

Impacts of Participating in an Environmental Voluntary Agreement

A Case Study of Plastics Pact NL



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Abstract

The purpose of this research is to indicate the influence of environmental voluntary agreements (EVA) on participating organisations in terms of inter-organisational and intra-organisational changes. For this research a case study design was used, wherein the Plastics Pact NL (hereinafter the Plastics Pact) together with its participants were the unit of analysis. The study was implemented through conducting desk research and semi-structured interviews, having a matrix filled out, and informal observations of meetings of the Plastics Pact. Sixteen participants were included in the research, who have participated from the beginning of the pact and together covered the entire value chain. The results illustrate that the Plastics Pact influences the direction, precision of targets, and scope of plastic strategies, internal business processes (mostly regarding monitoring processes), and connections through the value chain. Currently, interviewed participants are mostly located in the middle of the change process whereby participants have set up a strategy and an implementation plan, empowering broad-based action, and have established some short-term wins. However, these organisations encounter certain organisational, technical, and system barriers to change. System barriers are mostly experienced when participants work towards the recycled content target and the recycling target of the Plastics Pact. Interestingly, not all participants internalised the targets of the Plastics Pact. Hence, the Plastics Pact is recommended to monitor the commitment of all parties and to provide additional stimulus to these organisations, in order to prevent free riding behaviour. Further research could focus on the intra-organisational and inter-organisational changes after the completion of the Plastics Pact. Moreover, the difference in successful completion of EVAs involving sectoral actors compared to EVAs involving value chain actors could also be further explored.

Keywords: Circular Economy; Influence of Environmental Voluntary Agreements; Change Management; the Plastics Pact NL; Value Chain Collaboration; Plastic Strategy; Internal Business Process Changes.

Executive summary

The total amount of plastic packaging is expected to quadruple by 2050. At this moment, the worldwide use of plastics is causing negative impacts on the environment like biodiversity loss, water and air quality reduction, climate change, and the decrease of human health. Therefore, action is needed to diminish or even eliminate the negative impacts of plastic usage. The Plastics Pact NL (hereinafter the Plastics Pact) is an environmental voluntary agreement (EVA) between public and private parties that addresses the production, use and waste management of plastics, and is used as one of the instruments by the government to move towards a circular economy (CE) for plastic packaging and single use products. At the launch of the pact, the pact had 74 signatories. Currently, this number has grown to 110 signatories. The aim of the pact is to collectively achieve four goals: 1) produce 100% recyclable plastic products, 2) reduce plastics use by 20%, 3) create at least 70% recycling capacity, and 4) use at least 35% recycled plastics in products.

This research focuses on the intra-organisational and inter-organisational changes the Plastics Pact causes at participating organisations to determine if and how the organisations work towards the goals of the Plastics Pact. Additionally, this research indicates to what extent organisations establish lasting change in the organisation. Results show that the Dutch Plastics Pact, together with the increased public and political attention for plastics in Europe, has a bolstering effect on participating companies to set up a plastic strategy. Direct influence of the Plastics Pact on the strategy of participants regarding the direction, targets, and scope, has been found at plastic product and packaging supplying and applying organisations, as well as waste management organisations. With respect to internal business processes, the covenant mostly influenced the monitoring processes of companies. The pact facilitates enabling factors for value chain collaboration, including: 1) a common goal to work on, 2) network possibilities involving all value chain actors, and 3) propagation of a sustainable reputation. Still, the Plastics Pact has not yet been able to initiate concrete value chain collaborations. However, participants have made new contacts or revitalised existing contacts via the pact. In the near future the Plastics Pact will conduct a variety of pilot projects with multiple participants per project to incentivise further collaboration. The impact of this is potentially large when the solutions of these projects are harmonised or standardised beyond the pact's own participants.

A couple of barriers are found for organisations to accomplish the Plastics Pact's targets. Firstly, a barrier within the covenant is the internalisation of the covenant's targets by participants. Not all participants have internalised all targets to which they are directly connected to by the Plastics Pact. This should be carefully monitored. The Plastics Pact could deploy additional stimulus, such as active outreach by asking participants about the action plans to establish the covenant's targets. Furthermore, providing participants with the tools they need, will help enable participants to achieve the Plastics Pact's targets. This can be done by creating a "one stop shop" site for the Plastics Pact participants that integrates all relevant information, knowledge, other initiatives, accessible subsidies, and progress of the pact itself and participating organisations, and matchmaking of challenges and solutions of participants.

Secondly, three system barriers are present that form an obstacle in the movement towards the Plastics Pact's targets. These consists of the following: 1) the European Food Safety Authority (EFSA) legislation, 2) the price of virgin plastics in comparison to recycled plastics, and 3) the waste management system. The government could take action to remove the last two barriers. The government could internalise the negative impacts in the price of virgin plastics or develop legislation to regulate a minimum threshold for recycled content of plastic products. Furthermore, the government could rearrange the waste management system in such a way that the requirements for municipalities, waste management organisations, and recyclers are better integrated and harmonised. In this waste management system both quality and quantity should be emphasised.

Thirdly, the results show that badly designed packaging/product combinations can pollute the plastics waste stream which can negatively impact the recycling of a whole stream. To prevent this from happening, policies on badly designed packaging/products at European level can be set up to mitigate or prohibit such products. In this way, bringing badly designed packaging/products on the market would result in more serious consequences for the producing parties.

Finally, an observed barrier is the variety of plastic material types and designs. The Plastics Pact aspires among others to generate clarity on which material types and designs are best to use. After which, these types and designs can be harmonised and/or standardised. It is important to take these results beyond the participants of the pact to establish a large impact. Therefore, the Plastics Pact is recommended to share the results of the pact and take the right actions to facilitate harmonisation, or even standardisation by developing guidelines or regulation on e.g. material types and designs.

For the Plastics Pact to succeed, it is important that participants internalise the targets of the pact as this formalises the commitment to the targets within the organisations. This way, companies can make the necessary resources available to work towards the targets. When companies have formalised the targets in the organisation, organisations have extra stimulus to collectively work towards the targets, and enable collaboration across the value chain. This will be especially beneficial to overcome the latter barrier and establish harmonisation and standardisation on material types and designs. At the moment, packaging and product suppliers and appliers, waste management companies, and recyclers are already actively communicating about optimisations for sustainability of packaging including recyclability. This demonstrates that the Plastics Pact participants are already working together towards the recyclability target. However, to achieve harmonisation/standardisation agreements will need to be made on a larger scale beyond the Plastics Pact participants.

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Abbreviations

BPC	Business Process Change
CE	Circular Economy
CEO	Chief Executive Officer
EFSA	European Food Safety Authority
EPR	Extended Producer Responsibility
EVA	Environmental Voluntary Agreement
ISO	International Organisation for Standardisation
KPI	Key Performance Indicator
rPP	recycled Polypropylene
NTCP	National Test Centre Circular Plastics
NGO	Non-governmental organisation
rPET	recycled Polyethylene Terephthalate
R&D	Research and Development
SUP	Single Use Plastics
SVHC	Substance of Very High Concern
VANG	Van Afval Naar Grondstof (From-Waste-To-Resource)

1. Introduction

The enormous amount of plastics used globally is causing negative impacts on the environment such as biodiversity loss, water and air quality reduction, climate change, and the decrease of human health (ten Brink et al., 2018; Shen et al., 2020). At the moment, 40% of all produced plastics is assigned to packaging in Europe. Only 42% of this amount is recycled currently (Plastics Europe, 2019). Limiting these negative impacts of plastics is necessary since the total amount of plastic packaging is expected to quadruple by 2050 (World Economic Forum and the Ellen MacArthur Foundation, 2016). Therefore, long-term solutions as waste reduction and waste management strategies like expanded recovery systems and extended producer responsibility (EPR) are suggested by Jambeck et al. (2015).

