms of possibilities and limitations of the mentioned instruments and links those to the implementing organisations’ answers.

Initially, the municipalities show multiple possibilities for waste prevention, mostly dominated by the socio-cultural elements of the PESTLE framework using soft- and infrastructural instruments.

All municipalities view communication as an essential means to motivate and inspire inhabitants’ waste behaviour. Moreover, municipalities are actively promoting prevention through educational- and prevention programs. The essential infrastructural instrument is the circular upcycle centre of Almere and the interest of the other municipalities in this waste-preventing tool. It creates awareness among residents and is the most tangible instrument in terms of material impact. Other possibilities were related to the ‘Pay-As-You-Throw’ system and political cooperation and support. Lastly, the hope for the effect of the indirect instrument, namely producer responsibility, is high. Municipalities and executing organisations of the national government foresee potential in the increased responsibility for producers regarding product design and waste collection funding.

However, the limitation of absent regulatory instruments due to the missing legal basis for the prevention aspect of waste management, affected many conditions. Because of the missing jurisdiction, there is weak target setting, lack of sanctions when the available targets are not achieved and barely any funding for waste prevention practices. This also influences the opportunities for the repair shops and secondhand stores. All the municipalities have this voluntary infrastructure available but do not actively use it, mainly caused by budgetary reasons. Other limitations were related to the market forces and the increased incineration taxes.

Finally, to answer the research question, the limitations of waste prevention are mainly related to the lack of jurisdiction of the national government which cannot be solved by municipalities alone. Furthermore, the used instruments that affect the waste stream of municipalities are indirect.

This research has shown that despite the strong limitations, numerous possibilities to address waste prevention by means of the current resources that Dutch municipalities have are feasible. Moreover, the policies applied by the municipalities require municipal motivation and own funding, which is the crux of all current prevention measures.

## **9.2 Reflection**

The final part will reflect on the research in terms of interpretations and limitations and will present recommendations. The SWOT analysis was challenging to operationalise since the discussed advantages and disadvantages of the instrument theory of Hood (1986), Howlett & Ramesh (2003) and Bouwma et al. (2015) were not directly related to the subject of waste. For this reason, it was decided to let the interviews lead in the classification of the strengths, weaknesses, opportunities and threats. To provide a more in-depth understanding, the PESTLE framework was used. This is initially only applicable to external factors. When adjusting the content of the factors slightly, the same construct was also appropriate to internal factors and contributed to the clarity of the research. Valuable insights regarding this technique could be obtained through further application.

Research has shown that there are essentially four policy instruments: regulatory, economic, soft and organisational instruments that directly influence municipalities' policies and actions. However, multiple instruments did affect the municipalities but were not meant to do so. Therefore, they were referred to as indirect. No reason has been found in the literature on instrument theory to distinguish between indirect and direct. It can thus be seen as a new finding on the theory.

The first limitation is related to the shortcoming of secondary data. There was limited academic literature on current waste (prevention) strategies in the Netherlands available. Therefore, the secondary data was primarily dependent on policy documents and municipal websites, making it challenging to perform triangulation.

Additional limitations of the research are mostly related to the scope of this research. The research presents four cases selected according to the aforementioned methodology. By selecting only four cases, additional valuable prevention practices in other municipalities are not involved in the research. Further studies could identify these measures by researching other cases. Furthermore, the gathered information depended on a sufficient group of experts but a selective group of municipal respondents. All possible respondents have been interviewed; however, the research was limited by available policy officers. A larger number of policy officers within the same municipality could reflect the prevention measures more critically. Last, to gain better insight into the political field, it could be chosen to also interview aldermen discussed in chapter 8. However, due to the scope and time constraints of the research, it was decided not to. Furthermore, the residents are not taken into account, which could have provided information about the acceptance of the waste prevention measures. Excluding this group could lead to a limitation of an in-depth perspective. Therefore, further research should concentrate on including these respondents.



