The acceleration of small wins to contribute to the problem of plastic pollution

A case study of Dutch initiatives contributing to plastic free waterways

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Abstract

In recent years, the accumulation of plastic pollution has been observed. The wickedness that is involved in this societal problem requires a suitable governance strategy. One literature stream that deals with wickedness from a bottom-up perspective is 'small wins'. Small wins focus on incremental change to achieve sustainable result, through guidance of a mission or vision. When the right propelling mechanisms are activated, consecutive small wins can lead to sustainable results. This research aims to contribute to current literature with an empirical case to identify current small wins and propelling mechanisms in the plastic pollution problem. Therefore, the following research question is addressed: *"How do propelling mechanisms amplify small wins related to the plastic pollution problem in the Netherlands?"* Additionally, three sub-questions are posed to address the difference among the actors that contribute to small wins and to give policy recommendations.

To answer this research question, a qualitative research strategy was followed, involving a case study of sixteen initiatives that contribute to 'removal measures' for plastic pollution in Dutch waterways. These actors were retrieved by desk research. Thereafter, semi-structured interviews provided insights in the context of the initiatives, which was analysed using 'NVivo'. Additionally, three experts from various Dutch universities were interviewed because of their expertise on plastic initiatives, missions or small wins.

The analysis shows that all propelling mechanisms from literature are important in accelerating small wins. Variance among the actor groups is observed. Innovation generators appear to be most concerned about their own barriers and generating credibility to catalyse additional resources, which activates the propelling mechanism *logic of attraction.* Innovation supporters care for their reputation and image, which is stimulated by increasing *energising.* Actors facilitating the societal infrastructure appear to transfer responsibilities, by being an example for others, therewith accelerating the *bandwagon effect*. The propelling mechanisms that seem to be lacking are *coupling* across policy domains and *robustness.*

Based on these findings, two governance strategies are recommended. The first one is the stimulation of bottom-up solutions that are already in place. It is important to stimulate relevant actors, promising innovations and focus on existing collaboration networks. The second strategy is to provide direction for and intervening in areas that are not naturally addressed. Direction appears to be lacking and should be enhanced to provide guidance. This can be done by addressing national or European regulations for plastic in water, in order to stimulate change.

Keywords: plastic pollution, small wins, propelling mechanisms, wicked problems, mission-oriented innovation policy.

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1. Introduction

Plastic production and consumption have increased over the last decades on a global scale (Avio, Gorbi & Regoli, 2017; Gourmelon, 2015). Europeans alone generate 25 million tonnes of plastic waste on a yearly basis, of which only 30% is collected for recycling (Gourmelon, 2015; Rankin, 2019). The increased amounts of plastic use has led to the accumulation of plastic waste in both oceans and at landfills, where it pollutes communities, harms animals, squanders important resources and takes up valuable space (Andrady, 2015; Gourmelon, 2015). Additionally, the decomposition of plastics is very slow, it can take up to 1000 years for plastics to decompose (Excell, 2019).

The problem of plastic pollution is that there is not one root cause, which makes it impossible to find an optimal one-size-fits-all solution (Koelmans et al., 2017). From the production of plastics to the plastic waste ending up in landfills and polluting oceans and beaches, many different actors are involved that contribute to the problem. Companies produce too much plastics, supermarkets overpack their products, consumers buy too much single-use plastic products and do not discard them properly, and recycling streams are not optimal (Gourmelon, 2015; Van den Berg, 2018; Zaman, 2010). The interconnected and complex nature of the problem of plastic pollution can be expressed as the 'wickedness' of the problem (Koelmans et al., 2017). Wicked problems are complex social or political problems that are intractable, open-ended, unpredictable and ill-defined (Rittel & Webber, 1973). The wicked character of this problem leads to diverging stakeholder perceptions and therewith clashes on what an acceptable solution should look like (Reinecke & Ansari, 2016).

Effectively managing the multi-causal problem of plastic pollution is difficult for policymakers, because of the aforementioned characteristics of wicked problems (Peters, 2017). Policy interventions for wicked, and in specific societal, problems are recently discussed in combination with mission-oriented innovation policy (MIP) (Mazzucato, 2017; Wanzenböck et al., 2019). The purpose of having a mission is that it can provide a shared direction for innovative activities (Wanzenböck et al., 2019). Setting missions brings people together around a common goal and enables stakeholders to contribute to that shared goal. With a missions approach, system change can be achieved for societal problems, because they enable the rise of multiple bottom-up solutions (Mazzucato, 2017; 2018a). Despite the already existing connection between top-down missions and bottom-up solutions in MIP literature, the focus appears to be more on formulating the mission, rather than how to coordinate and stimulate bottom-up solutions.

A perspective that follows the bottom-up logic, guided by a shared vision, is small wins (Weick, 1984; Urpelainen, 2013). Small wins focus on incremental change to achieve sustainable results for large societal challenges (Termeer and Dewulf, 2019). It is an action or measure that benefits a large set of actors (Urpelainen, 2013). Small wins can constitute a transition if they are guided by a vision or big dream and should *"enable another win that is somewhat less small"* (Urpelainen, 2013, p.115). A 'sustainability transition' is necessary because of current market failure in which plastic production is increasing, and society is not able to keep up with the waste (Löhr et al., 2017; Tibbetts, 2015). When consecutive small wins accumulate, they are able to produce large differences and can lead to a system change (Peters, 2017; Termeer & Dewulf, 2017). In order for small wins to accumulate, the right propelling mechanisms have to be activated by the small win itself or its stakeholders (Termeer & Dewulf, 2019). So far, six mechanisms (*energising*, *learning by doing*, *logic of attraction*, *bandwagon effect*, *coupling* and *robustness*) have been identified in literature that can propel an initial small change so that it becomes larger and stronger (Termeer & Dewulf, 2019). A deeper understanding of the

propelling mechanisms of small wins needs to be developed, as the six mechanisms are currently only conceptualised theoretically, but lack empirical evidence. This thesis aims to gain these insights for the plastic pollution problem in the form of a case study, by addressing the following research question:

How do propelling mechanisms amplify small wins related to the plastic pollution problem in the Netherlands?

The contribution of actors to accelerate existing or activate additional small wins is investigated through an in-depth research of the propelling mechanisms. Small wins can be distinguished by the contribution they make, being either focused on the generation of innovations, or on facilitating the societal infrastructure (Urpelainen, 2013). Actors that generate innovations to contribute to a small win, come up with new ideas they aim to implement, and can be technical as well as social innovations (Termeer & Metze, 2019), whereas actors that facilitate the societal infrastructure provide the rules and regulations, and therefore influence the conditions for other actors to operate, such as port authorities and municipalities (Urpelainen, 2013). The small wins and their characteristics are investigated according to this distinction, because of their diverse roles in society, which could influence their arguments to contribute to small wins and reasons for activating propelling mechanisms. However, this has not been investigated yet and is therefore a gap in scientific literature. This research aims to contribute to this gap by answering the following two sub-questions:

SQ1: How do the small win characteristics vary for the actor groups contributing to small wins?
SQ2: How do propelling mechanisms and the amplification of small wins differ for the actor groups contributing to small wins?

The research is conducted specifically for the Netherlands, because the Netherlands demonstrated its ambition to take the lead in an integrated approach of plastic litter in European watersheds (Van Nieuwenhuizen Wijbenga & Van Veldhoven-van der Meer, 2018). Additionally, the Netherlands formulated a goal for plastic pollution in a letter to the parliament. This letter addresses the mission-driven approach for innovation policy in the Netherlands, and reads: *"achieving plastic free waterways"* (Keijzer, 2019, p.1). The goal resembles a missions approach, since it provides a clear direction for a societal problem, sparks cross-actor innovation and is open to being addressed by different types of solutions (Mazzucato, 2018b). Although there is overlap between concepts of MIP literature and small wins, in terms of the shared goal and its corresponding bottom-up actions, the combination and integration of the two literature streams has not been made in scientific literature. This research aims to contribute to this gap in literature. Therefore, a third sub-question is addressed:

SQ3: What are implications of the propelling mechanisms for mission-oriented innovation policy?

The answers to these questions aim to contribute to the integration of MIP literature and small wins, with a focus on how bottom-up solutions are developed and scaled. A deeper scientific understanding of the propelling mechanisms and the role of different actors for achieving small wins is gained with an empirical case study. By understanding the dynamics of this complex, adaptive system of plastic pollution in which small wins are initiated and propel, insights can be gained into opportunities, limitations and conditions under which the system changes and can be directed in the future (Loorbach, 2010). Herewith, the current state of knowledge on the integration of small wins with a shared mission is expanded and assumptions for the importance of different propelling mechanisms for different small win types can be validated. This research also provides recommendations for policy makers to produce small steps of continuous change.

2. Theory

In this chapter, scientific literature is addressed that forms the basis of this research. First, the theory of wickedness is explained, already in part applied to the case of plastic pollution to illustrate the complexity of the problem. Secondly, MIP is further clarified. Thirdly, literature on small wins and their corresponding propelling mechanisms are discussed, as well as the distinction in actor groups that contribute to small wins.

2.1. Wickedness of problems

Rittel and Webber (1973) first described wicked problems as complex social or political problems that are intractable, open-ended, unpredictable and ill-defined. Wicked problems lack clarifying traits and do not have clear and objective optimal solutions. Furthermore, wicked problems may not have any directly traceable causes (Reinecke & Ansari, 2016), mainly because of its systemic and interconnected nature (Mazzucato, 2018a). This increases the complexity of the problem, which leads to difficulties in demarcating the problem, identifying specific culprits and providing concrete solutions (Mertens, 2015; Termeer et al., 2015).

Delimiting wicked problems and offering definitive solutions to these problems is difficult (Reinecke & Ansari, 2016). Solutions can never be entirely right, because there is no one-size-fits-all solution to a wicked problem and since stakeholders may differ on the cause of the problem. Depending on how the problem is understood by the actors involved, solutions can be better or worse (Rittel & Webber, 1973). As there are multiple causes and no optimal solution to the problem, multiple stakeholders from different sectors need to collaborate to have an impact.

Nearly all public policy issues and societal challenges or problems can be argued to possess some form of wickedness, such as climate change and clean energy (Newman & Head, 2017; Rittel & Webber, 1973). Within the policy issue of sustainability, the different aspects of economic, environmental and social systems intersect, which typically increases the complexity of the problem (Mertens, 2015). This is also the case for plastic pollution. It can be described as a wicked problem, because of the complexity and interconnectedness concerned with delimiting the problem. There is not one specific cause, since plastic pollution is rooted in production and consumption patterns, but also in the way we dispose and manage waste of different sectors across various industries (Chen, 2015). Additionally, there is no one-size-fits-all optimal solution to the root of the problem. Will bio-based plastics be the solution for the future as an alternative to conventional plastics? Should we focus on behavioural change by educating consumers about which materials are better, or circumventing the use of single-use plastics in households? Can this be achieved by company-based initiatives or do we need new regulations and legislation to tackle the plastic problem? (Landon-Lane, 2018). None of these actions alone provides an optimal solution for the plastic pollution problem, which means that simultaneously multiple solutions need to be initiated to address the problem and collaborations are necessary. Furthermore, other scholars have argued that the plastic pollution problem is a wicked problem, such as Landon-Lane (2018), who identified seven out of the ten initial properties by Rittel and Webber (1973) of a wicked problem for marine plastic pollution. The properties and reasoning for their presence and absence in the plastic pollution problem is displayed in Table 1.

Table 1: Properties of the wicked plastic pollution problem

Property of wicked problem (Rittel & Webber, 1973)	**Presence in Landon-Lane (2018)**	**Additional reasoning**
No definitive formulation of wicked problem	Absent	The root cause of plastic pollution problem cannot be traced. Finding the locus of the difficulty to formulate an optimal solution is hard. (Chen, 2015)
No stopping rule	Present	The plastic pollution problem may never disappear, because of constantly changing factors
Solutions are good-or-bad, not true-or-false	Present	Managing the plastic pollution problem is at best optimal and subject to managerial and external limitations
No immediate and no ultimate test of a solution to a wicked problem	Present	The effects of implementations are only known after being put in place and may irreversibly worsen the problem
Every solution is a one-shot operation, every attempt counts significantly	Absent	Every implemented solution for the plastic pollution problem is consequential. (Löhr et al., 2017)
No exhaustively describable set of potential solutions	Present	Inexhaustible set of solutions to resolve plastic pollution problem
Problem is essentially unique	Present	Every situation is one of a kind. The plastic pollution problem continues to change in the future
Problem can be considered to be a symptom of another problem	Present	Plastic pollution comes initially from a whole range of other problems
Existence of a discrepancy for wicked problem can be explained in numerous ways	Absent	Everybody picks the explanation of a discrepancy that conforms best to his or her intentions. Discrepancies on 'missing plastic'[1] involve multiple hypotheses. (Ritchie & Roser, 2018)
Decision makers have no right to be wrong	Present	They carry a heavy moral burden, since decisions cannot be wrong, because of the effects it will have on many industries and people

Note: table is adapted based on the article by Landon-Lane (2018). When presence of the plastic pollution problem was found in the article, that reasoning was applied. Otherwise, additional literature was exploited.

[1] The missing plastic problem describes the discrepancy between annual inputs of plastics to the ocean and estimates of surface plastic accumulation (Ritchie & Roser, 2018).

2.2. Mission-oriented Innovation Policy

Recently, there is an increased need for governments to respond to large social, environmental and economic challenges, such as climate change, demographic and health concerns (Mazzucato, 2017). These so-called 'grand societal challenges' can be addressed as wicked problems, because of the complexity and urgency involved, and the systemic and interconnected nature of the problem. Governing wicked, societal problems with innovation policy sparked a renewed interest in MIP (Wanzenböck et al., 2019). Missions were originally targeted at ambitious technical achievements, such as the man-on-the-moon mission. However, recently missions for societal challenges, which incorporate more than technological advances and are therewith more complex and unstructured, have been developed to provide direction. Societal missions are able to shape the direction for complex societal problems and assist in formulating societal needs (Mazzucato, 2018b).

The aim of policies with an orientation towards missions is to attain a specific goal or meet a large problem with a shared ambition (Mazzucato & Penna, 2016). The direction that this shared ambition provides is necessary for actors to be able to contribute to a common goal and experiment with multiple bottom-up solutions around that goal (Mazzucato, 2014). Missions are about wide engagement across society, where the same dilemma is shared between public, private and civil society to build the most fruitful conditions under which bottom-up solutions can be developed.

Current literature on MIP assumes that societal missions cannot be achieved by a single (technological) solution (Mazzucato, 2018a). A mission should stimulate innovation and be open to different types of bottom-up solutions (Mazzucato, 2018b). Missions address the problem and then identify potential technological, institutional and behavioural solutions (Hekkert et al., 2020). Missions are clear on the expected outcome, which is represented by the shared goal. However, the path to reach the outcome is determined by the bottom-up approaches that are introduced and contribute to the mission.

MIP attempts to combine the top-down approach in which a mission or vision is formulated, with multiple bottom-up solutions that are necessary to achieve the mission (Mazzucato, 2017). Herein, the literature elaborates on the formulation of missions, but lacks in explaining how to manage bottom-up solutions. It is not specified what bottom-up approaches should look like, how they should be managed, coordinated or accelerated to contribute to the shared mission. Here, the small wins approach can provide more insights.

2.3. Small wins

The small wins approach is a governance strategy that follows the bottom-up logic, which is still underdeveloped in MIP literature (Urpelainen, 2013). A strategy of small wins addresses the importance of incremental or marginal change to achieve sustainable results for wicked problems (Termeer et al., 2015). The aim of small wins is to achieve attainable goals, rather than sudden change in complex adaptive systems (Termeer, Dewulf & Breeman, 2013; Weick, 1984). A small win can be defined as an action or measure that benefits a group of actors without harming powerful opponents and can either contribute to 1) the generation of innovations or 2) facilitating the creation of a suitable societal infrastructure (Urpelainen, 2013). Accordingly, a small wins strategy can help policy makers to produce small steps of continuous change, to prevent them from getting caught up in wicked experiences of multi-causal problems (Termeer et al., 2015). The wickedness of problems can be overwhelming for policy makers, which could lead to a relapse in old stagnated routines, without any progress. By

producing a series of small wins, old routines can be transformed into new learnings and lead to a transition towards sustainability (Weick, 1984).

In contrast to the mission approach, small wins can be addressed as a strategy of change that is focused on micro processes (Reay, Golden-Biddle & Germann, 2006). However, the big difference with other bottom-up approaches is the contribution of small wins towards achieving an ambition or a big dream (Urpelainen, 2013), in which the ambiguity of an ambition is seen as the driver for change (Termeer & Metze, 2019). The ambiguity of an ambition refers to the fact that it should provide guidance, without hindering the innovativeness of actors involved. Small wins are at the core of a gradualist strategy that is guided by a specific goal (Urpelainen, 2013). The gradualist strategy for researchers and policy makers to evaluate the accumulation of small wins can be found in the three following steps provided by Termeer and Dewulf (2019): 1) identifying and valuing small wins, 2) analysis of the propelling mechanisms to determine whether the right ones are activated to accumulate into transformative change, and 3) feedback of results into the policy process to activate new small wins. By following these three steps, policy recommendations can be made.

The three steps resemble the three sub-questions that were posed in the introduction and provide the structure for this study based on Termeer and Dewulf (2019). The first step revolves around identifying and valuing small wins. Herein, emerging small steps are identified, which can be difficult, since they typically emerge under the radar of the public. For actions and measures to be labelled as a small win, they need to possess specific traits that are discussed in section 2.3.1. The evaluation for the small wins contributing to a solution for plastic pollution are discussed in section 4.3.