To deal with these types of environmental threats and to establish long-term solutions, governments can initiate environmental voluntary agreements (EVA). In the last decades EVAs have received increased attention by governments as an alternative policy to protect the environment (Borck & Coglianese, 2009). EVAs are agreements between public and private parties which are initiated to achieve an environmental goal by greater cooperation between different organisations (Crocì, 2005; Marx, 2010). From a governmental perspective, EVAs have the potential to reduce regulatory costs (Crocì, 2005). Although, the covenant provides no assurance that all parties will commit to the agreement. Additionally, due to its voluntary nature, there is no guarantee that all participating actors will actually comply to the agreements (Crocì, 2005; Delmas & Montes-Sancho, 2010). From a firm perspective there are several reasons to participate in an EVA. Motivations to participate exist of: 1) receiving a competitive advantage in respect to firms that did not commit to the EVA, 2) pre-empting regulation of the issue, 3) creating flexibility in decision-making regarding greener technologies, 4) pressuring competitors to adopt greener technologies (if a firm already exclusively owns these technologies), 5) averting costs by preventing pollution, 6) obtaining or sustaining a sustainable image, and 7) sharing information among the participating organisations (Crocì, 2005; Videras & Alberini, 2000; Wakabayashi & Arimura, 2016).

In the Netherlands EVAs have obtained a viable status as policy instrument for various environmental problems across sectors (Skjaerseth, 2000). In 2019 the Dutch government, together with organisations across the plastic industry, has initiated an EVA: the Plastics Pact NL (hereinafter the Plastics Pact). This pact is a form of EPR. The purpose of this covenant is to reduce pressure on the environment caused by plastics by accelerating the transition towards a circular economy (CE) for plastics (Van Veldhoven-van der Meer, 2019).

As stated by Cunningham and Clinch (2004) examination of the progress and development of the EVA is important to sustain its credibility. Multiple studies have focused on measuring the effectiveness of EVAs by assessing their environmental impact (Delmas & Montes-Sancho, 2010; Annandale, Morrison-Saunders, Bouma, 2004; Jiménez, 2007; Borck & Coglianese, 2009). However, very little literature is available on EVAs' effectiveness in terms of outcomes such as changes in businesses and strategic collaboration across the industry. The majority of literature focuses on governmental factors for successful implementation (Cunningham & Clinch, 2004), on participation levels (Delmas & Montes-Sancho, 2010) and on effectiveness in terms of addressing environmental impacts with EVAs (Borck & Coglianese, 2009). However, Jiménez (2007) analysed if organisations implemented environmental projects or initiatives as a consequence of participating in an EVA. Among the analysed factors organisational changes was an item. Nevertheless, this research did not investigate EVAs' influence on businesses elaborately in terms of changing business strategy and processes, and strategic collaboration across the industry. Therefore, this research aims to investigate

to what extent participation in an EVA leads to change in business operations and leads to horizontal and vertical collaboration across the industry. Hence, the following research question has been formulated:

What changes did the Plastics Pact cause on intra-organisational and inter-organisational level among participating organisations?

This research question will be answered by answering the following three sub questions:

Sub question 1: To what extent has the Plastics Pact influenced changes in corporate strategy among participating companies?

Sub question 2: To what extent has the Plastics Pact influenced internal business processes at participating firms?

Sub question 3: To what extent has the Plastics Pact stimulated the formation of strategic collaboration to enable knowledge sharing and collaboration between firms to achieve the Plastics Pact's goals?

Due to the novelty of analysing the inter-organisational and intra-organisational changes caused by EVAs, a qualitative combined inductive and deductive case study approach will be used to answer these three questions (Bryman, 2012; Eisenhardt, 1989). The scope of this study is on plastics producing, processing, and recycling organisations, and packaging and product supplying and applying firms. This scope applies to participants who have participated since the beginning in the Plastics Pact. Recently joined businesses are unlikely to have had enough time to incorporate the Plastics Pact's goals in their plastic strategy, business operations and use the Plastics Pacts network for strategic collaboration. For this reason the participants that recently joined the Plastics Pacts are left out of the scope of this study.

Since this study explores how organisations are influenced by participating in an EVA in terms of business strategy and processes, and value chain collaboration, which is a current gap in the environmental policy and regulation literature, this study will add to existing theory. Furthermore, governments will be able to get more insights into the effectiveness of EVAs through this analysis. Additionally, the government gains more insight into the corresponding drivers and barriers that companies face when acting towards establishing EVAs' goals. Consequently, governments are then better able to support companies to achieve the targets agreed upon in EVAs, which benefits society. More specifically, the Dutch government can give businesses more guidance in achieving the Plastics Pact's targets. Hence, a transition towards a CE for plastics can be established.

The structure of this report, will begin providing information on the Plastics Pact. After which, relevant theories are described. Next, the research design and methodology are explained. Subsequently, the results of the research are illustrated followed by a discussion section. The end of this report will provide the conclusions and recommendations made for this study.

2. Background - the Plastics Pact

The Dutch government has initiated a programme to establish a CE by 2050, with an intermediate goal of reducing 50% of primary materials by 2030 (Ministry of Infrastructure and Water Management, 2019). This plan consists of five topics including plastics. Subsequently, as part of this theme, the EVA the Plastics Pact was initiated in February 2019 (Van Veldhoven-van der Meer, 2019). This pact is in line with the European strategy for plastics in a CE (European Commission, 2016; Van Veldhoven-van der Meer, 2019).

Plastics Pact NL is an EVA between the Ministry of Infrastructure and Water Management and 74 companies consisting of plastics producers, plastic packaging and product suppliers and applicers¹, waste processors, plastics recyclers, and other parties from the start of the pact. The other parties include consultancies, banks and non-governmental organisations (NGOs), who cannot directly contribute to the Plastics Pact's targets on their own but can facilitate the other companies to achieve the goals (Van Veldhoven-van der Meer, 2019). An overview of the participating organisations is given in Appendix A. Together these parties have agreed upon four targets for 2025, which are the following:

1. plastic applying businesses that use single use plastics need to use at least 100% recyclable plastics and when valuable reusable plastics;
2. plastic applying companies need to reduce 20% of the used plastics (in weight) compared to 2017 through reducing the amount of used plastics, reusing plastics, and/or using more sustainable alternative materials;
3. plastic producing firms need to create sufficient sorting and recycling capacities such that at least 70% of all single use plastics and packaging can be processed at high-quality;
4. plastic applying companies, need to use at least 35% of recycled plastics (in weight) and as much as possible bio-based plastics in their single use plastic products and packaging to avoid the use of primary fossil plastics (Van Veldhoven-van der Meer, 2019).

Every year the participating organisations will make data available about the key performance indicators (KPIs) to the monitoring organisation. This way, the Plastics Pact is capable to monitor the progress and, moreover, is able to see if targets are met (Van Veldhoven-van der Meer, 2019). An overview of the KPIs are given in Appendix B.