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## Appendices

### Appendix 1: Dutch summary

Uitputting van grondstoffen wordt een steeds dringender milieuprobleem met de huidige consumptiepatronen en trends in bevolkingsgroei. Een deel van de oplossing ligt in bewust afvalbeheer als onderdeel van de circulaire economie. Nederland pakt dit probleem aan met het VANG-programma, dat ambities creëert voor gemeenten om meer te recyclen en afval te verminderen met een focus op restafval. Een kritiek van de NVRD en Rijkswaterstaat was dat gemeenten te weinig aandacht besteden aan preventie.

Dit onderzoek biedt inzicht in verschillende afvalpreventiestrategieën bij de gemeenten Almere, Heerenveen, Hengelo en Vught aan de hand van de volgende onderzoeksvraag:

**Wat zijn de mogelijkheden en beperkingen van de huidige mix van beleidsinstrumenten die Nederlandse gemeenten gebruiken voor de preventie van huishoudelijk afval en kunnen deze strategieën leiden tot mogelijke kansen voor andere gemeenten in Nederland?**

Een politieke instrumententheorie wordt gebruikt om deze verschillende benaderingen te onderzoeken. De instrumententheorie verdeelt de beleidsbenaderingen van de gemeente in vijf categorieën: regulerende, economische, *soft*, organisatorische en indirecte instrumenten. De theorie zorgt voor een duidelijke toelichting van de complexiteit van de gekozen tools. Een SWOT-analyse wordt uitgevoerd om de beleidsmix te evalueren en inzicht te geven in de mogelijkheden (sterktes en kansen) en beperkingen (zwaktes en bedreigingen).

Er worden kwalitatieve methoden gebruikt om de benodigde gegevens te verkrijgen. Wetenschappelijke literatuur en beleidsdocumenten worden gebruikt om gegevens te vergaren over de afvalpraktijken van de overheid en gemeenten. Om meer verdieping te krijgen, worden semigestructureerde interviews gehouden met relevante actoren van de gemeenten en externe experts.

Het onderzoek identificeerde interessante mogelijkheden en beperkingen van de gebruikte beleidsinstrumenten, die inzicht gaven in de huidige afvalpreventieprocessen. Geconcludeerd kan worden dat er veel verschillen bestaan in de uitvoeringseigenschappen van het afvalstelsel, met zijn eigen mogelijkheden en beperkingen. Bij aanpassing naar een bredere kijk is de instrumentkeuze echter redelijk gelijk. Regelgevende instrumenten ontbreken omdat de wettelijke basis voor preventie ontbreekt. Economische instrumenten zijn veelal een DIFTAR systeem in verschillende vormen en de door de rijksoverheid ingevoerde verbrandingsbelasting. Communicatie wordt door alle gemeenten en uitvoeringsorganisaties als essentieel aangemerkt. Dit draagt bij aan de motivatie, capaciteit en kansen van burgers. Tot slot zijn organisatie-instrumenten vooral infrastructureel en worden uitgevoerd in gemeentelijke programma's en één circulair ambachtscentrum.

Dit onderzoek zal als inspiratie dienen voor andere gemeenten in Nederland door de mogelijkheden van afvalpreventie te tonen ondanks het ontbreken van een wettelijke basis voor afvalpreventie.

## Appendix 2: Waste streams in the Netherlands and current data

### Unseparated residual waste

Residual waste is the non-separated waste that is collected within a household or in the neighbourhood. This waste stream does not include bulky residual waste, which will be explained later. In 2019, after source and post-separation of raw materials from the waste, an average of 145 kg per inhabitant remained in unseparated residual waste (NVRD et al., 2020). Over the past five years, the amount of fine residual waste has decreased from 194 kilograms to 145 kilograms per inhabitant, a decrease of 25 percent. This decrease is directly related to the increased recycling efforts of governments and households.