After having identified the small wins, the second step involves an analysis of the propelling mechanisms to identify what accelerated the initial small win. The goal for small wins is to enable another small win that is somewhat less small (Urpelainen, 2013). When a small win triggers another small win and accumulates, this can lead to a transformation (Termeer & Dewulf, 2017; 2019). Propelling mechanisms are *"chains of events that reinforce themselves through feedback loops with an amplifying effect on an initial small change so that it becomes larger and stronger, or intensifies and escalates its consequences"* (Termeer & Dewulf, 2019, p.305). The analysis of the propelling mechanisms is aimed at determining whether the 'right' propelling mechanisms are activated to accumulate into transformative change. Termeer and Dewulf (2019) distinguish six propelling mechanisms that are explained in section 2.3.2. Literature does not state exactly what 'right propelling mechanisms' entail, but they differ per situation. Therefore, additional empirical research is necessary to determine what right and wrong propelling mechanisms may look like and if it can be generalised. The results of this analysis are presented in section 4.4.

Finally, the third step is the activation of new small wins through feedback of results on the small wins and their propelling mechanisms into the policy process. This can be done by making the emerging small wins and propelling mechanisms more salient for actors involved and outside. Furthermore, it requires some reflection of the actors on how accumulated small wins have been achieved. These insights can be used to overcome barriers for initiating new small wins or upscaling existing small wins. This final step guides the implications of the small wins and propelling mechanisms for the missions' perspective that is provided in section 5.1 about policy implications, in particular for MIP.

2.3.1. Identifying and valuing small wins

In this thesis, four characteristics of small wins from Termeer and Dewulf (2019) are adopted and described to evaluate the identified small wins. Additionally, one characteristic described by Urpelainen (2013) regarding the importance of shared ambitions is added to complete the list of characteristics for small wins[2]. Table 2 summarises the five characteristics of small wins and their indicators.

Table 2: Indicators for characteristics of small wins

Characteristic	**Indicator**
Concrete outcome	Visible result
Moderate importance	Micro or local level
In-depth change	Change of structures, institutions and values
Positive judgement	Step forward, improvement
Direction	Contribute to a shared vision

Concrete outcomes: Small wins should yield concrete outcomes with visible results (Reay et al., 2006). It should go beyond promises and ideas and lead to the implementation of an activity, such as pilots, innovative contracts, citizen initiatives or novel legislation (Termeer & Metze, 2019).

Moderate importance: Small wins should be of moderate importance at micro or local level (Weick, 1984). This level is argued to be the most effective in meeting complexity and turbulence (Vermaak, 2013). Small wins can therewith be seeds for transformative change.

In-depth change: When implementing small wins, in-depth change should be achieved. Only improving current practices, without altering underlying assumptions is deemed insufficient (Termeer, Dewulf & Biesbroek, 2017). In-depth change comes down to a change in beliefs, routines or values (Termeer & Dewulf, 2019). Small wins should involve a second- or third-order change to tackle the underlying social causes and change structures, institutions and values (Termeer & Dewulf, 2017). Second-order change breaks through mind-sets and opens them up for discussion by reframing problems and practices and understanding them from a different perspective (Termeer et al., 2017). Third-order change relies on the development of the people involved to reflect on the schemata underlying the system of which they themselves are part. This kind of change aims to change the way we look, think and act.

Positive judgement: Small wins should be an improvement and step forward to be judged positively (Termeer & Dewulf, 2019). However, a small win to one specific group can be perceived as damaging for another group. Scholars have not been very clear on how a step forward can be estimated. Being judged as something positive can also become clear by (in)direct forms of gratitude from stakeholders or the public opinion.

Direction: The fifth characteristic addresses the shared vision or direction that a small win should contribute to (Urpelainen, 2013). Having a 'big dream' means that small wins can be designed in light of what needs to be done. Guided by an overall strategy, it increases the coherence of policies, both across policymakers and over time. The big dream should be relatively flexible in terms of

[2] Termeer and Dewulf (2019) noted the importance of a shared direction, but did not include it as a characteristic yet. In a recent article by Termeer and Metze (2019), this fifth characteristic is added under the label 'contribution to a shared ambition'.

understanding of what potential solutions should look like. Small wins anchored in a big dream allow to gradually overcome key strategic problems that impede cooperation to address societal problems.

2.3.2. Analysis of the propelling mechanisms

Six propelling mechanisms are described to enable the acceleration of small wins: *energising, learning by doing, logic of attraction, bandwagon effect, coupling* and *robustness* (Termeer & Dewulf, 2019). It is assumed that the presence of one mechanism can be enough to activate the accumulation of small wins. Moreover, propelling mechanisms can reinforce each other, which leads to stronger effects. The six propelling mechanisms are discussed in further detail based on Termeer and Dewulf (2019).
Table 3 provides a summary of the propelling mechanisms and their indicators.

Table 3: Indicators for propelling mechanisms

Propelling mechanism	**Indicator**
Energising	Energy and enthusiasm Empowerment
Learning by doing	More than one experiment Learning outcomes guide new experiments Experimenting also continues after disappointing and unexpected outcomes Communities of practice
Logic of attraction	Other communities know and value wins Additional resources Visible results and public acknowledgement
Bandwagon effect	Highlighting and celebrating wins
Coupling	Connections with problems or aims from other policy domains Connections across scales
Robustness	Numerous Non-stoppable Internalised behavioural change Examples of resisted opposition

Energising: The energising element of a small win is based on the ability to activate and accelerate other small wins, because concrete outcomes and visible results of one small win can motivate and provide encouragement for actors to look for other potential small wins. The energising mechanism can be activated technically, in the sense that small wins can prove technical feasibility, but also in the social dimension, where it proves actors' ability to accomplish results, which generates trust and commitment.

Learning by doing: The learning by doing mechanism incorporates the process of achieving small wins, which is not always directly successful. Small wins represent miniature experiments, where every attempt can activate learning by doing, due to quick feedback from visible results. This can help in determining future effective strategies. Communities of practice form suitable environments for learning, as they provide a context where mutual engagement allows for a locus for the creation of knowledge (Wenger, 1999).

Logic of attraction: The logic of attraction mechanism incorporates the tendency of resources to flow towards 'winners'. This means that after the small win is recognised by other actors, resources are mobilised for them, which increases the chance of activating and accumulating other small wins.

Influential actors can create credibility for small wins to attract additional resources (Termeer & Metze, 2019). Resources consist of human (e.g. new allies and additional employees), financial (e.g. funds and sponsoring) and physical (e.g. office space and equipment) resources (Surroca, Tribó & Waddock, 2010).

Bandwagon effect: The bandwagon effect occurs when actors decide to copy others. An alternative way of organising a small win can be inspiring for others, who decide to imitate and adopt it. The bandwagon effect is a psychological phenomenon where actors decide to undertake a specific action, because other actors are doing so (Biddle, 1991). Visible results and public acknowledgement of small wins encourage other people to take comparable actions. What is also important for others to copy an initiative is the extent to which others judge an initiative as legitimate. Herein, reputation and a positive image can help. However, what should be kept in mind, is that copying of 'bad practices' can also occur, which is disadvantageous (Termeer & Metze, 2019).

Coupling: The activation and accumulation of small wins can be accelerated when they combine with other events, such as new linkages across scales, businesses and policy domains (Termeer & Metze, 2019). Also synergies with other policy domains can create a combined effect that is greater than the sum of its separate parts. Events in one part of the system can offset a chain reaction and lead to the accumulation of events in other parts of the system. Cooperation between actor groups within a system can be established and increase the coupling mechanism.

Robustness: Every propelling mechanism contributes to an increased robustness of small wins. When small wins become numerous and therewith more likely to result in sustained change, they become more robust. A further increase in robustness occurs when the community that benefits from the small win expands. Robustness is characterised by small wins that go beyond being framed as pilots, no premature termination of initiatives, existing policies that are rearranged or an internalised behavioural change that can be observed.

2.3.3. Actors and their contributions to small wins

Hitherto, there is no research that distinguishes propelling mechanisms for the kind of small wins that they contribute to. Previous studies point to the fact that actors can contribute to different kinds of small wins, namely 1) the *generation of innovations*, and 2) *facilitating the societal infrastructure* (Urpelainen, 2013). In addition to these two groups, in this research a third group is added that supports the innovation generators, and is therefore called *innovation support*. The innovation supporters are closely connected and provide additional resources to one of the innovation generators. Moreover, small wins can be initiated from different types of organisations, such as public (policy makers and governmental agencies), private (large companies and SMEs) and civil society (community groups, NGOs, charities and social movements) and at different scales, such as global, national and subnational (Vince & Hardesty, 2017; Termeer & Dewulf, 2019; WHO, 2019).

This thesis is interested in exploring differences in the type of small wins that are produced as well as the propelling mechanisms that activate the accumulation of small wins among these groups. It is assumed that different initiatives contribute to making progress in wicked problems, and that this contribution depends on the type of small win. Therefore, the distinction between the three groups and their characteristics are discussed as follows:

First, actors that *generate innovations* to achieve small wins are characterised by efforts of research, development and implementation of new ideas, shown to other actors by demonstration projects (Urpelainen, 2013). They consist of both technical as well as social innovations, which involves product and process innovations as well as innovations in community development and education (Mulgan, 2006). The main type of organisation that generates innovations are private and civil society, because these groups are the most likely to come up with new alternative ideas that can change the current narrative. Private actors consist of industry actors such as multinationals, SMEs and start-ups, which act for profit. Civil society actors are mostly volunteers or citizens that come up with initiatives and are non-profit oriented (WHO, 2019). In terms of propelling mechanisms, the *logic of attraction* will probably be relevant, since mobilising resources and being valued as winners is important for these actors to be successful. Next, *energising* will be necessary to create increased trust and commitment from members involved and attract additional actors (Van Oers, Boon & Moors, 2018).

Second, *innovation supporters* are valuable actors for innovation generators to produce technical and social innovations. Developing a new technology or social innovation requires resources that actors might not have in-house and requires outsourcing (Belcourt, 2006). Consequently, these actors are mainly large organisations that provide the financial, physical and/or human resources they deem important for the acceleration of technical and social innovations. Innovation supporters start to collaborate with the generators after the first visible results have shown and therefore are often not involved in the initiative from the start. Innovation generators often depend economically on the innovation and benefits most from the collaboration, whereas the supporting actors typically have other business operations that ensure continuity of their organisation (Nieto & Santamaría, 2010). For this reason, it is assumed that the innovation supporters will value *coupling* as well as *learning by doing* as the most important propelling mechanisms. *Coupling* can be seen as reason for them to start a collaboration and *learning by doing* focuses on pilots and experiments which will lead to adaptations to improve the innovations (Urpelainen, 2013).

Third, actors that facilitate the *societal infrastructure* on a national and global scale determine for a large part how problems are addressed and which initiatives can get successful (Urpelainen, 2013). The societal infrastructure in this research is described as the infrastructure that is manageable by actors related to the plastic pollution problem, such as the conservation of a clean water or on-land environment (Tibbetts, 2015). Examples of those managing actors are organisations such as the port authority, Rijkswaterstaat and municipalities. They therefore can be supportive of or form a barrier for multiple actors, in contrast to innovation supporters who assist only one specific actor. Change in the societal infrastructure occurs on a higher level and has no intention to stimulate one individual organisation, rather do what is best for the whole society. Examples mentioned in previous literature are grid improvements and railway projects (Urpelainen, 2013).

Actors that facilitate and direct the societal infrastructure are expected to be primarily public actors, because efforts are required that aid the general public, which is generally more attributed to public actors (Urpelainen, 2013). However, facilitating actors can also be non-state actors who enhance the legitimacy of regulations or waste infrastructure by publicly supporting it. As facilitating actors, they have a large influence on what the market looks like and which type of technological, behavioural and institutional solutions will be favoured in society. Herewith, the propelling mechanisms that will be important for them are *coupling* and the *logic of attraction*, since they need connections to be awarded credibility. Next, it is expected that they are also the ones intervening and activating propelling mechanisms for innovation generators.

3. Methodology

3.1. Research design

A qualitative research strategy is used in this research, because it allows for a deeper understanding of the propelling mechanisms in general and a critical reflection on the accumulation of other small wins in this context (McLeod, 2017). The research is therewith more concerned with words, rather than numbers (Bryman, 2012). A multiple case study design is followed, where the cases were divided into the three groups of small win contributions. As the characteristics of the small win within each group should be as similar as possible, common and differentiating factors between the groups can be identified (Bryman, 2012). This provides the opportunity to understand potential generative causal mechanisms in contrasting contexts. The generative mechanisms that are responsible for observed (ir)regularities or variation in specific contexts can be understood as acts of causation and therewith increase the internal validity of the research.

This research follows an abductive research approach. Abductive research approaches differ from the process of deduction or induction in that it uses systematised creativity or intuition to develop 'new' knowledge, rather than focusing on generalisations or specific phenomena (Van Hoek et al., 2005). Abductive research is concerned with the particularities of specific situations where deviations from general patterns are essential. What is central in abduction is that the world is described and understood from the participants' perspective, where the researcher has aimed to construct a theoretical understanding within this specific context with these people (Bryman, 2012). Herein, the researcher tries to come up with the most likely scenario for the events that occur, by giving an inference to the best explanation (Reichertz, 2004). *"Abduction ... looks for meaning-creating rules, for a possibly valid or fitting explanation that removes what is surprising about the facts"* (Reichertz, 2004, p. 309).

Following the logic of the abductive research approach from Van Hoek et al. (2005), first theoretical knowledge on wickedness, small wins and missions was derived for this research. Thereafter, the real-life observations were studied to identify where the cases match with or deviate from the theory. Herein, theory matching was applied, which means that the theory used prior to the observations is tried to be extended (Dubois & Gadde, 2002). Finally, abduction is used to suggest general rules, hypotheses and/or propositions.

3.2. Data collection and sampling

Purposive sampling was used as a sampling method to identify and select potential and relevant small wins, since this method aims to sample cases strategically, and sample those that are relevant to the research question (Bryman, 2012). More specific, *stratified purposive sampling* was applied, which means typical cases were selected within subgroups of interest. These subgroups of interest should represent the maximum variation, which is in this research represented by the three groups of small win contributions (Palinkas et al., 2015). The selection of typical cases increases the external validity, because more general conclusions can be drawn for actors within the categories. Using this sampling method, the data can capture major variations as well as a common core.

Before starting the data collection, the scope of the research was limited to initiatives that contribute to the shared Dutch goal for plastic pollution, which reads *"achieving plastic free waterways"* (Keijzer, 2019, p.1). Herewith, the connection between small wins and the shared ambition that resembles a

missions-approach was made. The focus of the research on plastic pollution in the Netherlands is relevant, because the Netherlands is one of the frontrunners taking measures to tackle the plastic pollution problem. The country pronounced its ambition to take the lead for an integrated approach of plastic litter in European watersheds (Van Nieuwenhuizen Wijbenga & Van Veldhoven-van der Meer, 2018). It specifically focuses on waterways, because those are among the largest polluted areas with plastic debris (Den Oudendammer & Van Balen-Peeters, 2014). The Netherlands has a large responsibility for the waste that reaches the sea, because the Rhine and Meuse end in the North Sea (Rijkswaterstaat, 2018). Furthermore, the choice to only investigate cases within one country reduces the differences of formal and informal institutions, which makes them better comparable (Boschma, 2005).

After the scope was limited, the first step in collecting the data was the execution of desk research to identify relevant bottom-up actions or measures. To retrieve an overview of the ongoing initiatives, keywords[3] were sought for in data sources such as: Google, Google Scholar and news articles in LexisNexis. With the keyword search, 68 initiatives were identified in total. A first characterisation was performed to determine whether the initiatives qualify as a potential small win. This was done based on the set of criteria for small wins as explained in the Theory section. Information from the actors' websites, news articles, grey literature and scientific literature was utilised for the characterisation. Initiatives that did not meet the requirements in advance were neglected[4]. Of the 68 initiatives in total, 44 were designated as potential small wins based on the available data. Thereafter, it appeared that initiatives aiming for plastic free waterways could be assigned to one of the three categories: preventive, removal or recycling measures. To limit the scope of the research further and ensure comparability of the cases, only measures that focus on 'removal' were included. These measures were selected, because they have a clear visible result to litter-free waterways and focus on the post-consumer phase, where plastic ends up in the environment.

The second step of data collection included conducting qualitative semi-structured interviews. The insights gained from the interviews provided further contextual data, which is more elaborate and extensive than desk research alone (Bryman, 2012). By combining these two sources of information, data triangulation was ensured, which adds to the credibility and internal validity of the research. The semi-structured design of the interviews allowed the researcher to keep an open mind about what should be in- or excluded from the interview and for new concepts to arise from the data.

During the interview, the interviewees were asked to address how the initiative was initiated and what was important for the growth of the initiative. Herein, interviewees could already illustrate the importance of specific propelling mechanisms. The researcher let the interviewee come up with crucial interventions and mechanisms themselves to avoid steering the interviewees, which allowed for additional accelerating factors to appear from the interview. As a next step, specific questions were asked about propelling mechanisms that the interviewees did not mention, to check if those mechanisms were present after all. Additionally, during the interviews, important actors for the growth of the small wins were addressed. Whenever these came up, snowball sampling was applied to find out what the perspective of collaborating actors was on the importance of propelling mechanisms for small wins.

[3] The keywords of interest were: 'plastic AND waterways', 'plastic free waterways (Netherlands)', 'plastic free waterways public', 'plastic free waterways companies', 'plastic free waterways civil society' and 'municipality plastic initiative'.