To drive collective action the Plastics Pact has initiated four working groups: 1) Design for Circularity, 2) Collecting, Sorting, and Recycling, 3) Reduce and Reuse, and 4) Behaviour, Communication, and Education. Each of these working groups established a roadmap including actions in the form of pilots to collectively work on.

¹ The category of applicers includes all companies that use and sell plastic packaging and products. These are retailers, on-the-go restaurants, event organisations and brand owners (see Section 4.1).

3. Theoretical framework

Understanding the process of change and the factors which play an important role for change is essential. This will allow an analysis into whether the Plastics Pact induces intra-organisational and inter-organisational change. Furthermore, an overview is generated on how organisations can integrate a CE in the organisation.

3.1 Change management

In order to achieve goals, organisations have to make certain changes. A large amount of literature has been written about change management models. An often cited study is the study of Kettinger & Grover (1995) about business process change (BPC), which is defined as “a strategy-driven organizational initiative to improve and (re)design business processes to achieve competitive advantage in performance (e.g. quality, responsiveness, cost, flexibility, satisfaction, shareholder value, and other critical process measures) through changes in the relationships between management, information, technology, organizational structure, and people” (Kettinger & Grover, 1995, p. 12). This study gives a descriptive model for BPC (see Figure 1), which is grounded in existing literature. This model illustrates the entire change process of a company. Starting with external factors that influence the strategy for change, followed by company systems that could be changed to achieve a desired result. This model will help to assess to what extent companies adjust their transformational subsystems to achieve the goals of the Plastics Pact. Therefore, this model is chosen.

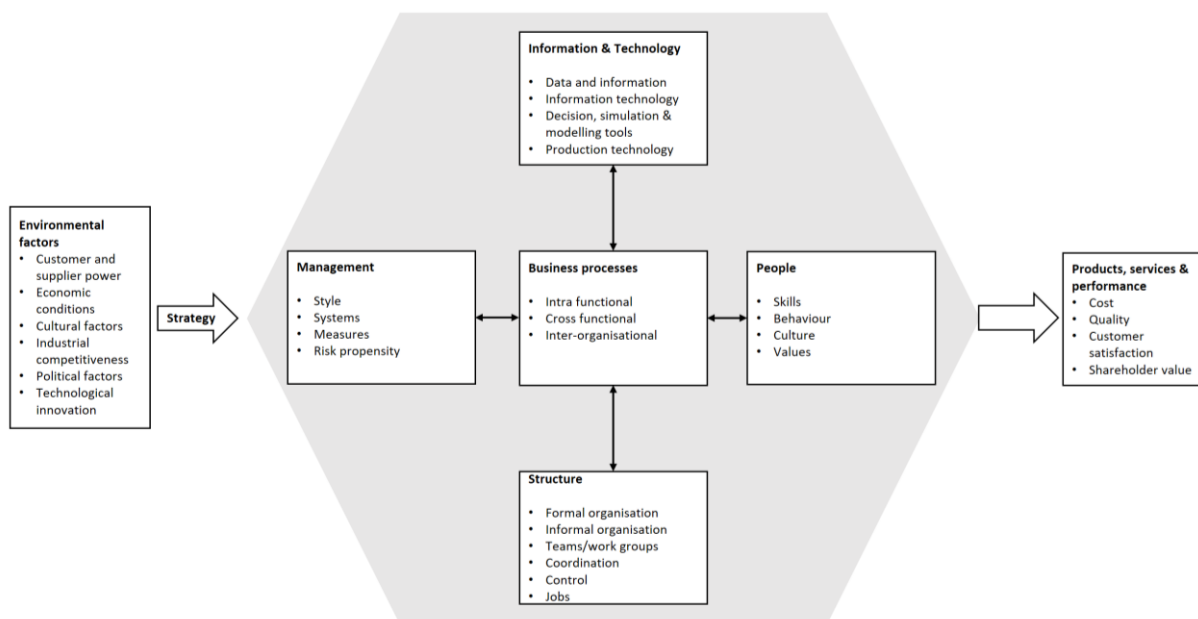


Figure 1: A model of business process change by Kettinger & Grover (1995).

The model shows that a firm’s strategy is influenced by several environmental factors, e.g. customer and supplier power, economic conditions, cultural factors, industry competitiveness, political factors, and technological innovation. Consequently, a changing strategy affects one or more transformational subsystems, existing of business processes, people, information & technology, management, and informal and formal organisational structures, which results in improved products, services and/or performances in terms of costs, quality, customer satisfaction, flexibility/innovation, and/or

shareholder value. While transformation in an organisation can already be achieved by altering one transformational subsystem, the impact will likely be greater when more than one subsystem is modified (Kettinger & Grover, 1995). Thus, in light of this study and the given points of the BPC model, a change in one or more subsystems could lead to increased contributions to the Plastics Pact's goals.

Since this research focuses on intra-organisational and inter-organisational changes, it is valuable to know which factors facilitate BPCs. Kettinger & Grover (1995) poses an additional theoretical framework which illustrates how top management could enable change by influencing four forces via strategic initiatives. The four forces that can be influenced exist of: 1) cultural readiness, 2) knowledge-sharing capabilities, 3) relationship balancing, and 4) learning capacity. Firstly, the facilitation of a culture by leaders that is ready for change, is important so that an effective process of change can be initiated (Saffold, 1988). Secondly, knowledge-sharing capabilities are essential in order to obtain useful information hence facilitating the propensity to change (Charan, 1991; Nonaka, 1991). Thirdly, by leveraging boundaries and relationships a value chain can be reengineered achieving successful process change. This is usually caused by a balance of internal and external networks of cooperation and competition (Charan, 1991; Nonaka, 1991). Lastly, leaders can facilitate learning capacity by initiating and using informal networks for knowledge acquisition and learning processes (Brown & Duguid, 1991). Learning capacity can range from correcting errors within a process to changing the entire business structure from within (March, 1991).

To implement change in an organisation the above four forces are important. Although, a more practical prescriptive approach is formulated by Kotter (1996), who is found to be the most cited scholar on organisational transformation through leadership (Hughes, 2015). The study outlined eight steps firms could follow to implement and manage change (see Table 1).

3.2 Circular economy and extended producer responsibility

Waste reduction and waste management strategies are two approaches suggested by Jambeck et al. (2015) to limit the negative impacts of plastics. More specifically, expanded recovery systems and EPR are mentioned as a solution. These two long-term solutions will help to establish a CE. Additionally, these approaches are applied in the EVA, the Plastics Pact, by stimulating plastic packaging and product supplying and applying organisations to use less plastics, use recycled plastics, and design better recyclable products and packaging. As part of this approach plastic producing and applying companies need to collaborate with waste management companies (Lindhqvist, 2000). Before continuing to how CE and EPR can be integrated on a business level, the definitions together with general implementation strategies will be provided.

Kirchherr, Reike, & Hekkert (2017) have defined CE as follows “... *an economic system that is based on business models which replace the ‘end-of-life’ concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes [...] with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations*” (Kirchherr et al., 2017, p. 224). In line with this definition the Ellen MacArthur Foundation (2019) has formulated that a CE has the objective to decouple economic growth from infinite resource consumption. Hence, a systemic shift from a linear economy to an economy of long-term resilience is necessary (Ellen MacArthur Foundation, 2019). Applying this concept more specifically on plastics, the World Economic Forum & the Ellen MacArthur Foundation (2017) have formulated three strategies to transition to a CE for plastics: 1) innovation & redesign, 2) reuse, and 3) recycling with improved quality and economics. A

Table 1: Kotter's eight steps to successful change (1996).