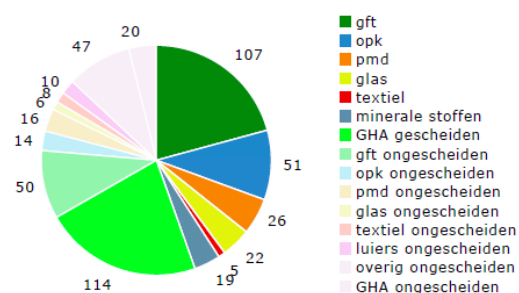


Figure 12. Raw materials streams (in Dutch) (NVRD et al., 2020)

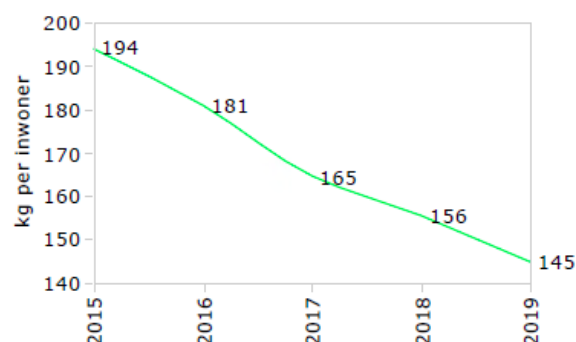


Figure 13. Reduction of fine residual waste (in Dutch) (NVRD et al., 2020)

### Separated waste

Separated waste has different categories, which are listed below:

#### 1. Organic waste (GFT, groente-fruit-tuinafval):

Organic waste consists of vegetable, fruit and garden waste. In 2019, the amount of separately collected organic waste was 107 kilograms per inhabitant. This is a waste stream with improvement potential. Analysis of the residual waste shows that 50 kilograms per inhabitant is not separated (NVRD et al., 2020).

#### 2. Paper and Cardboard (OPK, oud papier en karton):

In 2019, an average of 51 kilograms of paper and cardboard waste was collected separately per inhabitant. Over the past five years, the amount of OPK has decreased by 11 percent, from 57 kilograms to 51 kilograms, which is in line with the trend of decreasing door-to-door paper delivery and the increased use of IT. However, analysis shows that 14 kilograms per inhabitant is still not separated (NVRD et al., 2020).

#### 3. Plastic, Metals, Drinking cartons (PMD):

This relatively new waste stream was implemented in 2009. The composition and inclusion of this waste stream varies by municipality. Some municipalities decide to exclude metals or drinking cartons, and some decide to use post-separation techniques (J. Coeleveld, personal communication, February 10, 2021). In 2019, an average of 26 kilograms of PMD was collected separately per inhabitant. In the past five years, this waste stream has more than doubled, with a 13 percent increase in 2019 compared to 2018 due to the increased attention and opportunities of waste collection given by municipalities. Analysis shows that there is still much potential because 16 kilograms per inhabitant is not separated yet (NVRD et al., 2020).

#### 4. Glass:

The waste stream of glass has remained consistent in recent years in terms of separation and non-



separation. In 2019, separated glass collection had an average of 22 kilograms per inhabitant. Analysis of the residual waste shows that 6 kilograms per inhabitant is not separated.

5. Textiles:

The waste stream of textiles is not only clothing and products of good quality. It also consists of the following items: clothing (including swimwear and underwear); shoes (tied together in pairs); curtains; bedding, including sheets, blankets, pillowcases and duvet covers; towels; tea towels; tablecloths; napkins; washcloths; socks and stockings; accessories, including belts, bags and ties; hats; caps; gloves; stuffed animals (clean); and cleaning cloths and rags (Milieu Centraal, n.d.). In 2019, the average amount of textiles collected separately was 5.1 kilograms per inhabitant. Compared to other waste streams, textiles, with 7.8 kilograms non-separated waste per inhabitant, are the least recycled waste stream. Over the past five years, the separated waste even increased by 11 percent, from 4.6 kilograms to 5.1 kilograms per inhabitant. However, it is difficult to determine whether more textiles have been separated or consumed (NVRD et al., 2020).

6. Other household waste:

Other household waste consists of four streams. First is small chemical waste (KCA, klein chemisch afval), which consisted of an average of 1.4 kilograms per inhabitant in 2019. Second is diapers and incontinence material, which is collected separately in 22 municipalities. Because most municipalities are not acting upon this waste, an average of 10.5 kilograms per inhabitant can still be found in residual waste. Third is frying oils, which consisted of an average of 0.15 kilograms per inhabitant mostly collected via the recycling centre. Last is secondary substances such as mineral substances, biogranulate and biofuels, which are often the by-products of the separation process of PMD. Only eight of the participating municipalities in the benchmark specified these substances, which accounted for an average of 19 kilograms per inhabitant of usable substances from the PMD process (NVRD et al., 2020).