[4] For example the plan for deposit on cans and small plastic bottles, which might be implemented from 2021 onwards, if no reduction of 70-90% of small plastic bottles in litter is achieved by spring 2020 (Van Veldhoven-van der Meer, 2019). Since this initiative is only a promise and no visible result yet, it was not included.

Data collection continued until theoretical saturation was reached (Bryman, 2012). This meant that towards the end of data collection, repetitive answers were given by the interviewees about the characteristics and interventions that occurred to accelerate small wins. For pragmatic reasons all interviews were conducted in Dutch, because that is the native language of the researcher and all interviewees.

In total sixteen actors were interviewed. These actors contributed to small wins that initiated between 2012 and 2017. They are all quite recent, with a maximum duration of eight years and a minimum of two years. Two actors ceased their operations and transferred their responsibilities to other parties, but still remained active in the field. The innovations from *innovation generators* include both technical and social innovations. They are bundles for the sake of simplicity and assumed to require similar interventions, compared to *actors that facilitate the societal infrastructure* who operate on larger scale and require resources for different reasons. *Innovation supporters* assist innovation generators with their technologies or social innovations, and do not develop them on their own, but focus on other business operations for their day-to-day business. When dividing the small wins into the categories of their contribution and the type of organisation (see Table 4), what stands out is that public actors only facilitate the societal infrastructure, whereas private and civil society actors focus on innovation generation, as well as facilitating the societal infrastructure. Furthermore, support to the innovation generators is solely provided by private actors. The final list of interviewees can be found in Table 6 in Appendix I.

Table 4: Actors per small win contribution and type of organisation

	Innovation generators	**Innovation supporters**	**Actors facilitating the societal infrastructure**	**Total**
Public	0	0	5	5
Private	3	3	2	8
Civil society	2	0	1	3
Total	**5**	**3**	**8**	**16**

As the third step of the data collection, three experts from the scientific field were consulted to verify results and interpret the data. The experts were consulted on the topics of: water systems and the initiatives contributing to plastic free waterways (E1), missions (E2) and small wins (E3). All experts are professors from various Dutch universities and knowledgeable on the topic of plastic pollution or familiar with the theoretical framework that was used in this study. The interviews with the small win contributors were leading in this research, because with those interviews the practical evaluation of the theory was tested. The insights from experts were used to provide a deeper understanding or additional context. A list of the experts can be found in Table 7 in Appendix I.

3.3. Operationalisation and data analysis

To increase the external reliability and replicability of the study, a clear operationalisation is necessary, which is able to measure the investigated concepts (Bryman, 2012). This operationalisation follows from the concepts as explained in the Theory section and can be found in Appendix II, Table 8. The devised interview questions for the small win contributors and experts, designed based on the indicators from the operationalisation table, are represented in the Interview Guide, which can be found in Appendix III.

To analyse the data, all interviews were recorded and transcribed. A multiple-case comparative analysis is executed between the different small win types, where actors either 1) generate innovations, 2) support innovations or 3) facilitate the societal infrastructure. These cases are compared, because it is expected that different propelling mechanisms are important among the groups. The kind of contribution that actors deliver to small wins, is expected to have the largest impact on the kind of accelerating processes that are important for them. By executing a cross case analysis, the commonalities and differences between the groups become visible. Interpretations on this level provide insights in the main patterns and conditions under which the system currently operates and what important interventions and mechanisms are important for all three groups to provide direction for the future.

The interviews were processed using the qualitative data analysis computer software package 'NVivo'. The analysis of the data is executed based on a coding scheme that guided the coding process. This coding scheme was developed with the operationalisation table and interview questions as guidelines to enhance consistency and internal reliability. Subsequently, when new themes arose that could not be placed under any of the predetermined characteristics, new concepts were added to the existing coding scheme through open coding. Also, under the category of 'wickedness' and 'missions', data was coded based on open coding. Therewith, theoretical contributions could derive from the data. An example of a new theoretical contribution is 'Overcoming barriers' that was added to the small win characteristics. Based on the initial literature review, it was not yet part of the characteristics and therefore added after it stood out as a recurring theme from the data analysis.

During the coding process, notes were made that included outstanding results or reasons for in- or excluding a concept from a node by axial coding. These iterative reflections were made to ensure consistency of the coding process and increase the intra-coder reliability and decrease the intra-coder variability. The names of the interviewees and their organisations are not mentioned in the Results, because of privacy reasons. To indicate the interviewees that confirmed statements, they are addressed as follows: I1, I2, etc. The same goes for the experts, which are addressed as: E1, E2 and E3. Table 6 in Appendix I specifies the type of organisation and initiative that was initiated by the interviewee.

4. Results

In this chapter, the results of the research are presented. First, a network of the actors demonstrates the connectivity among the interviewees. In section 4.2, the wickedness of the problem is exemplified with illustrative quotes. Next, the first two steps of the small wins evaluation framework by Termeer and Dewulf (2019) are discussed. Self-organising small wins are identified and evaluated in section 4.3. Thereafter, section 4.4 describes the analysis of propelling mechanisms that are activated. Section 4.5 contextualises the small wins and propelling mechanism.

4.1. Network

To give an overview of all interviewees and to show the interconnectivity and dependence on the other actors, the interviewees have been placed in a collaboration network[5] (Figure 1). This network consists of connections that are established when two actors exchange resources, such as knowledge, materials or physical space. Networks give insights on which and how actors depend on each other (Friemel, 2008). Being highly connected to other actors that are concerned about plastic pollution is a desirable position in the network, because it gives the actor a large influence on the other actors (Jackson, 2010). Highly connected actors generally determine which initiatives are stimulated and attract more resources, and which do not. Therefore, the actor's position within the network determines its opportunities and constraints and is therefore critical for survival.

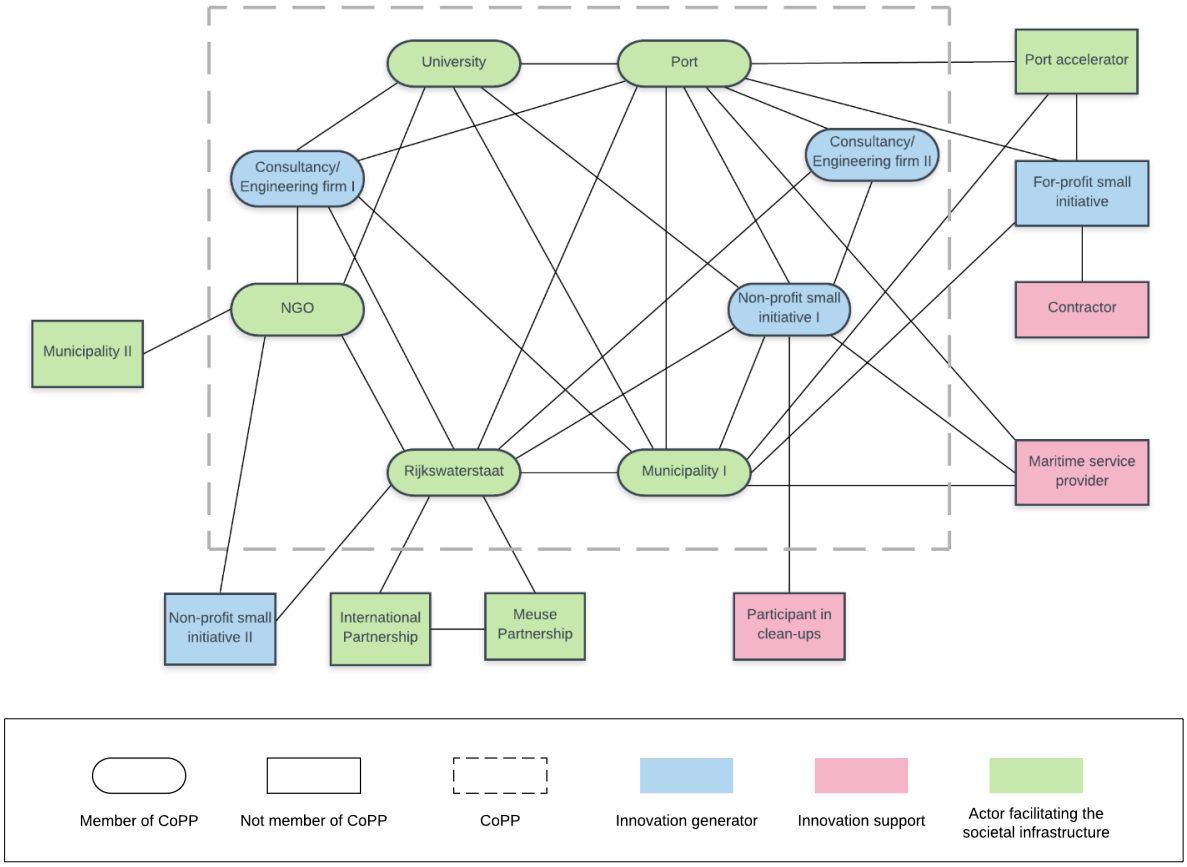

Figure 1: Interviewee network

[5] Note that this is not the total population and some connections might lack, because they were not mentioned by the interviewees. If this is the case, apparently the connection was not that important, since neither mentioned it.

Eight members of the Community of Practice Plastic (CoPP) in Rotterdam, which consists of eighteen members in total, form the core of the network in this research. This was done, because the connectivity between the actors in the CoPP is quite high, which can be explained by their monthly meetings in which knowledge and resources are shared. The CoPP is a collaborative community which aims to get a full understanding of the problem of plastics in rivers by conducting joint research (RDM Centre of Expertise, n.d). The CoPP allows parties to organise joint activities in which shared learning among the actors is the main goal, according to the expert on plastic in waterways (E1).

Looking at the network in more detail, we see that firstly, geographical proximity seems to be important for the connectivity of the actors. Almost all initiatives are geographically located in the centre or the western part of the Netherlands, except for one particular triangle within the network, between the facilitating actors: Rijkswaterstaat, the International Partnership and the Meuse Partnership. The two 'outlying actors' are located in the south of the Netherlands and are only connected to the other actors through Rijkswaterstaat, who operates on national scale. This relates back to the geographical distance between the actors within the triangle, and the rest of the actors. Hence, an advantage in the connectivity and therewith the influence of actors is experienced when actors are located in the same physical location. Even though it seems relevant, scientific literature has argued that geographical proximity is not necessary, not sufficient for learning to take place (Boschma, 2005). Therefore additional factors that influence learning and growth have to be taken into account.

Secondly, the position of Rijkswaterstaat and the Port, in which they both possess nine connections with other actors, followed by Municipality I, with eight connections, show the highest 'degree centrality'. This can be expected from their role as public actors that facilitate the societal infrastructure. The degree centrality indicates the relative importance of the actor within the network (Borgatti, 2005). This position allows them to influence which initiatives will be stimulated, accelerated or face more barriers. This makes them an important ally for innovation generators.

Thirdly, it can be noted that the amount of connections for innovation generators is rather low. Only one of them has over five connections with others, which can either indicate their lack in finding enough partners and stakeholders to grow and accelerate or their preference to work alone. From the data, it becomes clear that the actors are willing to collaborate with others, but cautious for their competitors. Whether being connected to more actors indicates a greater success for innovation generators would be interesting to investigate in further research. Nevertheless, in general one can argue that when more connections are made, more resources are exchanged, which can lead to more learning and faster growth. Herein, one of the experts (E1) recognised that smaller organisations might not be as visible and lack an extensive personal network, where the CoPP can help increase the visibility.

Fourthly, we see that the innovation supporters are located in the periphery of the network and are only connected to a maximum of three other actors. This follows from the fact that they are present within this network to assist innovation generators with resources. Therefore, their influence on individual innovation generators can be rather high, but the total influence they have on the network will not be substantial.

From the interviews, it becomes evident that sharing knowledge, which is represented by the edges in the network, is deemed an important resource by many actors. The reason is that the main focus of the initiatives appears to be on exploring and defining the problem in terms of what happens, why it happens and how the problem unfolds. This has been confirmed by the E1. Specifically in this phase, where actors strive to gain knowledge to develop better policy regulations or innovations, sharing knowledge

is important to grow. More knowledge that is shared leads to intensified networking, contributions to a shared goal and shared learning. However, knowledge can also be seen as a competitive advantage compared to other actors and sharing of knowledge is then unfavourable and can become a barrier. This can occur when unwanted knowledge spills over to other actors, or when actors hold back valuable information that could benefit the growth of others. If NGOs for example develop new knowledge, this data is always public, and thus shared with others, whether they want to or not (I5). The expert on small wins (E3) recognises the benefit of sharing knowledge to grow, but also describes the internal information of organisations as their 'patent', which they do not want to disclose to everyone.

4.2. Wickedness of plastic pollution

The fact that the problem of plastic pollution is a complex problem, with characteristics that can be addressed as wicked, was already touched upon in section 2.1. The most outstanding and recurring results from the empirical data on the wickedness of problem and solution will be highlighted in this section, to show the different aspects for the plastic pollution problem in the Dutch waterways.

First, a *divergence in stakeholder perceptions* related to the cause of the problem can be observed. As empirical data show, the main stumbling point is the disagreement between the interviewees on the 'source' of the problem. As Reinecke and Ansari (2016) already mentioned, wicked problems have no directly traceable cause. The source of the problem is perceived differently by the actors, depending on their focus area, and appears to be shifting one step back in the 'plastic pollution chain': from seas to rivers, and from rivers to shores. This general pattern comes down to actors attributing the problem of plastic pollution to the actors or organisations that are one phase ahead of them, respectively. For instance, actors concerned with cleaning the environment on land, see this area as the source of the problem and therewith the starting point to prevent it from going into the water system (I2). Yet, actors who are active in harbours and rivers address the problem there and aim to prevent it from ending up in seas and oceans (I4, I6 and I16). One of the actors highlighted the importance of this shifting perspective and illustrated the problem by the following quote:

> *"Everyone wants to work on prevention. For us prevention is: approaching the river, while people concerned with the rivers say, we have to address the situation on land. And on land, who is responsible then? The plastic manufacturers. So eventually everyone is forwarding their responsibilities. We all want prevention, but everyone further down the water system claims prevention starts one step ahead of them. The result of this is that nothing happens in the end."* (I4)

Even though this would lead to the plastic producers being the 'initial source' of the problem, because they are the ones bringing the plastics to the market, one actor (I16) specifically mentioned that leakages to the environment will remain. Even if plastic is replaced by other sustainable materials, a fully circular economy cannot be realised. Hence, next to the producers, consumers are addressed as an important source in the plastic pollution problem, and especially in leaking the plastic to the environment (I2, I5, I6, I9 and I14). However, tracing them and specifically addressing the polluters with specific solutions will be difficult (I6). Efforts that are made to address consumers relate behavioural solutions (I9). This is in accordance with a study from Heidbreder et al. (2019), who investigate perceptions and interventions to tackle the plastic problem and found that political and psychological interventions will be necessary to address the problem.

The second characteristic that can be observed from the empirical data is that *"a problem can be considered to be a symptom of another problem"* (Rittel & Webber, 1973, p.165). It appeared difficult to determine what the root cause of the problem is and whether the problem described by the actors was actually caused by another problem or because a solution was implemented that led to new problems. For example, when initiatives clean up litter from the environment with a given technology (solution), actors struggle what to do with the collected plastics (problem as a result of solution; symptom) (I1, I6, I12 and I14). The additional problem (collected plastic) follows from a solution that is proposed to solve the 'original problem'. This makes it particularly hard to formulate comprehensive solutions, as new problems might keep on occurring. Following Rittel and Webber (1973), one should not try to keep on curing symptoms of wicked problems, but address a higher level of the problem.

Thirdly, the two previously discussed characteristics of wickedness, diverging stakeholder perceptions and not one directly traceable cause, lead to a variety of solutions being offered to the problem descriptions. In other words, an *inexhaustible set of solutions* arise to resolve plastic pollution (Rittel & Webber, 1973), which brings along high uncertainty about the future. Among stakeholders this attitude prevails, as can be seen from the following quotes which describe the view of actors on which solutions should dominate in the future:

> *"It can go three ways, either we will ban plastic, or we will make it so degradable that it decays into CO_2 and water, or we find equipment to make it so valuable that a closed circle arises naturally. This can be done with deposits, but also in different ways."* (I12)

> *"The deposit on small bottles and cans, which might be implemented from 2021 onwards, is one of the solutions. It will not solve everything, but it will definitely help to levy a deposit."* (I9)

> *"Plastic is made to last forever, which is why it is bad for nature, but also super valuable. Therefore, we decided to take out the plastic from rivers, and use it to make something positive for nature. With sea level rise in mind, our idea is to have floating islands with houses made from plastic, combined with waste catching systems."* (I1)

With the plans and actions that are addressed to these problems, technologies and new regulations rely on the judgement of trust and credibility of others to determine whether they will be enlarged (Rittel & Webber, 1973). Because of this judgement of other influential actors, it becomes important to investigate what innovation generators are currently in place and which actors are enhancing the societal infrastructure, which will be done in section 4.3 and 4.4.