Step 1	Create a sense of urgency	Creating urgency for the problem is crucial to gain cooperation from key individuals to put effort in creating and communicating a vision for change.
Step 2	Establish a guiding coalition	A strong guiding coalition is needed existing of the right balance of people, level of trust and shared objectives in order to develop the vision and communicate it, to remove obstacles, to generate short-term wins, and to institutionalise the change.
Step 3	Develop a vision and strategy	A vision pictures the future and explains why people should strive to this future. A corresponding strategy will provide the plan to accomplish the company's vision. A vision and strategy helps to guide people towards the right direction.
Step 4	Communicate the changed vision	A vision is empowered when most of the employees have a shared understanding of the vision. Potentially resulting in motivation and coordination for transformational activities.
Step 5	Empower broad-based action	The organisation enables major internal transformations by empowering employees. This can be done by removing barriers like formal structures, a lack of skills, personnel and information systems, and supervisors that discourage action.
Step 6	Generate short-term wins	As change can take a long time, it is important to celebrate the short-term wins to show employees appreciation for their work which can positively contribute to their motivation.
Step 7	Consolidate gains and produce more change	Sustain acceleration by consolidating gains to generate more change through the identification of success, failure and potential improvement.
Step 8	Anchor new approaches in the culture	Institutionalising change in the organisation to embed the change in the company culture. This is relatively easy when the new vision is compatible with the old culture. However, anchoring change becomes harder when the change is incompatible whereby some inconsistent practices need to be removed before anchoring the new practices.

cross-value chain collaboration approach is needed for these strategies to increase recycling economics. These strategies are linked to the BPC model of Kettinger & Grover (1995) (see Table 2).

EPR is defined as *“a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product”* (Lindhqvist, 2000, p. 154). To implement EPR four actors are especially relevant: producers, users, waste managers and authorities (Lindhqvist, 2000). Manufacturers, and sometimes distributors, mainly manage changes in design, while users and waste managers have relatively few influence on these changes. Although these three different actors are all differently regulated by authorities, among which waste managers are much more regulated but are often not involved in product development. In order to implement EPR, good working feedback loops need to be established among these actors.

3.3 Integration of circular economy in business

Participating organisations in the Plastics Pact need to implement a CE in their business to be able to achieve the targets of the covenant. Multiple studies have already investigated how a CE could be integrated into business. Some general strategies for integrating a CE in businesses are first illustrated, after which some specific approaches for CE regarding packaging are provided.

Laubscher and Marinelli (2014) studied how a CE could be implemented in a multinational corporation. They identified six important areas for integration of a CE in the organisation. Firstly, the company's sales model needs to be converted to a service model and/or needs to create incentive for customers to return the used products. Secondly, a CE needs to be integrated in the product design to enable high quality of reusable products, components and materials, and to assure material separation and waste separation. This is in line with the plastic strategy for a CE by the World Economic Forum & the Ellen MacArthur Foundation (2017). Thirdly, the right information technology and data management need to be available to keep track of the progress on resource usage and to create an overview of logistics. This will facilitate effective return logistics. Fourthly, closed supply loops need to be established by using recovered materials originating from their own products and other recycled materials/components as much as possible. Fifthly, stakeholder engagement of upstream and downstream partners and customers is important to implement a CE. Sixthly, and lastly, the integration of a CE in human resources is essential to generate the culture and capabilities to enable the transformation towards a CE.

Other studies have looked more specifically into factors for successful integration of circularity in packaging development processes. This is valuable to illustrate, given the targets of the Plastics Pact. De Koeijer (2018) mainly found that integration on three different levels is important, namely: integrated product-packaging development, front-end integration, and cross-functional actor integration. Enabling factors for these three integration strategies are given. On a strategic level, commitment and support from senior management is essential since they formulate the goals and strategies for new product development (Hallstedt, Thompson, & Lindahl, 2013). Moreover, on an operational level the usage of sustainable development tools and corresponding evaluations are essential (De Koeijer, 2018; Hallstedt et al., 2013). Herewith, applying systems thinking is important to consider the total product-packaging system to avoid negative environmental impacts elsewhere in the value chain (Verghese & Lewis, 2007). Additionally, the structure of and processes within development teams are important. The team should be multidisciplinary, among which a sustainability specialist safeguards sustainability (De Koeijer, 2018; De Medeiros, Ribeiro, & Cortimiglia, 2014; Boks, 2006). Next to this, the team should incorporate a sustainability dialogue among team members (Tingström and Karlsson, 2006), environmental milestones within the development process (Boks, 2006; Dangelico and Pujari, 2010), and sustainability trainings for employees (Hunt and Auster, 1990). Besides, the involvement of the procurement team (Hallstedt et al., 2013) and external value chain actors (Karlsson & Luttrupp, 2006) can be valuable. The latter is important in order to reduce environmental impacts and commercial costs, and optimise efficiencies for the entire supply chain (Verghese & Lewis, 2007). To summarise, all the factors for organisational change and successful integration of a CE in businesses are divided into the five transformational subsystems of Kettinger & Grover (1995) they belong mostly in order to create an overview (see Table 2). Some factors are categorised in multiple subsystems as they are overarching.

Table 2: Overview of factors of success for integrating CE in business per divided among the transformational subsystems of Kettinger & Grover (1995).

<i>Business processes</i>	<p>Cross-functional actor integration (De Koeijer, 2018) Stakeholder engagement (Laubscher & Marinelli, 2014) Conversion of sales model (Laubscher & Marinelli, 2014) Closed supply loops (Laubscher & Marinelli, 2014)</p>
<i>People</i>	<p>Human resources (Laubscher & Marinelli, 2014) Sustainability trainings for employees (Hunt & Auster, 1990) Cultural readiness (Kettinger & Grover, 1995)</p>
<i>Information & Technology</i>	<p>Sustainable development tools and evaluations (Hallstedt et al., 2013; Verghese & Lewis, 2007) IT and data management (Laubscher & Marinelli, 2014) Product design (Laubscher & Marinelli, 2014; World Economic Forum & Ellen MacArthur Foundation, 2017) Innovation & redesign (World Economic Forum & Ellen MacArthur Foundation, 2017) Knowledge-sharing capabilities (Kettinger & Grover, 1995) Reuse & recycling (World Economic Forum & Ellen MacArthur Foundation, 2017) Closed supply loops (Laubscher & Marinelli, 2014)</p>
<i>Management</i>	<p>Commitment and support from senior management (Hallstedt et al., 2013) Learning capacity (Kettinger & Grover, 1995) Knowledge sharing capabilities (Kettinger & Grover, 1995) Relationship balancing in supply chain (Kettinger & Grover, 1995) Environmental milestones within product development (Boks, 2006; Dangelico and Pujari, 2010)</p>
<i>Organisational structures</i>	<p>Incorporate sustainability dialogue among team members (Tingström and Karlsson, 2006) Sustainability specialist in team (Boks, 2006) Multi-disciplinary teams (De Medeiros, Ribeiro, & Cortimiglia, 2014) Front-end integration (De Koeijer, 2018) Cross-functional actor integration (De Koeijer, 2018) Integrated product packaging development (De Koeijer, 2018) Involvement of procurement team and external actors (Hallstedt et al., 2013; Karlsson & Luttrupp, 2006; Verghese & Lewis, 2007) Establishment of good working feedback loops between actors within the value chain (Lindhqvist, 2000).</p>

4. Research design and methodology

This study is concerned with analysing the Plastics Pact's effectiveness in terms of outcomes on intra-organisational and inter-organisational levels among participating businesses, and is therefore regarded to be of evaluative nature. Because of the novelty of this study, a qualitative combined inductive and deductive research approach is adopted as this allows the generation of new ideas and concepts in order to elaborate on existing literature that studied EVAs' effectiveness (Gioia, Corley, & Hamilton, 2013; Gioia & Pitre, 1990; Bryman, 2012). Correspondingly, a case study design is implemented to connect practice with theory (Eisenhardt, 1989).