7. Bulky residual waste:

This waste stream consists of large garden waste, electrical and electronic appliances, household goods, scrap iron, wood AB, wood C, rubble and other separated wastes. In 2019, this stream averaged 134 kilograms per inhabitant; 114 kilograms thereof was recycled through (post-) separation. This is an average of 20 kilograms per inhabitant. Over the past five years, this amount decreased from 28 kilograms to 20 kilograms, which is 29 percent (NVRD et al., 2020).

### Appendix 3: Research information and topic list interviews (Dutch)

#### *Onderzoeksvraag*

**Wat zijn de mogelijkheden en beperkingen van de huidige mix van beleidsinstrumenten die Nederlandse gemeenten gebruiken voor de preventie van huishoudelijk afval en kunnen deze strategieën leiden tot mogelijke kansen voor andere gemeenten in Nederland?**

#### *Het onderzoek*

In het kader van mijn masterscriptie doe ik onderzoek naar afvalpreventie strategieën onder gemeenten in Nederland. De NVRD, RWS en VNG hebben in de evaluatie benoemd dat afvalpreventie meer aandacht nodig heeft. Op dit moment zijn gemeenten vooral gericht op recycling, maar nog niet op het voorkomen van afval zodat de totaliteit van het afval afneemt. Dit onderzoek gaat de mogelijkheden en beperkingen van het huidige afvalpreventiebeleid van verschillende gemeenten in Nederland onderzoeken en onderzoeken of er *best practices* of mogelijkheden voor verbetering zijn. Hiervoor worden beleidsinstrumententheorieën en een SWOT-analyse gebruikt.

#### *Praktische informatie*

Duur: maximaal 60 minuten

Geluidsopname voor transcriberen: Voor het opnemen wordt toestemming gevraagd. U hoeft hier niet mee akkoord te gaan, maar het zou helpen bij het transcriberen en coderen van het interview om zo verwerkt te worden in het onderzoek. De audio-opname wordt verder niet gedeeld.

Anonimiteit: Mocht u anoniem willen blijven dan zal uw naam niet in het onderzoek worden genoemd. Alleen uw functie en de overheidsinstantie.

#### *Opbouw interview*

Het interview is een semigestructureerd interview waarbij wordt gewerkt met topic lijsten en niet wordt vastgehouden aan een vaste vragenlijst.

#### *Topic lijst Ministerie en uitvoerende organisaties*

1. Inleiding – Introductie
2. Basis informatie afvalpreventie – Visie en verwerking VANG doelen
3. Historie – Belangrijke interventies verleden
4. Rolverdeling – Rol RWS, rol gemeenten
5. Instrumenten - Wat voor instrumenten / handvatten worden er aangeboden bij de Nederlandse gemeenten (financieel, juridisch / politiek, communicatief/ kennis, infrastructureel / organisatie)
6. SWOT analyse - Wat zijn krachten, zwaktes, mogelijke toekomstige kansen en bedreigingen
7. Overige zaken en eventuele contacten

#### *Topic lijst gemeenten*

1. Inleiding – Introductie
2. Basis informatie afvalpreventie – Visie en VANG doelen
3. Basis informatie afvalbeleid
4. Historie – Belangrijke interventies verleden in de gemeente
5. Instrumenten - Wat voor instrumenten / handvatten worden er gebruikt in de gemeente om afvalpreventie te bewerkstelligen (financieel, juridisch / politiek, communicatief/ kennis, infrastructureel / organisatie)
6. Mening over de instrumenten die de nationale overheid aanreikt
7. SWOT analyse - Wat zijn krachten, zwaktes, mogelijke toekomstige kansen en bedreigingen
8. Andere gemeenten – Wat zijn lessen van andere gemeenten en wat zijn tips voor andere gemeenten in Nederland
9. Overige zaken en eventuele documenten / contacten – Basis info gemeente, documentatie afvalbeleid en preventie