Finally, the *ease at which responsibilities are transferred* between actor groups came forward from the empirical data. Responsibility of who is accountable for the development and implementation of solutions is easily transferred to another actor or actor group. A potential reason for this can be the fact that: *"Waste does not have an owner, but it does have a polluter"* (I6). When there is no owner for trash and pollution, nobody feels responsible, unless it becomes a burden for actors. This can explain why actors constantly transfer their responsibility to others and feel like public, governmental actors should be the ones handling this societal problem. This is illustrated by the following quotes from interviewees:

> *"For the upcoming five years I expect that the European Union will come up with strict rules [for the design and material of plastic products], which is also very necessary to structurally solve the problem"* (I4)

"Very important is the government, on a national, regional or local basis, they need to take the lead to set something up, with regulation, supervision of companies. I think that is necessary for initiatives and enthusiasts to attach themselves to an agreement, goal or ambition that is present within an organisation." (I5)

"It is the responsibility of plastic producers to make plastics simpler and better recyclable." (I16)

Also, the expert on waterways (E1) recognises the easy transfer or responsibility for plastic pollution. The expert mentioned it is a consequence of the market mechanism that was created by all of us, where consumers, producers, as well as governments have played an important role in developing the waste and should therefore also be responsible for finding a solution. Transferring responsibilities for the problem and solution has been addressed in scientific literature specifically focused on plastic pollution (Heidbreder et al., 2019) as well as in literature where responsibility is argued to come from the complexity involved in the multi-dimension nature of societal problems (Wanzenböck et al., 2019). With examples derived from the data on the wickedness of the problem and potential solutions, it is interesting to see what initiatives have arisen and what governance strategies can be applied to deal with these wicked problems.

4.3. Description and evaluation small wins

In this section, the first step of the governance strategy of small wins will be used as a means to deal with the wickedness involved in plastic pollution to answer the first sub-question. This is done by the evaluation of small wins that contribute to 1) the generation of innovations or 2) facilitating the societal infrastructure. The group of actors supporting the innovation generators will not be included for the evaluation of small wins, as they start collaborating after the first results are visible, or when the small wins accelerate. The main results per characteristic and between the two small win contributions are addressed in a short conclusion. Moreover, the theoretical contribution of the additional characteristic, *overcoming barriers*, that is derived from the data, is addressed as well. An overview of the key findings and some exemplary quotations are provided in Appendix IV, Table 9.

4.3.1. Concrete outcome

For the first characteristic, it is important that small wins go beyond promises and ideas and lead to the implementation of an activity or have a visible result (Termeer & Dewulf, 2019). Potential small wins can take different forms, from experiments, pilots and start-ups to contracts, citizen initiatives and innovative legislation or contracts (Termeer & Metze, 2019).

The visible results of *innovation generators* are the developed social or technical innovations. For the case of plastic pollution, social activities revolve around a new community-based clean-up strategy (I1, I2) or lobbying activities to induce a change in policy for plastic production and distribution (I2). Technical innovations encompass passive (I1, I5) and active (I3, I4) waste catching systems for waterways. Next to the visible result of the tangible technology or social innovation that is produced, the desired outcome is in the end a cleaner environment and strengthened local communities, such as improved fishing conditions (I1). This can be considered an indirect visible result of the innovation generators.

The concrete outcome of *actors that facilitate the societal infrastructure* do not involve social or technical innovations, but instead consists of providing stimulating performance contracts and

regulations (I9, I10 and I11) or programmes for monetary interventions that can assist innovations to come up (I12, I14 and I15). Herein, they can take the role of launching customer (I12), wherein they help with development activities by stimulating, designing or participating in the development phase of projects (Enkel, Perez-Freije & Gassmann, 2005). These interventions go beyond promises and ideas, which is one of the criteria for small wins. For actors facilitating the societal infrastructure, an indirect concrete outcome of the interventions is the cleaner environment.

Conclusion
The concrete outcomes of the small wins reflect technical, social as well as regulatory visible measures that have been implemented by the different actors. Herewith, they went beyond promises and ideas. What stood out between the two groups is the kind of concrete outcome that is produced. Innovation generators develop tangible technologies, whereas facilitators of the societal infrastructure do not produce directly visible results, but mostly assist with financial or contractual resources so innovation generators can produce easier or more visible results.

4.3.2. Moderate importance

Potential small wins start on a small scale, because that is the level where the most radical ideas can arise and where complexity and turbulence can be effectively managed (Termeer & Dewulf, 2019). Small wins should be moderate and small up to a certain point. After that point, they can scale up, broaden or deepen (Termeer & Metze, 2019).

The moderate importance of the *innovation generators* can be observed from the development phase that they are still in. Most of the innovations went through a few trials and pilots, but none have been implemented on large scale. They all started their developments locally in one of the areas where they observed plastic pollution, such as the harbours of Rotterdam (I1, I3, I4, and I5). Since then, some actors have been able to expand their innovations on a larger scale to for example Asian markets (I1, I3). However, generally the innovations can be observed as moderately important with a rather narrow scope (I1, I2 and I5). Still, small initiatives have the benefit that they can gain trust in local communities more easily than large established organisations, which will grant them the ‘power-of-the-people’ (I2). Herewith, they can initiate a bottom-up change with support of citizens.

In general, the impact of *actors facilitating the societal infrastructure* is larger than for innovation generators, because they can approach and influence a wider range of actors. Once a new programme or regulation is implemented, its effects can be widespread. Nevertheless, in the period before large-scale implementation, moderate importance can be observed from the fact that tests on a small scale are necessary before the programme or regulation can be implemented on a large scale. Trials have been executed in one geographic location, before rolling it out for the whole country (I9, I10) and the test duration of pilots is often short (I11). Furthermore, what appeared is that small wins yield small rewards. While doing the trials, the people involved received only small gestures of compensation for their efforts (I10).

Conclusion
Moderate importance for small wins in the plastic pollution problem appears from the fact that tests need to be executed on a small scale before implementation on larger scale can take place. This often involves local pilots in one geographic location, before upscaling takes place. Both actors recognise the initial phase of small wins as being moderately important and operating on a local scale. What stood out is that for innovation generators, being small was helpful to win over the ‘power-of-the-people’.

Therefore, an increase in trust becomes important. Actors facilitating the societal infrastructure also experienced this modest character of their small wins, but the impact of their small wins, once implemented on a larger scale, is more widespread. Therefore, it is debatable whether moderate importance is a good qualification for actors that facilitate the societal infrastructure to contribute to small wins.

4.3.3. In-depth change

The third characteristic highlights the focus on second- and third-order change of radical new practices, which should go beyond quick wins or low-hanging fruit (Termeer & Dewulf, 2019). The kind of radicalness and newness of the initiatives is discussed here. The main argument by Termeer et al. (2017) is that quick in-depth change is only possible on small scale.

The second-order change that *innovation generators* activate, is targeted to change the behaviour of citizens (I1) or corporations (I2). A change in behaviour is difficult to achieve for the whole population at once. Through awareness campaigns, educational and lobbying activities, innovation generators attempt to influence littering of individuals or production efforts of companies. These can form quick in-depth changes, but on small scale, which is in line with scientific literature from Termeer et al. (2017). Additionally, different business models have shown to facilitate an in-depth change (I3, I14). An example of this is I3 who changed the working conditions for cleaners of waterways from labour intensive work, to an automatic technical innovation, which is remote controlled. This creates a higher work level. Herewith, the initiative rethinks the current ways of working and opens up current mind-sets.

For the small wins of *actors facilitating the societal infrastructure*, in-depth change was observed in the behavioural change of targeted groups, such as municipalities (I10) and boat owners (I14). Initially, financial incentives appeared to be necessary to make people aware of their behaviour and change it, but once the incentive was lifted, the desired behaviour remained and a change of habits was achieved. Herein, to create more acceptance for the change, it is deemed important for the actors to be aware of the initiative and of their own behaviour (I9, I14).

Conclusion
In-depth change can be observed in terms of the change in behaviour of individual citizens, companies and municipalities. It appears that mainly second-order change is aimed at, in which current mind-sets are re-evaluated to facilitate new ways of thinking. This seems to be present, but only on a small scale, which prevents transformational change from occurring. The main difference between the two groups appears to be the approach to influence behaviour. Innovation generators aim to change behaviour via educational awareness activities, while facilitating actors of the societal infrastructure are more focused on financial incentives.

4.3.4. Positive judgement

Small wins should be regarded as a step forward or an improvement (Termeer & Dewulf, 2019). In this research, small wins are regarded as positive, when they themselves are evaluated as positive by others, or if the effect on others is regarded as a step forward. Therefore, as an extension on current literature on small wins, positive externalities are included as positive judgements of small wins.

The positive judgement of others on the *innovation generators* becomes visible from positive externalities and acts that demonstrate they are judged as positive. Positive externalities are related to improvements in environmental conditions, because less litter is present in water areas and on land. One interviewee (I1) argued that their waste catcher has led to better fishing conditions and more tourism. Furthermore, better working conditions for cleaners, as discussed in the previous characteristic, have an indirect positive effect on the labour intensity of employees (I3). Acts that demonstrate that they are judged as positive include winning competitions (I1, I2), awards (I3), growth to various regions (I4) and additional resources that flow towards them (I5).

The small wins that *actors facilitating the societal infrastructure* contribute to appear positive in terms of the increased interest in the regulation or programme that was put in place. This can be seen for example from the increasing numbers of clean-ups that are organised (I9) and applicants for programmes (I14, I15). This shows the positive effect of the regulation or programme, the willingness of people to join and their positive attitude towards it. Next, actors facilitating the societal infrastructure, appear to value market forces as a means to show which innovations from innovation generators are most promising and thus judged as positive (I12).

Conclusion
Positive judgement is present in various ways; judging the small win as positive, as well as the positive externalities of a small win. Judging the small win as positive, is demonstrated by the initiatives winning competitions and growth in terms of regions and actors. Expanding current small wins is a sign that the initial small win is judged positively by others, because there is room for growth. An increased interest in the initiatives is shown for both types of small wins, either by the growth of people that support the small win, or by additional interest or resources that are awarded. The difference can be observed in terms of the positive externalities. The externalities of innovation generators appear to focus on improving additional environmental factors, such as better fishing conditions, while the positive externalities of actors facilitating the societal infrastructure is not so observed. One can imagine that with more clean-ups and applications to programmes, the society at large benefits from it economically and environmentally, but this has not been explicitly articulated.

4.3.5. Direction

The contribution of small wins to a shared narrative is addressed as the direction (Termeer & Metze, 2019). A common goal should be in place to tell individual actors what kind of change has to be made to prevent contradiction (Urpelainen, 2013). The ambition or goal that is described by the interviewees will be discussed per group and compared to the shared Dutch goal of *"achieving plastic free waterways"* (Keijzer, 2019, p.1). For this characteristic, the expertise of E2 on missions and shared goals is used.

The direction among *innovation generators* can be observed from the individual goals that they aim to achieve. These goals revolve around creating a litter-free environment (I1, I2) and good quality waterways (I3, I5). These individual goals fit with the shared Dutch goal for plastic pollution as addressed in the letter to the parliament. Partially, they go even further, by addressing the water quality that should be improved or creating a litter-free environment, which incorporates areas beyond waterways, such as on land.

The *actors facilitating the societal infrastructure* appear to be more interested in how they can address plastic pollution. They address various ways of the solutions-side. Among the solutions, regulatory measures, as well as networking measures are put forward as their individual goals. The regulatory measures include creating more awareness for the problem and solutions (I14), providing supervision to ensure correct implementation of regulations (I10) and implementing agreements to prevent littering (I9). The networking measures include collaborations with other countries and organisations to exchange ideas for solutions (I11, I15). One can conclude that there is variance among the actors, but in some way they aim to achieve plastic free waterways indirectly.

This variance among actors is acknowledged in terms of the general lack in 'top-down' direction that is experienced for the problem of plastic pollution. Both type of actors experience a lack in direction, structure and uniformity on national and international level that should guide initiatives for plastic pollution (I4, I10 and I11). Also the expert on initiatives in Dutch waterways argued that regulations for plastics in water are currently missing on the national and European scale. Next to policy makers, also schools are addressed as public actors that can contribute to providing direction on plastic pollution from a young age onwards (I2). One community that addresses a shared goal and develops collaborative knowledge around the topic of plastic pollution is the CoPP. Members of the community have argued that they have the same goal in mind, which is to create an aquatic environment without plastics (I1, I5, I12, I14 and E1).

Conclusion
A general lack in direction is mentioned as a potential issue that can be improved. Generally, it is believed that guidance should be provided by public actors that can be either policy makers or schools. Thereby, existing communities that dispose of a shared goal can be taken as an example. Developing guidelines for ensuring compatibility between the small wins and the shared goal is addressed by literature as a means to enhance direction (Urpelainen, 2013). Distinctive for the two groups is the way in which they frame their individual direction. The goals for innovation generators are aimed at *what* should be achieved, while actors facilitating the societal infrastructure direct their attention to *how* they can address the problem of plastic pollution.

4.3.6. Overcoming barriers

Overcoming barriers is essential for small wins, as they need to face resistance if they want to achieve an in-depth change. If a small change does not create tensions with existing institutions, it may not be able to make a transition happen (Termeer & Metze, 2019). Also when small wins grow, the barriers they have to face become larger. From the empirical data it appeared that resistance is present in a few areas that are addressed in the following paragraphs: institutional, organisational, technical and knowledge barriers.

Firstly, *institutional barriers* in terms of the resistance to change current institutions on national and European level is experienced by the actors (I4, I9). This has led to obstacles for testing ideas and implementing innovations or new regulations. Actors have experienced that the Netherlands and Europe in general are lagging behind with the implementation of innovations, and that other places in the world are faster with adopting innovative ideas (I3, I7). Also permits and safety measures are mentioned to prevent pilots from being conducted (I14, I16). This caused one innovation generator (I3) to move to other places outside of the Netherlands. Other than regulatory measures, also the fragmented character of the Netherlands, in which *"every region has its own decision-making procedures, ambitions, targets and priorities"* (I4), is argued to create a barrier for the creation of uniform solutions and regulations

for the whole Netherlands. Some initiatives were not able to overcome these institutional barriers and had to terminate their initiative (I4), but for the others it demonstrated their persistence although this was not heavily observed. Institutional barriers appear to be the hardest to overcome, and also the most difficult to change.

Secondly, *organisational barriers* can come up intra- as well as inter-organisationally. An example of an intra-organisational barrier is the employees' resistance to change when new technologies or business structures are implemented, because they are used to the old routines and challenged when structures change (I1, I7). As a means to overcome this barrier, employees that resist are closely involved in the process of the change. However, changing habits and routines is difficult. Inter-organisational barriers come up when actors need to find a collaborating partner to execute their idea (I14), but are also present when there is a partnership and they need to determine how they arrange finances. In a collaboration, small organisations tend to be depend on the larger organisation financially (I2, I3), while large corporations work on a voluntary basis (I6). The tension this creates can form a barrier that the collaborating partners need to overcome together.

Thirdly, *technical barriers* are faced by the actors contributing to technical innovations. Tests and pilots contribute to addressing the technical problems, such as the angle of the waste catcher's 'arms' (I6) and a system to lift the waste catcher out of the water (I7). Deviations are generally made to optimise the technology. These kinds of barriers are relatively easy to overcome compared to the previous two types of barriers, as technical barriers are the ones that can be identified and adjusted more easily.

Fourthly, when actors produce concrete outcomes, *knowledge barriers* can come up, either in transferring information and a message, or in collaborating with other organisations. In transferring the message to convince others of the innovation or new regulation, barriers occur, because of a lack in understanding the urgency and relevance of the initiative (I2, I9 and I10). Actors that experienced this, aimed to increase the public acknowledgement and focused on storytelling to overcome this barrier (I2, I10). As for collaborations, it appeared from section 4.1 that sharing knowledge is also deemed important. The CoPP was referred to as a community where collective efforts are made to get an idea of the total amount of plastics in rivers by joint research (RDM Centre of Expertise, n.d.). However, members have experienced a lack in sharing knowledge, because they are competitors and want to prevent knowledge spill overs (I1, I5 and I14). Sharing too much information can then become a disadvantage for the actor's own position.

Conclusion

The barriers that the small wins should overcome are institutional, organisational, technical and related to knowledge. When actors are not able to overcome these barriers, it can be problematic and even critical for their survival. Institutional barriers appear the hardest barriers to overcome once they form a problem, because they are the most difficult to change and can involve national structures. Organisational changes can be difficult to make, because it involves also changing people's behaviour and routines. Technical barriers can be overcome more easily, because technological adjustments can be made once they are found, but technical adjustments require additional time and resources. Knowledge barriers appear when organisations need to spread their message or collaborate with others. The CoPP is an initiative that aims to remove this barrier by connecting actors across the field and facilitate knowledge exchange.

4.4. Propelling mechanisms

In this section, the propelling mechanisms that were activated to accelerate small wins are investigated, with examples that demonstrate the effect. This gives an indication of the 'right' propelling mechanisms in the plastic pollution problem. It therewith addresses the second step of the small wins strategy by Termeer and Dewulf (2019), which answers the second sub-question. For this analysis, all three contributors to small wins are included to identify the difference in the attitude of the small win groups. A summarising table, Table 10 in Appendix IV, shows the key findings and exemplary quotations of the propelling mechanisms per group.

4.4.1. Energising

The first propelling mechanism directly links to the concrete outcomes and visible results that should encourage actors to look ahead for new potential small wins (Termeer & Dewulf, 2019). For every group the way in which actors become enthusiastic is highlighted, and if possible, the effect of that enthusiasm in the form of another potential small win is addressed.

Innovation generators energise others by making them enthusiastic and being a source of inspiration by showing others how easy it is to set up the technology or social event (I3, I4 and I5). They do so because they want to increase the trust and commitment to their innovation (I3, I5) and gain additional resources (I4). Both reasons are mainly aimed to accelerate their initiative, but partly to encourage others to look ahead for other potential small wins. Examples of how actors energise others include personal contact in which people experience clean-ups for themselves or take part in face-to-face conversations (I1, I2). Thereby, a committed team has been addressed as a valuable asset to inspire and attract additional human resources in the form of volunteers (I2), employees (I3), interns (I1, I3) and partners (I1). Data show that energising is important throughout all stages of development. From initiation, where only ideas and action plans are present (I4), to the first visible results (I1, I3, I4 and I5), and even after the first pilots are executed (I1, I2 and I5).