4.1 Case selection

The Plastics Pact consists of actors covering the whole value chain: 1) plastics producers, 2) plastic packaging and product suppliers (hereinafter suppliers), 3) plastic packaging and product appliers (hereinafter appliers), 4) waste management companies, 5) plastics recyclers, and 6) other parties. This study focuses on organisations within the first five segments since these groups have direct impact on achieving the goals of the EVA (see Figure 2). Furthermore, this study only incorporated organisations that participate from the beginning in the pact as these firms will likely have changed more, due to participation in the Plastics Pact than recently joined firms. Through theoretical sampling, which is one of the preferred methods in case study designs (Eisenhardt, 1989), sixteen organisations are selected for analysis (Corbin & Strauss, 1988). For the selection of the sixteen organisations, a variety of businesses are selected which together cover the whole supply chain and vary in commitment to the Plastics Pact. The commitment of the Plastics Pact was indicated by an expert interview with an employee from the Ministry of Infrastructure and Water Management who is involved in the Plastics Pact. Based on this, sixteen organisations were selected covering the whole value chain in which at least two polar cases per categorical group regarding commitment to the pact were present (Pettigrew, 1990) (see Table 3). Because of this case selection, varying data regarding the influence of the pact on participants is expected to be retrieved (Pettigrew, 1990; Eisenhardt, 1989).

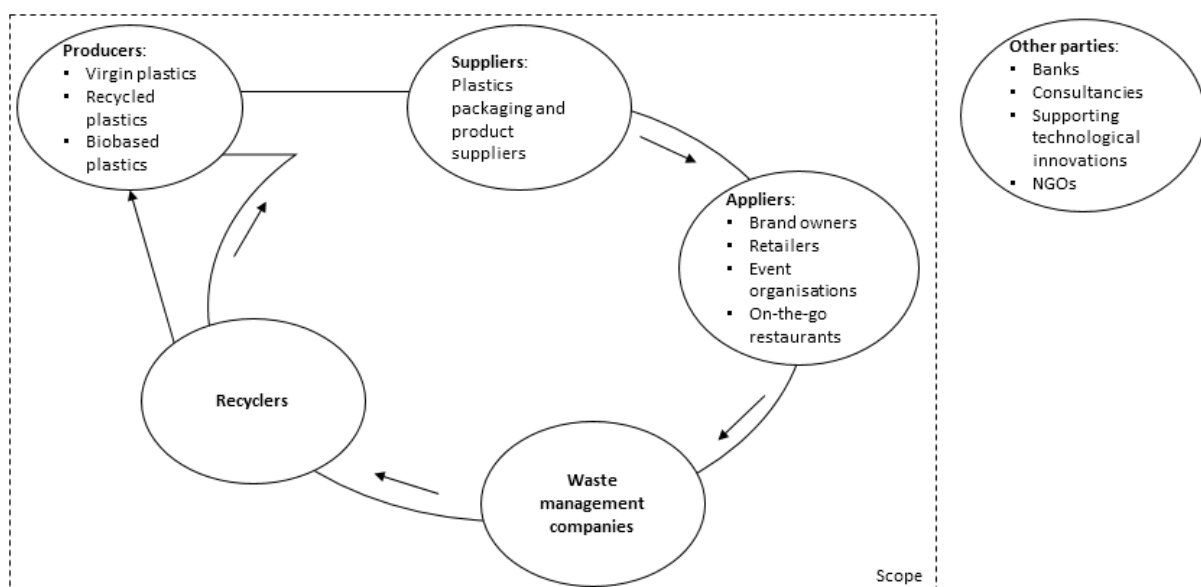


Figure 2: Actors involved in the Plastics Pact and scope of research.

Table 3: Specification of selected participants per category.

Company categories/Change	High to medium involvement in pact	Low involvement in pact
Plastic producers	A virgin and recycled plastics producer	A bio-based plastics producer
Suppliers	Two packaging suppliers	One packaging and product supplier
Appliers	A retailer, an on-the-go restaurant, and a brand owner	Two brand owners and an event organisation
Waste management organisations	Two waste management companies	One waste management company
Recyclers	A recycler	A recycler

4.2 Operationalisation

This research consists of two levels: the intra-organisational and the inter-organisational level. On the intra-organisational level, an analysis on changing corporate strategy, management practices and business operations is conducted, and on the inter-organisational level an analysis on strategic collaboration across the industry is implemented among participating organisations. Although, the concepts can be separated in two different levels, they are interlinked with each other as demonstrated by the model of BPC of Kettinger & Grover (1995), whereby inter-organisational business processes are connected with intra-organisational transformation subsystems.

To create a holistic overview of the change management theories, a framework is constructed that combines the model of BPC by Kettinger & Grover (1995) and Kotter's eight steps of successful implementation of change (1996) as these two theories are complementing each other (see Figure 3). Whereas, the model of Kettinger & Grover gives an overview of the change process, Kotter gives an inside business perspective by showing the process organisations need to follow to generate the desired change. The first step of Kotter, create urgency, corresponds with the factors from the BPC model that influence a firm's strategy. From these factors the necessity for change arise which, consequently, can be used to illustrate the urgency for change within the firm. Step one is followed by establishing a guiding coalition. This coalition can help with formulating the strategy and vision. Thus, logically step two and three corresponds to the strategy phase in the BPC model. Accordingly, the strategy and the vision need to be communicated, as implied by Kotter's fourth step. This takes place before the transformational subsystems will be changed. After this, step five, six, and seven follow, which provide the actual change within business processes, resulting in one or more changing transformational subsystems. Within the transformational subsystem information and technology, data management systems to monitor the achieved progress towards the goals of the Plastics Pact are very important (Laubscher & Marinelli, 2014). These changing subsystems will lead to impact in terms of changing products, services, and/or performance. When arriving at this stage and the achieved results affect the firm positively, the company should anchor the approaches in its culture, which is in line with Kotter's eighth step.

Accordingly, firms are evaluated on their change process, which has been put in place to reach the Plastics Pact's goals, by defining their position in the framework. Therewithal, the barriers and drivers companies have faced and/or are facing to reach this change are identified. Besides, this study analysed the influence of the Plastics Pact on companies' change processes.