Furthermore, it seems that an additional energising effect for the innovation generators is activated by the *innovation supporters* in the form of storytelling and sharing updates on their media channels (I7, I8). This is due to the fact that they are energised to start a collaboration and therefore have an interest in the success of the innovation that is generated. The reason for them to start collaborating can be found in the sustainable perspective of the innovation (I6, I7 and I8). The effect of energising others is observed in an increase in media attention and public acknowledgement (I6, I7 and I8), as well as a new potential small win that got inspired[6].

The energising effect of *actors that facilitate the societal infrastructure* is related to their belief that others should be responsible for activities or follow their example. They do so by putting in place regulations that provide the right conditions for others (I9), or by pioneering and demonstrating how activities can be executed (I10, I14). For instance, I10 showed municipalities how to organise a clean-up, by organising the first clean-up themselves. This made it easy for municipalities to follow. Additionally, by being an example for others, this provides the benefit of positive framing by others (I12), which attributes to the reputation of actors.

[6] The new potential small win observed the innovation of I6 that collects river plastic and produces waste catchers from that. Afterwards it started their own initiative, producing boats from collected river plastic.

Conclusion

Energising is a mechanism that is important for attracting additional financial, physical or human resources. The main means by which the actors have energised others are by showing others how easy it is, get in direct contact or storytelling. This finding is in line with the current theoretical literature streams (Termeer & Metze, 2019). Moreover, it has been found that the relevance of energising can be observed even before the first visible results are present, which extends the literature from Termeer and Metze (2019), who claim that concrete outcomes provide actors with excitement and encouragement to look ahead for the next potential small win. Furthermore, a clear connection can be observed with other propelling mechanisms that require resources, such as learning by doing, logic of attraction and the bandwagon effect. Energising can lead to external actors paying more attention to the small wins and thereby attracting additional resources, inspiring others to experiment or look for new potential small wins.

Differences between the three groups can be observed mainly in terms of their reason for energising others. Innovation generators primarily do so to benefit from it economically. The innovation supporters assist the generators with it, to stimulate their reputation, whereas actors facilitating the societal infrastructure mainly aim to set an example and inspire others to execute similar activities.

4.4.2. Learning by doing

The idea behind learning by doing is that concrete results of small wins are able to reveal previously unseen resources and barriers, provide feedback on approaches, give insight in responses from the system and encourage reflections (Termeer & Metze, 2019). Experiments and pilots are interventions that can stimulate learning by doing. In general, the CoPP contributes to 'shared learning', in which participating actors experience the creation of knowledge by mutual engagement, which is in line with the notion of communities of practice as introduced by Wenger (1999).

Learning is essential for *innovation generators* to proceed and grow. It allows them to detect technical mistakes and flaws in the design of educational programmes. This information is used to guide them in future developments. This guidance can come from feedback on executed pilots, experiments or consecutive tests. Accordingly, technological adjustments are made to improve the design of technologies (I1, I2, I3 and I5) and the content of programmes is rearranged and adjusted accordingly (I1, I2). Furthermore, the growth of innovation generators can also lead to new challenges, because the organisations expand, which requires to learn new skills (I1, I2 and I3). For instance, I1 had to learn how to deal with organisational growth in terms of the increase in the amount of people and assets involved. However, rolling out projects after pilots have finished is still difficult, which constrains the robustness. This can be observed from the fact that the technical and social innovations are all still in the pilot phase. According to E2 this is in part due to the fact that the projects are not yet market ready.

Innovation supporters learn from experience alongside the innovation generators and provide additional resources that are necessary to learn. Supporting actors are not involved with the technical and social innovations from the start and join in a later stage, where additional resources to execute the pilots and tests are necessary. They are responsible for assisting with technical iterations that are necessary to come to the final design. Innovation generators that are assisted by supporting actors have an advantage over the ones that do not, because they have more external resources at their disposal to learn. The resources that are provided are *material* (e.g. boats and test locations by I6 and I7) and *human* (additional employees and collaborating partners by I6) resources. *Financial* resources were mainly provided by investors or came from subsidies issued by European, national or regional governmental

organisations (I6 and I7). Without these external investments in the technical and social innovations, developments could not have been made.

Actors facilitating the societal infrastructure, which consist for the largest part of governmental actors, are the ones that take risks with opportunities that arise and find budget to do pilots (I9, I10, I12, I13 and I16). Their main argument for doing so is to identify the main pitfalls before implementing on larger scale. Herein, their role as launching customer (I12) has a large influence on which initiatives survive, thrive or phase barriers. Launching customers invest in the development phase to test technologies and do pilots by providing physical test locations (I14) and experts (I15). However, also here a lack in rolling out the projects can be observed.

Conclusion
Learning by doing takes place in two aspects, technically and organisationally. Through learning, the feedback from previous experiences provides guidance for the future. Empirically, taking risks has shown to form an important part of learning and determines which projects fail or succeed because of the resources that are provided. In general, there is a lack in rolling out the pilots to large scale implementations, which can on the one hand be due to the initiatives being not ready for the market yet. On the other hand, facilitating actors can take a more active part in their role as launching customers in the implementation of initiatives.

When comparing the groups, the main difference can be found in the aim behind experiments. For the innovation generators and supporters, the underlying goal for learning is to develop better technologies and improve the content of programmes. The facilitating actor of the societal infrastructure executes pilots and experiments to put a regulation in place or help smaller initiatives with resources.

4.4.3. Logic of attraction

The logic of attraction is activated when financial and human resources flow towards 'winners' (Termeer & Metze, 2019). When influential actors advocate a small win, this creates credibility and can catalyse additional resources. Winners become visible when they are judged as something positive by means of their acts. In general, The Ocean Cleanup[7] is a famous example within the field of plastic pollution. It receives substantial human and financial resources from larger organisations, which allows them to become bigger and create more impact. This is acknowledged by most of the interviewees. *"There are large companies [...] who transfer him [Boyan Slat] one or two million euros per year to do whatever he wants with it. I think it is amazing how he does it!"* (I6). Therefore, the initiative can be seen as one of the winners where more resources flow towards. However, what lacks from theory is what determines whether one small win will gain more attraction than the other. E1 addressed the marketing strategy and storytelling of The Ocean Cleanup to be the success factors that make the initiative more visible and easier to connect with others.

For *innovation generators*, it seems that to be considered a winner, it requires to be a credible actor with a good reputation. This can be challenging for small wins, because they generally lack legitimacy and a prior reputation to build on (Aldrich & Fiol, 1994). Strategies that the innovation generators have pursued to increase their legitimacy are: 1) incorporating influential actors and 2) positive evaluation based on actions. The effect of influential actors, such as the European Commission and Rijkswaterstaat, on the innovation generators can be observed in increased credibility and public acknowledgement (I1,

[7] NGO that develops technologies to rid the oceans of plastic, conceived by Boyan Slat

I2 and I3). Positive evaluation based on acts corresponds to section 4.3.4 in which positive judgement is discussed and becomes visible in the form of winning competitions (I1, I2), awards (I3) or being selected for a follow-up project (I4). The credibility that is created for innovation generators with these measures catalyses additional resources in the form of cheques, sponsoring and subsidies (I1, I2 and I3), which enhances the logic of attraction. On the contrary, the data also show what is believed to be lacking for innovation generators: subsidies in this specific field (I3), more structural partners (I1), and volunteers (I2). Enhancing these assets could enable the logic of attraction further.

Innovation supporters are typically large organisations with an extensive network that can create a supportive structure for innovation generators to gain momentum (Farla et al., 2012). We see that large supporting organisations are the influential actors that can take more risks, because they have more financial stability (I7) and structural partners (I6, I7 and I8). With these two assets they can reach a larger public when publishing articles, to target new communities and actors compared to innovation generators.

Actors facilitating the societal infrastructure influence the success of and catalyse additional resources to innovations, since they are the ones distributing targeted interventions, such as awards, acceleration programmes, tenders and market consultations (I9, I12, I14 and I15). Selection of winners is done based on criteria such as: urgency, opportunity, budget, maturity level and effectiveness (I12, I15 and I16). Next to the criteria and strategies to determine winners, market forces are also addressed to determine which initiatives will survive and become winners (I12). This addresses an attitude that is waiting for the best innovations to thrive and does resemble active involvement. Lastly, as an explanation for withholding large scale implementation for technical and social innovations, the fact that 'used plastics' do not have a plastic business case is mentioned (I14). This explains the general lack of external actors providing resources for initiatives that aim to catch plastics from waterways or on land.

Conclusion
Small wins can be evaluated as winners when they achieve increased public attention and credibility. This can be observed in the small wins that receive awards, win competitions or are selected for programmes. Influential actors are important, since they can determine who becomes a winner, based on a set of criteria or increases the public attention. Based on the actor group distinction, it becomes visible that mainly innovation generators are the 'receiving actors' of credibility, while the innovation supporters and facilitating actors are the 'granting actors' of credibility.

4.4.4. Bandwagon effect

The bandwagon effect can be explained by the fact that organisations start to do something because others are doing it (Termeer & Dewulf, 2019). Telling the story and spreading the message is important for others to be aware of what is out there. Then, when actors become examples or best practices for others, copying their practices occurs. The benefit of this mechanism is that when someone makes the first step, the others will follow (Termeer & Dewulf, 2017). In the studied initiatives, the CoPP is considered as an advantageous community, where organisations cling on to and is described as the 'Golden Goose' effect by interviewees (I5, I14), which enhances the bandwagon effect.

The bandwagon effect seems to be present among *innovation generators*, but it would be too early to observe any real effect of standardisation as a result of imitation. What can be observed though is the similar design of active and passive waste catching systems and clean-up events, which might indicate that copying of practices takes place. There is still divergence and no standard design yet. Many

experiments are done and new entrants keep on entering the market with new ideas. It can be argued that when the first technical innovations on water came up, they were mainly focused on passive designs (I1, I5), while innovation generators that entered in a later stage focused on different forms of active designs (I3, I4)[8]. The efforts that innovation generators have made to increase their awareness attribute to telling and re-telling their story on for example media channels (I1, I3), events with innovation reveals (I1) and lectures (I1, I4). Also large credible organisations, such as municipalities (I3), port authorities (I5), WWF (I1) and the Plastic Soup Foundation (I1, I3), can increase public awareness when they write about the innovations. In terms of the diffusion curve, one could argue that the initiatives are situated in the 'innovators' and 'early adopters' phase (Rogers, 1983), which leaves room for more designs to arise and might negatively influence the firm survival of established organisations.

Innovation supporters activate the bandwagon effect by showing others their positive contribution to a societal problem by assisting innovation generators. Herewith, they are an example for other large organisations and inspire them to copy their efforts (I6). Storytelling is again the main means by which the message is brought to others, either on the supporting actors' media channels (I6, I7 and I8), leaning on the efforts of the innovation generators (I6, I7) or because of an increase in the success of well-known actors, such as The Ocean Cleanup (I6). Interesting is the reciprocity between the different actors, where both the innovation generators as well as the innovation supporters rely on each other to increase publicity, which will end up to be more than the sum of its parts. The difference can be found in the efforts done to increase publicity, where the generators of innovation are dependent on obtaining subsidies and external support, the innovation supporters have other business activities that ensure they can maintain their operations (I6).

As it appears, the *actors facilitating the societal infrastructure* encourage others to copy their example, as a means to transfer responsibility of actions to others (I9, I10 and I14). They aim to be an example for others by storytelling and showing how it is done, while embedding important representatives to increase credibility. Storytelling is done for instance by demonstrating how polluting plastic is in the waterways to members of the European parliament or other large corporations (I11), or on a smaller scale by promoting initiatives on innovation expositions (I12, I16). For important representatives that are embedded in ideas, one can think of deputies from regional or national governmental organisations (I10).

Conclusion

Attempts to enhance copying of practices and thus stimulating the bandwagon effect can be observed from the empirical cases. Others become aware of what is out there because of storytelling and the inclusion of important representatives. A clear connection can be observed between the bandwagon effect and logic of attraction, as for both mechanisms an increase in storytelling and media attention contribute to public acknowledgement, which can either lead to copying of practices or to additional resources being transferred to winners. What could not be observed from the actors and is therefore presumably not being taken into account, is the idea that 'bad practices' can also be copied. When this occurs it can lead to undesirable results. However, it is difficult to determine in advance what practices will turn out to be bad.

Repetition of current practices does take place, both in the innovations as well as for facilitating actors. However, the bandwagon effect appeared specifically important for actors facilitating the societal

[8] The active designs consist of motorised boats to catch plastic and a bubble screen that can be implemented in rivers and canals.

infrastructure, as they aim to set an example for others and therewith provoke others to copy them. Among innovation generators, copying of designs can be observed, but this is not the aim for actors that generate innovations, as it does not contribute to their success. Also no standardised design can be observed yet.

4.4.5. Coupling

The accumulation of small wins can speed up when they combine with other topics or ambitions beyond the scope of the small win, across policy or business fields (Termeer & Metze, 2019). Creating synergies with other organisations is beneficial for all actors, as it may create effects that are in sum greater than effects of the individual initiatives. Also, complementary technologies and knowledge can activate the further accumulation of small wins. The links between the actors have been observed in the network in section 4.1 and illustrate which actors exchange resources. In general, the CoPP can be addressed as a community that contributes to the coupling mechanism in the plastic pollution problem and thereby enhances connections across scales and boundaries of organisations. *"Within the collaboration of the CoPP we are collaborating together to collect joint knowledge"* (I5).

Innovation generators couple with other types of organisations because they seek additional resources, such as technical skills (I1, I5), marketing strategies (I3), clients (I1, I2 and I5), sponsoring (I1, I3) and knowledge (I2). Coupling is deemed to be important and successful among the innovation generators, as it has led to increased sales markets (I3), resources for pilots (I1, I5) and increased brand awareness (I1). Coupling takes place by collaborating with actors across the boundaries of the innovation generators business, focus area or scale. The type of actors they appear to be collaborating most with are governmental actors and large companies, because of their credibility and because they can more easily transfer resources. Even though coupling is already present, it seems that the innovation generators would prefer more coupling with more structural partners (I1, I3) and complementary technologies (I5).

The *innovation supporters* have experienced coupling with an innovation generator in terms of sharing resources as discussed before. The main reason for the innovation supporters to enter into the partnership is to create a positive image and judgement of their practices for other organisations, because they are collaborating with a good cause (I6, I8). It therefore contributes to their reputation of being an environmentally-conscious organisation. Coupling happens between organisations of different scales (I6, I7 and I8) and other domains, where one is producing products and the other is collecting waste from the environment (I8). It is a small addition to the current core business of the innovation supporters (I6). The assets that the innovation supporters contribute to the collaboration range from large expenses (I6, I7), technical support (I6, I7) to promotion (I8).

Coupling for *actors facilitating the societal infrastructure* takes place because they require assets from the actor they couple with (I9, I10, I11, I12 and I14), or because they want to coordinate activities collaboratively (I10). The aim for actors when coupling is to get inspiration for their own initiative (I14), expansion of their network (I12, I14) or expansion on a larger scale (I9, I10 and I11). The role of the actors facilitating the societal infrastructure in these joint efforts varies from sponsoring and market consultations (I12, I14 and I15) to contributors to knowledge development (I9, I10, I11 and I16). Coupling occurs over different scales; geographical (I10 and I11) and business scale (I9, I12, I14 and I15), and between public and private actors (I9), but coupling appears to be missing in the connection with other policy domains, such as energy, health and food. Plastic pollution overlaps with those areas, but the initiatives do not seem to link back to those.

Conclusion
In general, coupling can be observed in the collaborations that are present among the actors. The CoPP is an example of a community that couples in terms of sharing knowledge and learning because of the shared goal among members. Actors recognise that it can be difficult to address complex problems individually and partners are necessary. Nevertheless, a lack can be observed in coupling over different policy domains, which was expected from scientific literature. Therefore, a larger focus on this could contribute to the acceleration of small wins in the future.

Every group of actors appears to be willing to couple with other actors, but for different reasons. Innovation generators aim to put in place their innovation and need connections to grow. Innovation supporters care most about the reputation they get from coupling with sustainable initiatives. Actors facilitating the societal infrastructure do so to enlarge their network or their initiative.

4.4.6. Robustness

Robustness refers to the 'point of no return', where returning to the initial situation is no longer possible because actors get used to the new situation and develop new routines with new norms (Termeer & Metze, 2019). However, it is hard to reach this point, because the closer you get, the bigger the barriers become.

The empirical data show that a point of no return has not been observed for *innovation generators* yet, as they struggle to go beyond the pilot phase and become robust. Some technical innovations have been launched on the market, and social innovations have been implemented, but none of them became fully embedded in current practices yet (I2, I3). Furthermore, some initiatives have been terminated after the pilot phase, which indicates a lack in robustness (I4). The innovation generators mentioned that contributions to economies of scale (I3), more time and budget (I4) could help to bridge this lack in robustness.

Even though, a tipping point has not been reached, the problems concerning plastic have gained more interest over the last years according to the *innovation supporters* (I6, I7). This is backed up by scientific literature (Gourmelon, 2015; Heidbreder et al., 2019). One interviewee (I6) talks about a paradigm shift, in which actors now seem to own up to their responsibility and willingness to take action, in comparison to a few years ago. This has created more demand and interest for alternative solutions. This growing interest can also be observed by an increase in public acknowledgement. An example of this is described by I7 who was asked to present their innovation on national television.

Among the *actors facilitating the societal infrastructure* also a lack in robustness and roll out of projects on large scale is observed, even though they strive to make innovations more 'fit for market' (I12, I14). Reasons for this lack in uptake of innovations, and them becoming embedded in current practices are attributed to the absence of regulation on plastics in water on national and European level (E1, I16). The consequence is that water managers do not see the need to intervene and take responsibility, which was already addressed in the wickedness of the problem in section 4.1. Interviewees mentioned ideas to improve the robustness related to reinforcing the role of launching customer among governmental actors, with a larger focus on scaling and implementation, in contrast to the current focus on testing and piloting (I12). Also the export potential of innovations is addressed as promising to scale up (I12). This does already take place for several small wins (I1, I3, I10, I11 and I15), where for example the technical innovations (I1, I3) both exported their technologies to Asian markets.

Conclusion

In general, it seems that the initiatives are still in a premature phase, with some having to terminate their actions, or face difficulties in going beyond the pilot phase. Only a few technical and social innovations have been implemented in the market. Reasons are attributed to a lack of policies for plastics in water resulting in a lack of guidance from national and European governmental organisations. This finding points to the sense of direction that might still be missing for policy, and the absence of responsibility taken by actors. With clearer guidelines and more urgency addressed to the problem, potentially more resources could become available for the permanent implementation of initiatives in the water system and on land.

Comparing the three groups, the innovation supporters see the bright future that lies ahead for robustness and increasing efforts that are made to reach that, while the innovation generators paint a less rosy-tinted picture and appear more realistic, than optimistic. Actors facilitating the societal infrastructure take action in enhancing the implementation of innovations, but lack a sense of urgency.

4.4.7. Comparison and interlinkages of propelling mechanisms

To summarise the previous findings on the propelling mechanisms, a summarising table is provided in Table 5. Here, indicators are described that came forward from the data, and compared to the indicators from the Theory section, which is complemented by additional indicators for propelling mechanisms from the scientific article from Termeer & Metze (2019)[9]. Four results stand out from this analysis. The first is that setting an example is attributed as an indicator for *energising* as well as for the *bandwagon effect*. However, this has not been mentioned in literature. Apparently, not only the copying of practices, but also showing others how they can do it, is important in this case study. Secondly, a few times the contribution of launching customers is described to accelerate small wins, especially for *learning by doing* it could help small wins to go from their pilot phase into implementation. Thirdly, an overlap can be observed in terms of involving credible actors to activate the *logic of attraction*, as well as the *bandwagon effect*. Lastly, the export potential could be addressed as another way of increasing the *robustness* of bottom-up solutions.

Table 5: Comparison of indicators for propelling mechanisms

Propelling mechanism	**Indicators based on literature review**	**Indicators based on empirical analysis**
Energising	Energy	Source of inspiration
	Enthusiasm	Increased commitment and human resources
	Empowerment	Share story
		Set an example
		Positive framing
Learning by doing	More than one experiment, continue experimenting after disappointment	Pilot, experiment, consecutive tests
	Communities of practice	Community of practice
	Learning outcomes guide new experiments	Learn from past events
		Organisational growth
		Launching customer

[9] Indicators that are marked with an asterisk were derived from the article from Termeer & Metze (2019).

Logic of attraction	Additional resources	Additional resources
	Visible results and public acknowledgement	Publicity and media attention
	Commitment of influential actors*	Credible, influential actors and actions
	Showing positive evaluation in acts*	Positive evaluation
		Market forces
	Other communities know and value wins	
Bandwagon effect	Highlight and celebrate wins	Storytelling
	Copying goods and practices*	Copy designs
	Golden Goose*	Golden Goose
		Public acknowledgement
		Reputation
		Set an example
		Involve credible actors
Coupling	Connections across scales	Connection across scale and focus area
		Complementary technologies
		Shared challenge
	Connection with aims from other policy domains	
Robustness	Non-stoppable	Paradigm shift
	No premature termination*	No premature termination
	Go beyond framing small wins as pilots*	Go beyond pilots
		Stimulating regulations
		Export potential
		Economies of scale
	Internalised behavioural change	
	Examples of resisted opposition	

Reflecting on previous sections, it becomes clear that the propelling mechanisms are interlinked and mutually reinforcing. This was also addressed by the expert on small wins (E3). With the information available, a schematic overview of these linkages between the propelling mechanisms for the case of small wins contributing to the wicked problem of plastic pollution is provided in the Figure 2. Connections are made when one of the propelling mechanisms has an influence on another. The arrow is directed towards the mechanism that is influenced. Every propelling mechanism can be a starting point for amplifying small wins, which can then further accelerate other mechanisms according to the arrows in the figure. All linkages are reinforcing, which means that an increase in the initial mechanism will have an indirect increasing effect on the latter. This also holds for decreasing effects.

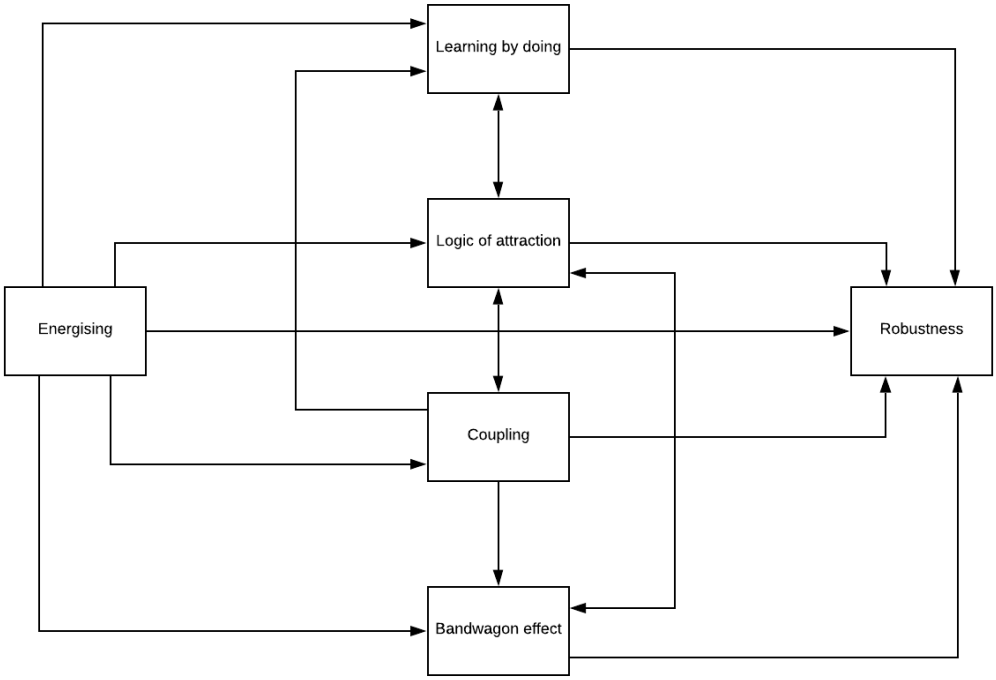

Figure 2: Interlinkages propelling mechanisms

The figure illustrates that *energising* is the main initiator of indirect effects in other mechanisms. This is in line with theory, as an energising effect will lead to actors being more receptive to new technologies or regulations, which might lead to an increase in collaborations, resources and publicity. *Robustness* on the other hand is only receptive of the effects of other mechanisms. This is also in accordance with theory, because the reinforcing effect of mechanisms contributes to reaching a tipping point, where small wins have become institutionalised and legitimatised in new practices (Termeer & Dewulf, 2019). It is possible that in the future the linkages between the propelling mechanisms are different, and other connections are important to further accelerate small wins. For instance, *robustness* will most likely reinforce other propelling mechanisms when its effects become visible. However, this has not been observed by the actors yet, because within the playing field of plastic pollution robustness is still lacking.

After discussing with E1, who is an expert on plastic initiatives in waterways, the order in which the propelling mechanisms will most likely be important was mentioned. The expert mentioned that *learning by doing* is the most essential propelling mechanism for the actors in this playing field, because the initiatives are still in the phase of identifying the problem and the scale of the problem. When more is learned, it leads to an increase in *logic of attraction*, because more resources can be attracted. Eventually, this leads to an increase in *coupling* and the *bandwagon effect*, because copying and cooperating with others becomes more important. According to the interlinkages from the figure, it is a possible reinforcing path, but not the only one. The large emphasis that the expert put on *learning by doing* as the starting point for the initiatives can be seen from the focus of the initiatives on the pilot and experimentation phase.

Nevertheless, every group seems to favour one specific propelling mechanism. The most distinctive propelling mechanisms for the three actor groups according to this case study will be addressed and compared to the initial expectations from 2.3.3. Innovation generators seem to focus more on attracting resources, which requires them to possess some form of credibility and is generally difficult to obtain.

Therefore, the *logic of attraction* is considered as distinctive for them, which is in accordance with the initial expectation. Innovation supporters seem to value their personal reputation most. Herein, making others aware that they are collaborating with a sustainable initiative, and therewith *energising*, is considered important. This is different from the expectation, where *coupling* and *learning by doing* were assumed to be relevant. *Coupling* is still important in their collaboration with the innovation generator, but was not deemed the most important reason for their collaboration. Lastly, actors facilitating the societal infrastructure aim to be an example and transfer their responsibilities to others, therewith activating the *bandwagon effect*. This was also not expected from the initial assumption, but can be attributed to the wickedness involved in the problem, where one could already observe that responsibilities are easily transferred among actors.

4.5. Contextualising propelling mechanisms

The context of small wins is only moderately discussed in literature, but was deemed important for the success and acceleration process of the actors. A few external attributes are addressed to influence the survival, growth or failure of small wins, in terms of the kind of interventions that are implemented and the effect of those interventions. This additional insight was discussed with all three experts, and all of them acknowledged the importance of context factors: a small change can be in-depth in some contexts, but does not necessarily have to be in-depth in another context (E3), the context around missions is important for their success (E2) and context factors such as geographical location and river area determine what solutions works and which do not. This relates back to the theory of Rittel and Webber (1973) who discuss the idea that there is no optimal one-size-fits-all solution to wicked problems and that different environments require different strategies. Because context factors differ, it becomes important to identify context factors before initiating a small win or scale up to other locations.

Strategically choosing the location to initiate or accelerate a small win is important, because the environment or context in which initiatives operate can constrain or accelerate them, but is generally difficult to influence and therefore often taken as a given. As an example, it could be seen that the Dutch environment was regarded as blocking for testing and further development of an initiative, which formed an obstacle that was not faced in another country (I3). Directly copying practices and expanding in scale can also be obstructed by the context factors, which discourages the bandwagon effect. This can be seen from the following quote: *"After we found out the idea worked, we wanted to implement it in other regions, but the dynamics are very different in every area"* (I4).

Additionally, when interventions are carried out to activate propelling mechanisms, an initial small win is *amplified*, which can occur in three ways: upscaling, broadening or deepening (Urpelainen, 2013). In the context of the plastic pollution problem, only upscaling and broadening have been experienced as amplifying effects. Upscaling took place when practices were copied and is thus stimulated by the bandwagon effect (I9, I10). Broadening was experienced when experiments were executed in different contexts (I1, I3), which is in line with current scientific literature (Van den Bosch & Rotmans, 2018). For instance I1 tested their passive waste catching system in Indonesia and the Netherlands, where different context factors led to the designs of different systems, suitable for that environment. Deepening, in which shifts in the ways of thinking, doing and institutions are changed cannot be observed from the small wins. System-level amplification is also argued to be necessary for continuous radical change and is enhanced when small wins become robust (Plowman et al., 2007; Termeer & Dewulf, 2017). This kind of change is facilitates deepening and might be enhanced in the future for the plastic pollution problem as well (Van den Bosch & Rotmans, 2008).

5. Implications and conclusion

This chapter addresses the policy implications as well as the main conclusion, to answer the research question. Section 5.1 illustrates the implications that feed results from the analysis back into the policy process, with the aim to activate new small wins with a missions approach. Section 5.2 draws the main conclusion, which provides an answer to the main research question, as well as the three sub-questions.

5.1. Implications for Mission-oriented Innovation Policy

A small wins strategy can help policy makers to produce small steps of continuous change, therefore recommendations from this research can benefit policy makers. The strategy of Termeer and Dewulf (2019) is taken by using the results of the small wins and propelling mechanisms that are present to provide feedback for the policy process. This addresses the third step and third sub-question that was posed. With insights from the expert on missions (E2), this section has been shaped and will demonstrate two complementary strategies to strengthen MIP with a focus on small wins for plastic pollution. These two strategies are: 1) stimulate bottom-up solutions that are already in place, 2) provide direction for and intervene in areas that are not naturally addressed.

The first strategy revolves around the bottom-up solutions or small wins that contribute to technical and social innovations, and are naturally aligned. Policy makers can respond to what comes up from society and the market. From the previous results, the bottom-up solutions that are present demonstrate the mechanisms that are propelling, but also repressing. When governmental actors are aware of what happens in the industry, it becomes easier to respond. In consultation with E2, three components are addressed that are important for stimulating small wins that are already present: relevant actors, promising innovations and collaboration networks.

Active involvement of relevant actors increases the chance that results feed back into the policy process and energise actors to initiate new small wins (Termeer & Dewulf, 2019). Relevant actors are actors with a large influence on others. From the network that was displayed in Section 4.1, relevant actors are highly connected, and in this case all (partial) governmental organisations. Their influence can be used for the second component, promising innovations, in their role as launching customers. Herein, it is important to focus on implementation and overcoming barriers that are currently faced by innovation generators to expand and reach a larger scale. Additionally, The Ocean Cleanup has been addressed as an important and influential actor, which is able to attract new resources for its technology. Its success also determines the success of other initiatives, which could be used when involving this actor actively. Next to the actors and technologies that are present, existing collaborations in which actors already contribute to a common goal, such as the CoPP and the International Meuse Partnership, can be utilised and better conditions can be shaped for them.

Secondly, in providing direction for the areas that have not been created on its own, it is important to provoke new, transformative solutions. Guiding the actors involved into the desired direction can mobilise innovation (E2), which is something that appears to be lacking from the small win characteristics. However, in order to implement this strategy, prioritising is necessary. In this research, areas were identified where stimulation and improving of conditions can be a focus point in the future. These areas consist of: little small wins, lacking propelling mechanisms and absence of an amplifying effect. Areas that lack small wins, could for example include enhancing European regulation on plastic in water that is able to provoke change, as that is currently lacking (E1).

Thereby, intervening by encouraging the propelling mechanisms that currently lack is one strategy to accelerate small wins. In general, a lack can be observed in the *robustness* of small wins, since it is still difficult for small wins to get out of the pilot phase and scale up. The analysis of interlinkages shows that an increase in robustness comes also from the contribution of other propelling mechanisms, there is still opportunity for additional interventions to increase the total propelling effect. One way of doing so is by incentivising the implementation of well-functioning pilots to expand the impact that small wins have on communities that can benefit from it. Thereby, *coupling* across policy domains is not common and could be another focus point in the future, for instance with respect to synergies such as energy, health and food next to the environmental concern of plastic pollution. A tendency towards increasing these collaborations can be observed already, but it appears still too little. In literature, it also has been argued that destabilising conditions are necessary to help small changes lead to continuous radical change (Plowman et al., 2007). This has not been observed from the empirical data, as no big risks have been taken that work as destabilising on the current infrastructure.

Furthermore, as discussed in Section 4.5, more attention should be paid to the importance of context factors when implementing strategies and intervening at different geographical locations. Environmental factors influence the success of initiatives and therewith cannot be replicated without considering the context. Some technologies might be more suitable for implementation in different areas, where others might not have this advantage.

Lastly, as a result from the analysis on the wickedness, one should aim to settle problems on a level as high as possible and prevent falling back in solving symptoms of problems. A focus on small wins that try to go for system change is therein desirable. In addition, the shifting responsibility that appeared to be a problem should be addressed in the sense that organisations should show courage to address the problem.

5.2. Conclusion

The problem of plastic pollution in the Dutch waterways requires a strategy of interventions that is able to deal with the wicked character of the problem. The governance strategy that is followed in this research and which describes a bottom-up logic to deal with wicked problems is small wins. Small wins as a governance strategy that focuses on the importance of incremental or marginal change to achieve sustainable results (Termeer et al., 2015). Small steps of continuous change can be achieved by the activation of propelling mechanisms (Termeer & Dewulf, 2019). Scientific literature currently lacks empirical evidence of the conceptualised propelling mechanisms. Therefore, this research investigated how the propelling mechanisms contribute to the acceleration of small wins in the plastic pollution problem by answering the following main research question:

> *'How do propelling mechanisms amplify small wins related to the plastic pollution problem in the Netherlands?'*

To come to an answer to this question, a qualitative research strategy was used in which interviews were conducted with actors that contribute to small wins that address 'removal measures' for plastic pollution. Small wins contribute either to the generation of innovations or facilitate the societal infrastructure through small meaningful steps with visible results (Termeer & Dewulf, 2017; Urpelainen, 2013). The results show that all propelling mechanisms identified in the scientific literature

appeared to be important for the growth of current small wins and the acceleration of new small wins for tackling plastic pollution. This finding has been confirmed by an expert on plastic initiatives in rivers.