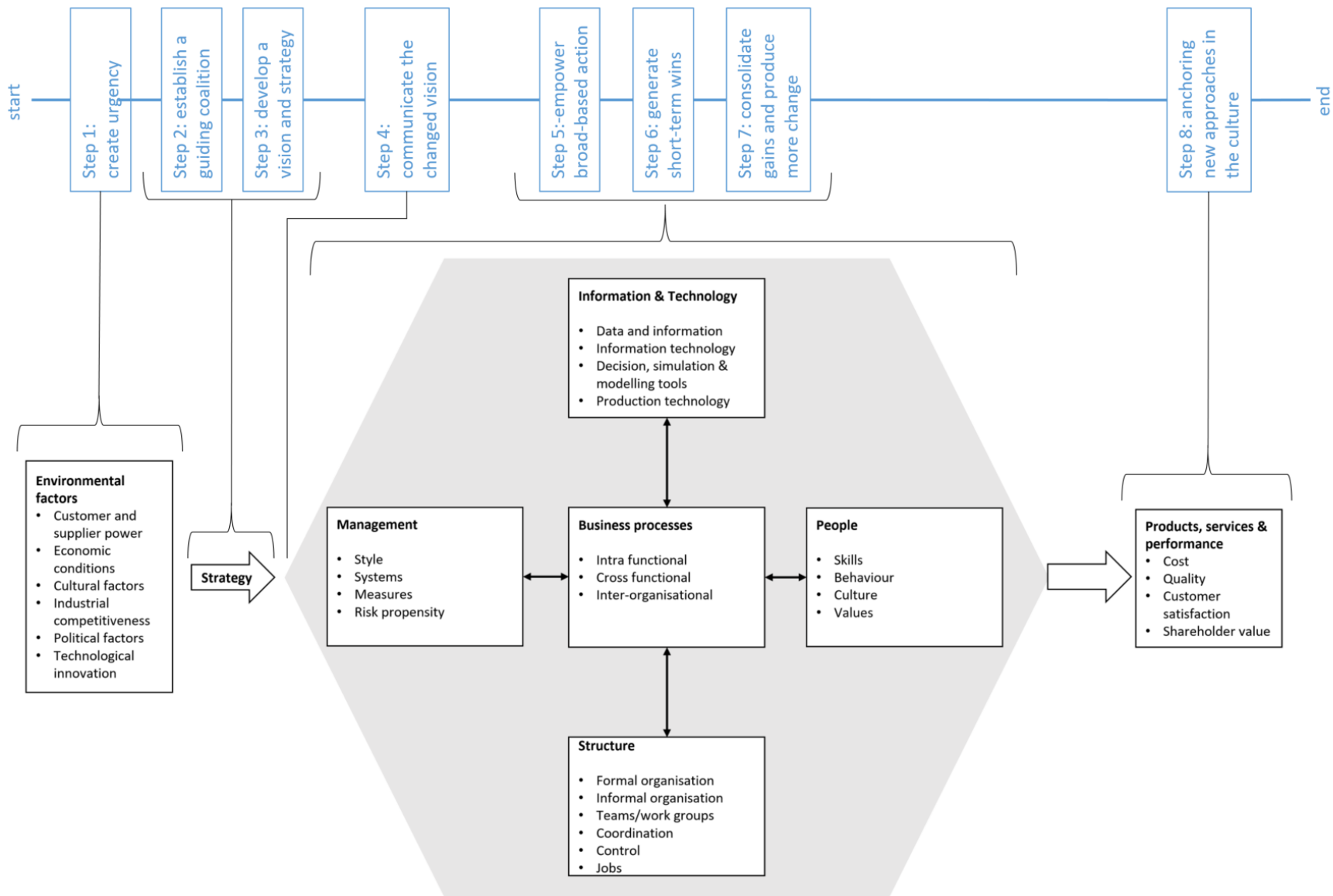


Figure 3: Change framework based on business process change model of Kettinger & Grover (1995) and Kotter's eight steps of successful implementation of change (Kotter, 1996).

4.3 Data collection

Data was collected via four sources to create data triangulation (Denzin, 1970) (see Figure 4). This enhances the reliability of the findings, as cross-checking information from different sources helps to discover, clarify, or possibly eliminate inaccuracies (Web et al., 1966). All data were collected between February and May 2020. Firstly, publicly available company documents and webpages were analysed and assessed on changes in corporate strategy, management practices, business operations, and strategic partners related to plastics during the last year. Subsequently, changes were also assessed to whether they correspond to the targets of the Plastics Pact (Appendix C). The suggested topics gave guidance for the search but did not exclude other relevant subjects from inclusion in the analysis.

Secondly, a matrix was designed that was based on the BPC model, Kotter's eight steps to successful change, and the literature on integration of a CE in businesses (Appendix D). The matrix was grounded in existing theoretical models which increases the theoretical validity (Maxwell, 1992) as this assures that the right constructs were measured to answer the research question. This matrix was filled out by nine of the sixteen selected participants and three other participants to assess if the category has already been successfully implemented, is currently being implemented, or is not implemented. Consequently, this information indicates the organisations' position in the created change model in Figure 3.

Thirdly, semi-structured interviews were conducted with employees who are contact persons of the Plastics Pact from the participating organisations. The interviews were conducted to gain deeper insight in the inter-organisational and intra-organisational changes that have taken place after joining the Plastics Pact. Additionally, the interviews provided insight in the corresponding drivers and barriers for change. For this, an interview guide² was used to ensure cross-case comparability (Bryman et al., 1994; Bryman, Gillingwater, & McGuinness, 1996), which can be found in Appendix E. The interview guide is based on the theory (see Section 3) which increases construct validity (Yin, 2003) and the results of this research.

Fourthly, informal observations were made at working groups to observe if knowledge is shared and to determine if the network created by the Plastics Pact is used by participants. This information complements to the insights provided by the interviewees on strategic collaboration (Coleman & Briggs, 2002).

To ensure the quality of the research, and consequently the validity of the findings, several quality measures were taken. First, to ensure the theoretical validity (Maxwell, 1992) of the study, both the interview guide and matrix were grounded in theoretical insights from existing literature. Moreover, using an interview guide to structure the data collection process, makes the process and outcomes more consistent and limits the researcher's bias (e.g. by asking leading questions by the interviewer). Besides, all interviews were recorded and transcribed, which contributes to the descriptive validity of the study which means that concepts derived from data accurately reflects the interviewees perspective (Maxwell, 1992). Finally, as previously mentioned, different sources of data were triangulated to increase the accuracy and thus reliability of the collected data. Whereas the accuracy of data is important for high quality results, it should be noted that this research has a qualitative nature. Therefore, the study aims to reflect perspectives by specific organisations rather than to find absolute truths. Hence, quality measurements were focused on developing new insights, rather than on ensuring reliability and replicability of the current findings.

² First the interview guide was tested at two participants of the Plastics Pact before conducting the other interviews. No major changes were made only one question on a common R&D agenda was added.