Regarding the individual propelling mechanisms, this case study shows that *energising* is important for attracting financial, physical and human resources. This is done by being an inspirational example and positive framing, sharing their story in direct contact and showcasing the innovations that are developed. Energising seemed important even before the first general results are present. *Learning by doing* seemed to be relevant in finding out what works technically and how to deal with organisational growth. Lessons from the past provided guidance for the future, but in general a lack in rolling out of pilots on larger scale could be observed. For the *logic of attraction*, it is important to be valued a winner and receive awards, but the required credibility appears to be difficult to obtain. Influential actors and an increase in public attention contributed to the growth of the propelling mechanism. The *bandwagon effect* could be observed in terms of the similar designs that appeared among actors. The effect was enhanced by storytelling and making others aware of their innovation or regulation. *Coupling*, as the fifth propelling mechanism, is deemed important by almost every actor, as developing new ideas often requires partners. However, a lack can be observed in the connection made across policy domains. Lastly, *robustness* appears to be lacking in this case study, as the innovations under investigation all experience difficulties in going beyond the pilot phase and premature termination of actions can be observed.

Next to the individual propelling mechanisms, the mutually reinforcing effect of the mechanisms has been mentioned in existing literature, but without empirically studying the underlying connections. By studying the interlinkages between propelling mechanisms, this research reveals that *energising* is the main initiator, indirectly affecting other propelling mechanisms. This is in line with theory, because energising ideally leads to actors being more receptive of innovations, which can result in an increase in resources and therewith benefits other mechanisms (Termeer & Dewulf, 2019). The main receptor is *robustness*, which follows logically from the fact that an increase in one of the propelling mechanism contributes to reaching a tipping point of sustained change, which makes small wins more robust.

In addition to the main research question, also three sub-questions were posed. The first question addressed the variation of *small win characteristics* between different types of contributors to small wins. From the results it becomes clear that the different small wins have different roles in society and contribute to solutions for the problem in various ways. The main difference for the *concrete outcomes* is the kind of intervention, while innovation generators develop technical and social innovations, actors facilitating the societal infrastructure develop contracts, regulations and provide monetary interventions. Next, the innovation generators can use their relative *moderate importance* to the advantage in gaining trust of the people, whereas facilitating actors generally have a larger impact and therefore this characteristic might not fit this last group well. The third characteristic, *in-depth change*, is mainly achieved by a change in behaviour, being either on individual, company or national level. This appears to be mainly second-order change. The *positive evaluation* of actors is demonstrated by the positive externalities of innovation generators and their evaluation based on acts. For actors facilitating the societal infrastructure, market structures are argued to determine what will become successful and the amount of affiliated people show how positive a new regulation is perceived. In general, a lack in *direction* is experienced by the actors, which leads to the absence in taking responsibilities and the request for more clear guidelines and a sense of urgency by both actors. In terms of the *barriers that are overcome* by the actors groups, innovation generators appear to be more focused on how they can overcome their own technical, institutional, organisational and knowledge barriers to benefit from it economically. In contrast, the facilitating actors direct their attention more towards being

an example for others. This was expected from theory, as the facilitating actors are supportive of other initiatives and make sure the desired environment is in place for others to experiment and small changes to come up and grow.

These differences between the actor groups are also reflected in the divergence between the perceptions of different actors on what the problem of plastic pollution is, who is responsible for the problem, who should contribute to the solution and what that solution should look like. This confirms the wickedness of the problem. Nevertheless, the general perception is that governmental actors should show more courage in providing guidelines and regulations that stimulate the emergence of new small changes.

The second sub-question concerned the *difference of the propelling mechanisms* between the groups that contribute to small wins. What appears from the case study is that the role of the actors also influences their motive to activate propelling mechanisms. When comparing the three groups, every group has one propelling mechanism that stood out for them and attributed to their growth in a specific manner. Innovation generators are most dependant on the *logic of attraction*, because in their role to generate innovations, they aim to receive credibility. This is necessary for them to survive, but difficult to obtain, as they depend on other organisations' resources for their own growth. For innovation supporters *energising* others to show their efforts in assisting a sustainable initiative is most distinctive for them. This stimulates their reputation and can improve the image other organisations have of them, which is the main argument for their collaboration in the first place. The main argument for actors that facilitate the societal infrastructure is to set an example for others enhances copying and is therefore a stimulator for the *bandwagon effect*. In their aim to transfer responsibility, it becomes important to get others on the bandwagon. In absolute terms, these propelling mechanisms might not be the most important mechanisms, but are the most distinctive for each group.

The third sub-question concerned policy implications for MIP in the Dutch waterways and resulted in two strategies to be followed: 1) stimulate bottom-up solutions that are already in place and 2) provide direction for and intervene in areas that are not naturally addressed. In the first strategy it is important to involve relevant actors, encourage promising innovations and focus on existing collaboration networks. The second strategy involves providing more direction on national and European level in terms of clear regulations, and intervening in the propelling mechanisms that currently lack, such as *coupling* across policy domains and *robustness*. Both approaches enhance the governance strategy of small wins and feed the results from this research back.

Combining these insights, this qualitative research has shown that different propelling mechanisms have been described as important for the different types of small wins. It is not a problem that has a 'one-size-fits-all' solution and requires multiple types of solutions to be able to make a transition happen. These insights can be used for governance interventions, where next to a focus on stimulating current small wins, new additional small wins can be encouraged through the activation of the lacking propelling mechanisms.

6. Discussion

6.1. Theoretical contribution of the study

In this research, several theoretical contributions were made to existing literature streams on small wins. First of all, the addition of the three groups contributing to small wins in the evaluation of their characteristics and attitude towards important propelling mechanisms. In-depth insights are gained on the role of different actors for achieving small wins. Herein, to mention one example it appears that for actors facilitating the societal infrastructure, the small win characteristic *moderate importance* might be less valuable compared to innovation generators, because the impact of their implemented regulations and contracts is relatively large. Generally, a more detailed perspective of the different groups in terms of what is important for the growth of small wins has become clearer. This can set an example for future research on small wins in other research areas with wicked problems, such as climate change, obesity and poverty.

Secondly, two theoretical contributions were made to the characteristics of small wins. The first contribution follows from the combination of the literature strands from small wins and MIP. The expectation that a clear direction should be incorporated in the small win characteristics, so they are guided by a shared goal is confirmed. Three sources, namely the literature research, results from the empirical analysis and the expert interview with the expert on small wins (E3), validated the addition of *direction* as a characteristic for small wins. Herewith, the results are in line with the initial assumption that was made. Also this result is reflected in the latest article by Termeer and Metze (2019)[10]. This also provides a contribution to the bottom-up side of missions, by focussing on bottom-up solutions that contribute to one shared goal.

Additionally, the category *overcoming barriers* is included in the small win characteristics. This characteristic was not discussed in earlier small win literature and appeared from open coding in the empirical analysis. It was added because the initial list appeared to be focusing too much on presenting positive experiences and not so much on the hurdles the initiatives had to face while attempting to grow. This new category was also supported by the article from Termeer and Metze (2019). This validates the decision to add it to the list of characteristics of small wins and is therewith in coherence with literature.

Thirdly, theoretical contributions were made for the propelling mechanisms. A deeper scientific understanding is gained because of the empirical analysis in this thesis. This resulted in additional insights on the most distinctive contribution to the growth of each small win group. Thereby, it also shed more light on the interventions that contribute to the propelling mechanisms, and as it appeared, one intervention can contribute to multiple propelling mechanisms. For instance, interventions to create public acknowledgement or credibility can lead to the small win being valued as a winner, which adds to the *logic of attraction*, but can also lead to an increase in copying and therefore increase the *bandwagon effect*.

Also in contribution to the deeper understanding of the propelling mechanisms, the interlinkages among the mechanisms have been illustrated. Herewith, it was visualised that an intervention aimed to stimulate one particular propelling mechanism can indirectly also influence another mechanism. This

[10] Termeer and Metze (2019) was published in December 2019 when all data collection and part of the data analysis for this study was already performed.

mutually reinforcing effect should be considered when initiating and stimulating small wins. The result that *energising* is the initiator and *robustness* the receptor of the mechanisms matches the expectations from scientific literature (Termeer & Metze, 2019).

6.2. Limitations of the study

In this section, the empirical, methodological and theoretical limitations of this research are discussed. Regarding the sample there are three limitations that the reader should keep in mind. Firstly, the final sample is highly concentrated with actors that operate in the harbours of Rotterdam. This can be partly due to the fact that this area is more active in terms of small wins for plastic pollution in the Dutch waterways, but may also be due to the sampling strategy of snowballing that was used. Snowball sampling was applied to investigate the perspective of actors that the small wins addressed as important for their growth. Therefore, after the initial small wins were identified with desk research, additional actors were contacted that followed from the initial interviews. This strategy might have provided a sample that does not exactly reflect the total population. However, since this strategy has been only applied to find additional actors, it contributes to the external validity. As a result, generalisations can be made for initiatives in coastal areas, but one needs to be careful directly implementing the results in other areas in the Netherlands.

Secondly, the sample consists of initiatives that are initiated recently. Therefore, it becomes hard to predict the propelling effect of measures and successfulness of small wins in the future. For initiatives that have been in place for longer, it becomes easier to observe the success and impact, which cannot always be observed from the small wins in this study. The recency of the initiatives comes from the fact that initiatives that aim to contribute to a solution for plastic pollution problem in waterways have only gained momentum during the past five to ten years, which was confirmed by the expert on plastic initiatives in waterways (E1). Therefore, it was not possible to evaluate small wins in this subject from a larger time frame.

The third limitation regarding the sample is the tendency of this research to observe especially positive experiences. Only two out of the sixteen total cases stopped their innovation or programme for several reasons. The fact that mainly positive experiences have been observed, can be attributed to the visibility of positive experiences, over the ones that have failed and which are more difficult to detect. The effect of only observing positive experiences is that the research generally lacks the perspective of what mechanisms blocked the acceleration of small wins. It is partly covered in the sixth characteristic of small wins, but here the small wins were mostly able to overcome the barriers. An additional limitation of the positive cases is that the identification of the 'right' propelling mechanisms is only viewed from the positive perspective. This should be re-evaluated for negative cases as well to generalise the result on what is right and wrong in this perspective. Future research could focus on these negative experiences in attempts to achieve small wins, but it was beyond the scope of this study.

Fourthly, a bias of the researcher can occur in terms of the interpretation of the empirical data from the interviews. This research is based on an external evaluation and interpretation of what the interviewees have addressed as important. To increase the external reliability, critical notes were made for every propelling mechanism to enhance consistency and replicability. Thereby, exemplary quotations can be found in Appendix IV and demonstrate the presence or absence of the mechanisms. Furthermore, this can also be seen as a consequence of the abductive research approach that was taken in this study, as abduction looks for the most fitting explanation that can explain what is surprising about the events.

During the execution of the interviews, other biases can occur in terms of the interviewees discussing what they expect the researcher wants to hear or what they think is socially desirable. For instance, the *bandwagon effect* can be observed from the designs of technical innovations that appear similar. However, when asking interviewees about it, everyone explained that they thought of the idea themselves. This is possible, but it should be kept in mind that also the social desirability bias can be present in the sense that actors do not want to admit that someone else gave them an idea or inspiration. More in-depth research on the timelines of the different initiatives and conversations with actors involved would be required to determine whether this is the case. The internal validity is still guaranteed, given the time constraints and the fact that the bandwagon effect could be observed even though the actors did not admit to it.

In terms of the generalisability of the results, the research has been specifically executed to map out the small wins, its propelling mechanisms and the corresponding interventions that have taken place for the problem of plastic pollution. It is possible to find similar results for other societal problems related to environmental issues, however as this research has exemplified, the context should be kept in mind and results cannot directly be copied to new circumstances. Theoretical contributions that concern the most important propelling mechanisms for the three small win contributors as well as interlinkages between the propelling mechanisms can be applied in other perspectives, but always with a critical note to reflect on the specific circumstances. For the interlinkages, it is reasonable to assume that *energising* can also in other circumstances be the initiator of the reinforcing effect for other propelling mechanisms and *robustness* as the main receptor of this effect. This is attributed to the specifics of energising that will have an encouraging effect, that facilitates the other mechanisms, and robustness of small wins is enhanced when other mechanisms are activated. This validates the external validity of the interlinkages, but has to be evaluated in future research.

6.3. Further research

This study is unable to encompass the entire research field of small wins in plastic pollution, which leaves room to strengthen this research with further research. Areas for further research, to contribute to the current study, are the following:

Firstly, more research is necessary to evaluate the failed small wins in the plastic pollution problem, as mainly positive experiences were evaluated in this study. This could include an identification of the components that formed a barrier for the failed initiatives and kept them from growing and accelerating. This could be done by more in-depth research in the recently added small win characteristic of ‘Overcoming barriers’, and in specific the barriers that the small wins were not able to overcome. Also conceptual issues should be addressed as to whether failed initiatives can still be called small wins, or if they should be addressed as small losses. In the expert interview with the expert on small wins it was mentioned that also the failures are often necessary to achieve a change. This comes from the idea that even though an initiative failed, their impact and inspiration for others or future projects might still be present.

Secondly, this research solely focused on initiatives that contribute to small wins aimed to remove plastic from waterways in various ways. However, the plastic pollution problem is much broader than that. Further research should be conducted to explore how small wins have been achieved and accelerated for initiatives that contribute to for example preventive (e.g. circular business models) and

recycling measures. The addition of these insights provides a more comprehensive image of the entire problem of plastic pollution in the Netherlands. What should be kept in mind though, is that it may seem better to include more research fields and different kind of measures into one analysis, but this can lead to getting caught up in wicked experiences (Termeer et al., 2015). Therefore, the strength of small wins should be used in focusing on incremental change to achieve sustainable results, which is a strategy that can be applied to the two additional areas of plastic measures.

Thirdly, more research is necessary to facilitate a full incorporation of small wins in MIP. This research contributed to highlighting the importance of direction for small wins, which provides the top-down connection in small wins, but is perceived to be lacking according to the interviewees. It also contributes to the bottom-up side in missions. However, more research is necessary to generate a full connection between the two literature streams. What would be interesting to investigate is the commonalities and differences between initiatives that are generated based on the top-down approach from missions and the bottom-up initiatives that are generated according to the small wins approach.

Fourthly, further research might explore the connections between small wins and other literature strands. An in-depth research on the integration of small wins in the focus area of niches by Geels (2002) to identify what are the similarities and differences is one option. There is overlap between the two literature strands as they both take the bottom-up approach for learning and changing the current system. However, small wins is more aimed at providing a government strategy on how to utilise small wins and feed back results of propelling mechanisms for stimulation of new small wins. In contrast, the transition literature by Geels (2002) argues for ways to change the current regime when different niches arise. Moreover, small wins has several interfaces with scientific literature on path dependence and legitimacy. The importance of choosing a path to follow, when the bandwagon effect is activated, shows a gap that can be filled to evaluate literature on path dependence and lock-in of technological transformation potential with regards to the bandwagon effect. This has already been acknowledged by small win researchers such as Urpelainen (2013). Furthermore, the logic of attraction connects to an increased legitimacy. However, this has not been observed from previous literature and therefore more empirical research can contribute to that.

Fifthly, as this research touched upon the amplifying effects (upscaling, broadening and deepening), it would be interesting to investigate this further to determine the impact of those effects on the propelling mechanisms, the interventions and the underlying reinforcing effects. Especially what should be done to increase the deepening effect among small wins in plastic pollution, as this seems to be lacking in general.

Lastly, further research is required to determine general rules and propositions based on this case study. As abductive reasoning suggests, propositions can be made and tested in future research on this topic and for theory in general. This could include propositions on the small win characteristics and the propelling mechanisms for the small win contributors. Additionally, the extension of this study to determine the underlying interlinkages can be put in propositions to be tested in further research. This will strengthen the assumptions that were made in this study. Investigation in different circumstances will exemplify what holds and what does not.

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Appendix I: Overview interviewees

Overview actors

Table 6: List of interviewees

Small win contributing to	Alias	Short description of actor	Type of organisation
Innovation generation	I1	Non-profit small initiative. Technology to clean water and clean-ups on land.	Civil society
	I2	Non-profit small initiative. Clean-ups on land.	Civil society
	I3	For-profit small initiative. Technology to clean water.	Private
	I4	Consultancy and engineering firm. Technology to clean water.	Private
	I5	Consultancy and engineering firm. Technology to clean water.	Private
Innovation support	I6	Maritime service provider. Co-developer with one of the innovation generators.	Private
	I7	Contractor for Green, Infra, Water and Sports. Co-developer with one of the innovation generators.	Private
	I8	Shop selling eco-friendly Ripstop nylon bags. Collaborated in the organisation of and participated in a clean-up.	Private
Facilitate societal infrastructure	I9	Executive agency of the Ministry of Infrastructure and Water Management. Set up agreement for clean-ups around waterways.	Public
	I10	Partnership between provinces of Brabant and Limburg, Rijkswaterstaat, water boards, municipalities, local parties, companies and volunteers around the Meuse.	Public
	I11	Partnership across the border with Belgium and Germany among municipalities, water boards, universities and Rijkswaterstaat.	Public
	I12	Municipality. Support for other organisations	Public
	I13	Municipality. Support to other organisations.	Public
	I14	Port authority. Set up programme for further development of innovative ideas to create a better environment in the port.	Private
	I15	Maritime accelerator with programme for technical innovation generators.	Private
	I16	NGO achieving to create a plastic free environment and in contact with small initiatives.	Civil society

Overview experts

Table 7: List of experts and research area

Alias	Name Expert	Organisation	Expert on
E1	T.T. den Oudendammer MSc	Hogeschool Rotterdam	Water System in the Netherlands and Community Director Plastics of the CoPP
E2	Dr. ir. M.J. Janssen	Utrecht University	Mission-oriented Innovation Policy for societal challenges
E3	Prof. dr. ir. C.J.A.M. Termeer	Wageningen University Research	Small wins and propelling mechanisms

Appendix II: Operationalisation

Table 8: Operationalisation table

Concept	Characteristic	Indicator
Small win	Concrete outcomes	Visible result
	Moderate importance	Micro, local level
	In-depth change	Transformation of old routines Change of values, institutions and structures
	Positive judgement	Improvement from the previous stage Step forward
	Direction	Contribute to shared goal of plastic free waterways
	Enable other small wins	Other small wins that were activated
Propelling mechanisms	Energising	Energise and encourage others Prove technical feasibility Social encouragement Increase of trust
	Learning by doing	Pitfalls and experiments (multiple) Future effective strategies after initial learning Guided by previous experiments Success of the small win
	Logic of attraction	Resource mobilisation Human, material, financial resources
	Bandwagon effect	Imitation Public acknowledgement
	Coupling	Connection with other events Collaborate with other actor groups
	Robustness	Numerous Non-stoppable Internalised behavioural change

Appendix III: Interview guides

Interview guide actors

Every individual interview was adjusted to fit the purpose of the initiative and specified for the kind of collaborations it had with others. Also questions were asked in a semi-structured way, which means that the order of questions could differ per interview and there was room to go in detail about subjects mentioned by the interviewees. Lastly, the questionnaire was reviewed after every interview that was conducted. Unnecessary questions were removed, illogical questions were clarified and sometimes if specific topics appeared at multiple interviews, questions were added.