4.4 Data analysis

Publicly available company documents were analysed via qualitative content analysis (Bryman, 2012). These documents were coded via NVivo on themes illustrated in Appendix C. After this the cases were compared with each other to find possible patterns (Eisenhardt, 1989). Moreover, all interviews were recorded and transcribed. Hereafter the interview transcripts were coded. The interview transcripts were analysed via the data structure of Corley & Gioia (2004), with which 1st order concepts, 2nd order themes, and 3rd order aggregate dimensions were generated, to ensure that the generated concepts and theories are embedded in the obtained data (Gioia et al., 2013). Through open coding relevant information was coded with unique concepts for each interview, without using concepts of previously conducted interviews to adhere the labels as much as possible to the interpretation of the interviewee. This ensures the descriptive validity of the study (Maxwell, 1992) as open coding helps to assure that concepts derived from data correctly reflects the interviewees’ perspective. Subsequently, the created concepts were organised in 2nd order themes. After a data structure was created, a within-case analysis was conducted first to fully understand the cases itself. After this the results were linked to the created change model in Figure 3 to map at which stage organisations were in the change process. Consequently, the barriers and drivers that companies face were identified. This process was followed by a cross-case pattern analysis to identify the intra-group similarities and inter-group differences (Eisenhardt & Bourgeois, 1988). Data collection and data analysis was implemented simultaneously which allowed adjustments to the interview guide for succeeding interviews whenever this appeared to be necessary from derived results of the data analysis (Eisenhardt, 1989; Harris & Sutton, 1986). Lastly, notes were taken while observing the working groups and other activities of the Plastics Pact and its participants. These notes were an addition to the interview data on strategic collaboration and internal business processes. An overview of the data analysis is illustrated in Figure 4. This analysis resulted in a framework that illustrates how the Plastics Pact influences the participating firms on intra-organisational and inter-organisational levels. Accordingly, the corresponding barriers for the resulting organisational changes were integrated in the same framework.

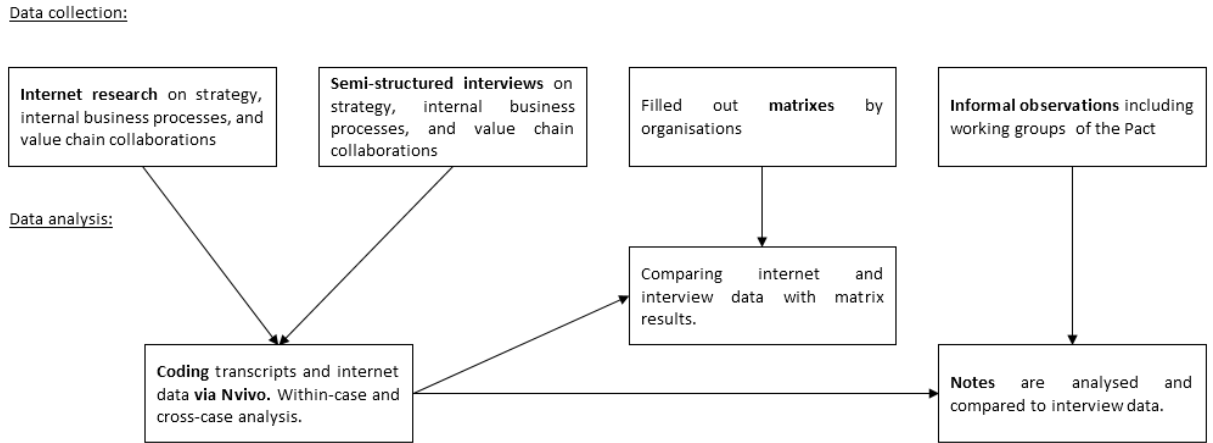


Figure 4: Visualisation of data collection and data analysis process.

5. Results

In this chapter, company strategies, internal business processes and value chain collaborations among the Plastics Pact signatories are illustrated to indicate where companies are in their transition towards the Plastics Pact's goals. The influence of the pact on these internal and external organisational developments towards a more circular plastics economy are explained. In addition, the drivers and barriers that companies encounter in these change processes are demonstrated.

5.1 Strategy

The plastic strategies of firms are discussed in this section. These strategies are evaluated, focusing on the included topics, its comprehensiveness, its specificity and its alignment with the Plastics Pact. Next to this, the presence of a roadmap is discussed. Accordingly, the factors that influence the establishment of these strategies will be shown. After which, the section discusses the influence of the Plastics Pact on the developments of plastic strategies of companies in more detail.

5.1.1 Content and comprehensiveness of plastic strategies

Companies differ greatly in their plastic strategy in terms of the presence of a plastic strategy and in its internal or external propagation. Furthermore, the themes and deepness of strategies vary across companies. This paragraph will elaborate on this.

Internal and external strategies - A big majority of the organisations have an internally or externally communicated plastic or packaging strategy, and three of the interviewed companies stated that they are currently developing one (see Table 4). This is an interesting finding as this indicates that the pact also incorporates participants which do not have everything ready in their organisation yet to work towards the goals. Remarkably, waste management and plastic recycling organisations mainly share their strategy internally, whereas other parts of the supply chain also share their strategy externally.

Strategic themes - Companies focus on divergent themes in their plastic strategy. These strategic themes focus on prevention and managing of plastics material streams. An overview of the specific themes with their corresponding places in the value chain is shown in Table 5.

Throughout the value chain, different strategic themes are important. More precisely, plastics producers, waste management organisations, and recyclers mainly focus on one specific target directly connected to their core business (see Example 1). To illustrate, the plastics producers focus on reduction of resources and plastics by using recycled content and bio-based materials, and waste management organisations and recyclers are focusing on plastic recycling. This contrasts with suppliers and appliers, who focus on a diversity of strategic areas. Admittedly, these firms are directly connected to more of the Plastics Pact goals, namely the reduction, recyclability, and recycled content target. While the plastics producers, waste management organisations and recyclers are only directly connected to the recycling target. Strikingly, four organisations consisting of a supplier and three appliers are focusing on a target beyond their direct scope, namely recycling. This is an interesting result as they incorporate their EPR on a strategic level. As a matter of fact, two of these companies are also focusing on removing plastic litter from the environment. Another remarkable topic is incorporated in the strategy of a packaging supplier, stating the power of value chain collaboration. This supplier is the only organisation among the interviewees which included value chain collaboration

in their strategy. Other interviewees have not incorporated value chain collaboration in their strategy, but do express the importance of it. As declared by a brand owner “Circularity is often not only about a product, but about the whole system [...]. As company, we are not alone in this, we need all kind of different parties”.

In general, both the reduction and recycling of resources and/or plastics are by far the most used strategic themes. The recycled content and recyclability themes, in contrast, receive less attention in plastic strategies of companies, since only suppliers and appliers address these themes. This might be because suppliers and appliers are directly connected to this, whereas the other parts of the supply chain are indirectly connected to it.

Table 4: Overview of the presence of plastic strategies across the value chain and their alignment with the pact’s goals.

Company/ Strategical themes	Presence of plastics strategy	20% reduction	35% recycled content	100% recyclable	70% recycling	Announc ement of PPNL on webpage
Producer	X	i			i	
Producer	X		b			
Supplier	X	X, r	X	X		X
Supplier	d	i, r				X
Supplier	X	X, r	X	X	X	X
Applier	l	i	X	X		X
Applier	X		b			
Applier	X	X	i	X	i	X
Applier	X	X, r	X	X	i	
Applier	l	X	X	X		
Applier	X*, d	i, r	i		i	
Processor	X, d				X	X
Processor	l	i			X	X
Processor	l				i	X
Recycler	l				X	
Recycler	l				X	

- X Full statement of PPNL target with corresponding percentage in formal or informal strategy or companies announced what the PPNL targets are and state that they fully support these on their webpage.
- l Only have an internal strategy.
- Highlight Goals of PPNL on which the organisations should monitor
- * Packaging strategy including plastic packaging.
- d Developing a plastics strategy.
- i Incomplete statement regarding the Plastics Pact’s target e.g. by not stating a target or by having a target not in line with the Plastics Pact’s target.
- b Fulfilling the Plastics Pact target by focusing on bio-based and biodegradable plastics.
- r Fulfilling the Plastics Pact target by focusing on reuse concepts.