Introduction of myself and my research
My name is Sanne Bours. At the moment I am finishing my Master programme Innovation Sciences at Utrecht University, where I do my Master Thesis on small initiatives that aim to contribute to the problem of plastic pollution in Dutch waterways. For the sake of my research, I investigate small initiatives that are growing or already became larger to find out what interventions and mechanisms were triggered to grow or accelerate others to become larger and stronger. Therefore, it is important for me that you elaborate on the starting position of your solution and what has happened over time that stimulated you or where you stimulated others.

General information interview
The interview will last about 45 minutes. I would like to record the interview for analysing purposes later in my research. The interview is constructed as follows: first, I will ask some questions about your background, then about how you and your organisation view the plastic problem and solution, followed by questions on the initiative and how it came about. Lastly, I would like to ask questions about specific accelerating mechanisms.

General Questions

1. Could you give an explanation of the initiative and what the most important activities are?
2. What is your role within the organisation?
3. What is the problem of plastic pollution according to you?
    a. Who causes it?
    b. Where does the problem originate?
4. What is the solution for the problem of plastic pollution
    a. How does your initiative contribute to a solution for this problem?
5. Who is responsible for the problem and for the solution?

Timeline

6. How did the initiative start?
    a. What was crucial in the beginning?
    b. By what was it inspired?
7. What was the goal/mission/ambition of the initiative?
8. What experiments did you execute over the years and what did you learn from this?
9. Which activities or events contributed to the growth of your initiative?
    a. What was crucial?
10. What changes did the initiative bring about?
11. How do you see the future of your initiative?

Additional propelling mechanisms

12. With what kind of organisations do you collaborate with?
    a. How do they support you?
    b. How did these collaborations start out?
13. How did this collaboration influence the growth of the initiative?
14. At what scale was the initiative operational in the beginning and how has that changed over time?
15. Has the initiative inspired others? And why is this according to you?
    a. Have others copied your ideas?

After interview

At the end of every interview, the interviewees were asked if they had any suggestions for other actors that might be interesting for this research or for a contact person of one of their most important collaborations.

Interview guide experts

For the three expert interviews, a unique interview guide was consulted that reflected the knowledge of that specific expert. There is little overlap between the Interview Guide for the three experts. Therefore, the interview guides for these actors are available on request.

Appendix IV: Summarising tables

Table 9: Small win characteristics and exemplary quotations

	Group	Key Findings	Exemplary Quotations
Concrete outcome	Innovation generator	Tangible technologies or actions	*"We developed the waste catcher based on an idea from a dredging machine. After we noticed that wind plays a factors on currents, we looked at ways to make a floating system to put on the water."* (I5)
		Cleaner environment	*"We aim to improve local communities through the creation of better fishing conditions, tourism and other systems that are involved and related to clean waters."* (I1)
		Change in policy	*"We delivered the data of litter with our volunteers that indirectly contributed to deposits on small bottles."* (I2)
	Facilitator societal infrastructure	Innovative contracts and regulations	*"With the new performance contracts, no separate invoices are necessary which decreases the barriers for contractors."* (I9)
		Stimulating programmes	*"We started with a market consultation […], additionally we have a programme for start-ups. Because we continued with the problem of plastic, we thought it would be nice to incorporate those initiatives as well."* (I14)
Moderate importance	Innovation generator	Development stage	"*There are many initiatives, but the majority is still in their development phase."* (I9)
		Small impact	*"That is our contribution to the solution. I am not saying that we are the oracle of the solution of the worldwide plastic problem, we are super small of course."* (I1)
		Trust	*"We have the power-of-the-people. The 'we-feeling' is very important for us."* (I2)
	Facilitator societal infrastructure	Small scale tests	*"Our test location was Limburg. Here we did trials with the collection regulation. Later in 2015 we rolled it out to Brabant to address it at municipalities there."* (I10)
		Small rewards	*"For example the orchestra received 250 euros for cleaning. In Brabant that was not the case and we denied that. There they received a cup of coffee and a slice of cake for cleaning."* (I10)
		Short test duration	*"The project only has a short duration. Maximum until 2022."*(I11)
In-depth change	Innovation generator	Change behaviour citizens and corporations	*"We did one assignment for a company that wanted to map out how much waste could be found around their own factory. We found so much waste there. Then the company decided for stricter rules and maintaining it. […] Companies are willing to go in conversation and look at their internal communication for how they throw away their items."* (I2)
		Awareness education activities	*"We work on awareness and education, because we feel like we have to work on long-term solutions, but we only see slow results of that. It takes years before people adjust."* (I1)
		Different business model	*"Before, cleaning the waterways was done by two people on a boat, but now with the new technology, the person driving the 'boat' is ashore, which provides better working conditions."* (I3)

	Facilitator societal infrastructure	Awareness	*"Now it just works. [...] A certain level of awareness is reached that made sure people adjusted their habits."* (I14)
		New habits and routines	*"In 2014 or 2015 we rolled the programme out [...] and we invested a lot to get every municipality on board. Up until now, where all municipalities collaborate and we do not need to interfere anymore as an organisation. It became an automatic process."* (I10)
Positive judgement	Innovation generator	Positive externalities	*"We strengthen local communities by creating better conditions for fishing and tourism in those areas. Actually everything that is connected to plastic pollution in the rivers."* (I1)
		Acts that demonstrate positive judgement	*"Our technology was nominated for a large award in Dubai."* (I3)
	Facilitator societal infrastructure	Market forces	*"The market will show what works and what does not."* (I12)
		Growing interest	*"Then it becomes clear, more parties join, the amount of volunteers increases sharply, therewith also the amount of trash bags and the number of projects."* (I9)
Direction	Innovation generator	Personal aim	*"Our mission is to keep the world waterways clean from every form of waste, not only plastics, but also biodegradables, oil and other waste. Thereby, we want to have clean, good quality waterways."* (I3)
		Lack in direction	*"Many initiatives are arising, and people are working with power and strength, but there is still little structure. [...] One is measuring, the other develops catching systems. So a lot of customisation and experimentation."* (I4)
		Importance to provide direction	*"Schools can provide a sense of direction. They are able to show what they stand for and convey that message to children."* (I2)
		Role of government	*"Very important is the government, on a national, regional or local basis, they need to take the lead to set something up, with regulation or supervision of companies. I think that is necessary for initiatives and enthusiasts to attach themselves to an agreement, goal or ambition that is present within an organisation."* (I4)
	Facilitator societal infrastructure	Lack in uniformity	*"I think there should be clear policy on how to deal with litter and on waste in general. I believe that at this moment municipal agreements are too diverse and too diffuse. [...] There should be more uniformity in the cost for waste. That is too different."* (I10)
		Shared challenge	*"Everything that is present in the river and the harbour is a shared challenge for public and private actors, and citizens. For all areas within the dikes you are dealing with regional water authorities, where the same problems play a role. The difference is that there the waste does not flow towards the sea, but it accumulates in front of pumps."* (I12)
Overcoming barriers	Institutional barriers	Lagging national system	*"It is not the case that the Netherlands does not want to clean, but the problem lies more in the use of new and young technologies. The Netherlands is not so keen on implementing innovations."* (I3)
		Resistance to change	*"Municipalities were unwilling to change their current practices and not open for adjustments."* (I9)
		Fragmentation	*"The fragmented character of the Netherlands is an issue. Every region has its own decision-making procedures, ambitions, targets and priorities that they want to adhere to."* (I4)
		Regulations that obstruct pilots	*"The most important and critical criteria for us is to warrant safety of shipping when we decide whether we want to collaborate with new technologies or not."* (I14)

	Organisational barriers	Resistance to change (intra-organisational)	*"We aim to convey cultural changes over the whole organisation and create support for new technologies. We do so by keeping the involvement as close as possible and in specific using demonstrations, where employees can drive around on new equipment and others explain to them what it is and how it works."* (I7)
		Company size (inter-organisational)	*"Large corporations are against deposit on small bottles and form a fierce opponent. The largest companies have the most power."* (I2)
	Technical barriers	Pilots	*"The problem is that you have currents. One moment the current is perfect and plastic drifts into the waste catcher. The next moment it is opposite. So we had to do pilots to find out the degree angle of the arms so the plastic would not float out."* (I6)
		Deviations	*"We had to make adjustments so that the floating waste catcher could be picked out of the water, which was not easy."* (I7)
	Knowledge barriers	Understanding	*"Not everyone made the effort to put the litter on the agreed areas so that it could be picked up. Some farmers found it easier to throw their trash back into the Meuse."* (I10)
		Urgency	*"In every community there are active volunteers, but the communication between municipality and the volunteers is insufficient. That is why we aim to bring those two together."* (I2)
		Knowledge spill overs	*"We are part of the community and are one of the few initiatives with a catching system. Other parties kept their cards close to their chests and were not willing to share their developments."* (I5)

Note: only two out of the three categories for small win contributors are included for the characteristics, as a premature state is described in which the innovation supporters are not yet part of the innovations.

Table 10: Propelling mechanisms and exemplary quotations

	Group	Key findings	Exemplary Quotation
Energising	Innovation generator	Previous to visible result	*"The day after I came up with the idea, I went to some colleagues and pitched the idea. […] After that I needed to make some more people enthusiastic about the idea within the company, which allowed me to work on it for some hours with budget."* (I4)
		Source of inspiration	*"Our technology is no rocket science. It is not complicated and everyone can easily replicate it. It shows that it is possible to do something that we are doing."* (I5)
	Innovation support	Sustainable perspective	*"It was nice for us to start working on this, because you work for a good cause and a better, more sustainable future."* (I6)
		Sharing story	*"We share their story because everyone was energetic and happy that we decided to join the clean-up."* (I8)
	Facilitator societal infrastructure	Set an example for others	*"Luckily Rijkswaterstaat and the municipality took over our role. Our organisation decided to draw back and pass on the responsibilities to other parties."* (I14)
		Positive framing	*"It is a form of positive framing when organisations work together with large actions for good causes."* (I12)
Learning by doing	Innovation generator	Pilots, experiments, multiple consecutive tests	*"Feedback from previous experiments was used to develop new systems and eventually also systems were proven of their technology."* (I5)
		Organisational growth	*"Organisationally, we grew very fast last year [...] we had to adjust ourselves, growing from 3 employees to 8 people, especially the management."* (I1)
	Innovation support	Provide resources for pilots	*"When you are collaborating with a foundation who does not have money, the people come to us as large companies to lend out boats and people to check out locations on rivers to implement the plastic waste catcher."* (I6)
		Need additional financial resources	*"The largest input for the development of the three plastic waste catchers was municipal subsidy."* (I6)
	Facilitator societal infrastructure	Pilots, learn from past events	*"In Limburg we did the first trials to find out what works and what can be improved before we scaled it up to all large rivers in the Netherlands."* (I10)
		Launching customer	*"As a launching customer we are the client. So I find the internal connection by enabling colleagues and from their annual budgets we can do pilots."* (I12)
Logic of attraction	Innovation generator	Influential actors and action	*"There are many competitions from the European Commission and other multinationals that have an impact fund, which they can donate to foundations like us. That creates impact for us, because we are acknowledged by those organisations."* (I1)
		Media attention, publicity	*"When we opened up our recycled platform from river plastics, this generated a lot of media attention and was a moment of acknowledgement from the public."* (I1)
		Positive evaluation	*"Because showed our results in the previous project, we were asked for a follow-up project as well."* (I4)
	Innovation support	Financial stability	*"We are a large company, so whenever we want to do a demonstration we can, but for the innovation generator it is very cost intensive. […] We have more opportunities to do demonstrations because of our financial position."* (I7)
	Facilitator	Selection criteria	*"For me and my colleagues we have to consider if it is urgent enough, if we have the opportunity to work on it and if there is*

	societal infrastructure		*budget. We look at technical readiness levels of new ideas."* (I12)
		Market forces	*"The market will prove what works and what does not, so that is the phase we are currently in."* (I12)
Bandwagon effect	Innovation generator	Copying designs	*"Lately there are more initiatives that try to catch plastic from rivers, but I do not know if they copied us. [...] It is hard to tell if they are competitors or not, because they do the same job, but that is positive as well, since that is what we want: to tackle the plastic problem."* (I1)
		Storytelling	*"We aim to focus on awareness and education with lectures, because we believe next to the short term solution, we also need to focus on long term effects."* (I1)
		Public acknowledgement with help of others	*"WWF is one of our sponsors in England. Additionally, the International Monetary Fund writes about us."* (I3)
	Innovation support	Public acknowledgement	*"The most important drivers were the fact that we received subsidy from the municipality and that the public attention has grown over the past five years."* (I6)
		Positive example, reputation	*"We focus on contributing to something small that is positive to inspire others to do the same."* (I6)
		Success well-known actors	*"The Ocean Cleanup possesses a lot of media power. [...] After their latest reveal of the Interceptor, we observed instant traction."* (I6)
	Facilitator societal infrastructure	Set an example for others	*"We hope to be a signal to the outside world that this problem is so structural. Requiring lots of efforts and money, which we have to collaborate to prevent it with a source-oriented approach."* (I11)
		Increase legitimacy by involving credible actors	*"We asked deputies from the province to help us involve municipalities in our programme, because they were not involved yet."* (I10)
		Golden Goose	*"The Community of Practice Plastic is a Golden Goose. It keeps on growing and getting bigger. Everyone that does something with plastic gets involved."* (I14)
Coupling	Innovation generator	Connection across scale	*"What can be seen is that smaller initiatives search for connections with larger companies, for investments in material for example [...] you need funding to develop a first prototype or full-scale technology."* (I12)
		Complementary technologies	*"We are no partners yet, but I hope that that will happen in the future. It has a lot of potential and could boost our budget."* (I5)
	Innovation support	Connection with other domain	*"We design bags that are sustainable, but decided that for a change we wanted to be active in a clean-up and help the innovation generator get attention."* (I8)
		Positive image	*"We create a positive image by collaborating with this small initiative."* (I6)
	Facilitator societal infrastructure	Need others	*"What can be seen is that smaller initiatives search for connections with larger companies, for investments in material for example [...] you need funding to develop a first prototype or full-scale technology."* (I12)
		Shared challenge	*"Everything that is present in the river and the harbour is a shared challenge for public and private actors, and citizens. For all areas within the dikes you are dealing with regional water authorities, where the same problems play a role. The difference is that there the waste does not flow towards the sea, but it accumulates in front of pumps."* (I12)

Robustness	Innovation generator	Difficult to go beyond pilots	*"It will be a lot of work to let the wins that are there have a chance to grow. [...] Those need a couple of years to create enough traction and budgets to do something."* (I4)
		Lacking economies of scale	*"Part of our production will hopefully go to India to get the cost price of the product down. This will allow us to scale faster, provide a cheaper product, which will make it more attractive for organisations to maybe even buy our product."* (I3)
		Premature termination	*"Because there was a similar design, we had two choices; start heavy investments or decide not to form a blockade for the other. That is why we decided to put the project on hold."* (I4)
	Innovation support	Paradigm shift	*"The change that can be observed in the paradigm is that it was never anybody's problem, but now there is more focus, also because of parties like The Ocean Cleanup, who give it an enormous boost. [...] That also leads to larger corporations finding out they have to take action."* (I6)
		Public acknowledgement	*"At the fair for climate control we presented our technology, which attracted many people. We were also interviewed by RTL 7, which shows that the product attracts the interest of people."* (I7)
	Facilitator societal infrastructure	Make initiatives fit for market	*"We often purchase or put out tenders for technologies with high technology readiness levels, while the interesting technologies might be in the more premature stage. [...] Hence, we try to stimulate products and make them more fit for the market together with universities."* (I12)
		Absence national and European regulations	*It is concerned with the responsibility. In the national Marine Strategy Framework Directive it is noted that plastic is an unwanted material in the marine environment, but the Strategy for water, which involves sweet water streams, does not include anything on plastic yet. If it is not noted down on paper, nobody has to respond."* (I16)
		Export potential	*"You notice it becomes an export product for areas that have heavier pollution, such as Jakarta, Indonesia."* (I12)