Table 5: Overview of strategic themes across the value chain.

Theme	Parts of value chain addressing this theme
Rethink, redesign, and innovate	Suppliers and appliers
Recyclability	Suppliers and appliers
Reduce plastics usage by elimination or reuse	Suppliers, and appliers.
Reduce CO ₂ emissions	Plastic producers, suppliers and appliers, waste management organisations
Recycled content	Suppliers and appliers
Bio-based plastics	Plastics producer and applier
Removing litter	Appliers
Recycling	Waste management organisations and recyclers
Closing the loop	Recyclers

Deepness of strategies - Besides the divergence in strategic topics across companies throughout the value chain, strategies differ in their specificity (see Example 1). Certain organisations have a very detailed strategy including targets and sometimes general action steps, while others only have one sentence which express their plastic strategy³. Throughout the value chain, suppliers and appliers have more elaborate strategies including corresponding targets when compared against producers, waste managers, and recyclers. Possible explanations of the variety in specificity of plastic strategies could be the complexity organisations face to deal with plastics and the priority plastics received within the business. One event organisation states that they did not make a very detailed roadmap since they only use plastics in cups. Expanding this argument to the other parts of the value chain, the problem for recyclers and plastics producers might be more straightforward than for suppliers and appliers, which might explains the use of more elaborate strategies of suppliers and appliers. Among the appliers which do not have a precise strategy on plastic packaging, are appliers who prioritise plastic packaging less in comparison to other items because it has relatively less impact on the organisation in terms of CO₂ emissions.

Example 1: Plastic strategies of participants - divergence in specificity and strategic themes.

<p>Strategy of a supplier:</p> <p>In 2025:</p> <ul style="list-style-type: none"> • We use 20% less plastics compared to 2017. • Our products and packaging are fully (100%) recyclable. • Our single use plastic products are as much as possible reusable. • All our single use plastics exist of 35% recycled content. • We only use bioplastics if they are recyclable and have a lower CO₂ footprint.
<p>Strategy of an event company:</p> <p>'[Organisation] steps away from plastic packaging made from fossil fuels.'</p>
<p>Strategy of a waste management organisation:</p> <p>'... our ambition to recycle plastics 100%.'</p>
<p>Strategy of a recycler:</p> <p>'Ensuring 100% recycling, cradle to cradle. We are a recycler, so we want to ensure that we can recycle the PET material of our choice with the highest possible efficiency.'</p>

³ For example, a recycler simply states that they want to close the loop. Another event company formulated the following strategy 'Our company abandons packaging made from fossil fuels'. In contrast to this a retailer and a packaging supplier formulated a very comprehensive and at the same time specific strategy including targets on their strategic topics.

Alignment with the Plastics Pact - In essence, all signatories have committed to the pact's goals by signing the agreement. Though companies vary in how extensively the goals are internalised in the organisation's plastic strategy. The alignment of plastic strategies with the pact is illustrated in Table 4. All organisations which need to monitor on either the reduction target or the recycling target mention this strategic theme in their internal or external strategy. One exemption is observed at a producer of bio-based plastics which does not focus on the recycling target in their strategy, nevertheless the firm does act on this theme. Moreover, half of the suppliers and appliers explicitly mention that they aim to achieve the reduction target by implementing reuse concepts (see Table 4)⁴.

According to the results of the matrix (Appendix F), a majority of the interviewees argue that the company's strategy is fully in line with the targets of the Plastics Pact. Nonetheless, these strategies are sometimes missing certain themes and specific targets of the Plastics Pact. An explanation for the lack of incorporation of some targets of the pact is given by a retailer, who describes that they cannot commit to the 35% recycled content target, as calculations showed that it was not feasible for them. Although, this company strives to apply the highest possible recycled content in their products. Another explanation was given by a plastics producer, who argued that a national plastics pact does not influence their international strategy. Despite this, the company has a general strategy for resource reduction.

On the other hand, appliers, waste management organisations, and recyclers sometimes have more ambitious recycling goals than the pact's recycling target. These companies formulated goals on 100% recycling or creating a closed loop (see Example 1). At the same time this is in contrast with arguments made by some of these companies claiming that a 100% recycling ratio will never exist due to the losses in the process. For this reason, these more ambitious goals might be interpreted like a vision instead of a strategy.

Presence of a Roadmap - As an internal reaction to the company's plastic strategy, companies can design an implementation plan to achieve their strategy. A majority of the interviewed companies are developing a roadmap or already have established a roadmap. These range from roadmaps with general steps to roadmaps with very detailed steps including projects for the upcoming two years. Mainly suppliers and appliers illustrate to have set up a comprehensive and precise roadmap. Contrastingly, one applier, an event organisation, is not developing a roadmap because of the small scale of the plastics problem within its organisation. Remarkably, a recycler focuses purely on technological developments in the roadmap, while contrastingly a waste management organisation focuses mainly on improvements of other parts in the value chain to increase the quality of the material streams. Another interesting finding is that two organisations have established a roadmap but do not yet have a plastic strategy. One of them has a strategy formulated by the owner but has not yet formalised this in the organisation. The other company, a brand owner, has set up a programme to establish the Plastics Pact goals and, besides this, the global organisation is thinking about a plastic strategy.

To resume, throughout the value chain companies mainly focus on the parts where they have direct influence on. With the target on recyclability, suppliers and appliers are already focusing a bit further on the value chain by enabling recyclability of their designs⁵. Despite the overall trend, a few

⁴ Appliers sometimes focus on light weighting of plastic products and packaging to achieve the reduction target which is respectively an easier approach than reuse concepts. Reuse concepts can involve organisational changes which are harder to implement (see Chapter 5.2.5).

⁵ Suppliers and appliers are stimulated by a differentiation rate on 100% recyclable plastic packaging of the EPR programme of Afvalfonds Verpakkingen. This might have caused the focus on recyclability of suppliers and appliers.

companies have set up strategies reaching further down the value chain than their own part. For example, a plastic producer and a waste management company focus on respectively recycling and resource reduction. These themes are of course directly linked to each other but show a slight expansion in focus across the value chain. Clearer results on this are found at a packaging supplier, a retailer, and an on-the-go restaurant, who focus on recycling in their strategy which suggests a bigger expansion of focus in strategy.

5.1.2 Factors influencing the plastic strategy

As has been mentioned in the theory section, environmental factors influence a company’s strategy (Kettinger & Grover, 1995). The influence of external factors on company strategies have been found in this study as well. Some companies experience these environmental pressures for change earlier than others and, hence, vary in their developments of having a strategy. For example, a packaging supplier already experienced environmental factors from the Dutch packaging covenant in 1991. Consequently, this organisation is focusing on reduction of plastic packaging ever since. Since then the market has been developing and multiple environmental factors have exerted pressure on companies to change their strategy on plastics. Accordingly, interviewed companies are revising their current strategy or are developing a new strategy.

There are five overarching factors that influence companies’ plastic strategy, namely 1) environmental impacts, 2) attention and policies from governments on plastics, 3) increased attention on plastics from society, 4) technological developments, and 5) a changing market. Most of the time companies are facing pressure by a combination of these factors on their plastic strategy. The interrelations between these different factors are illustrated in Figure 5.

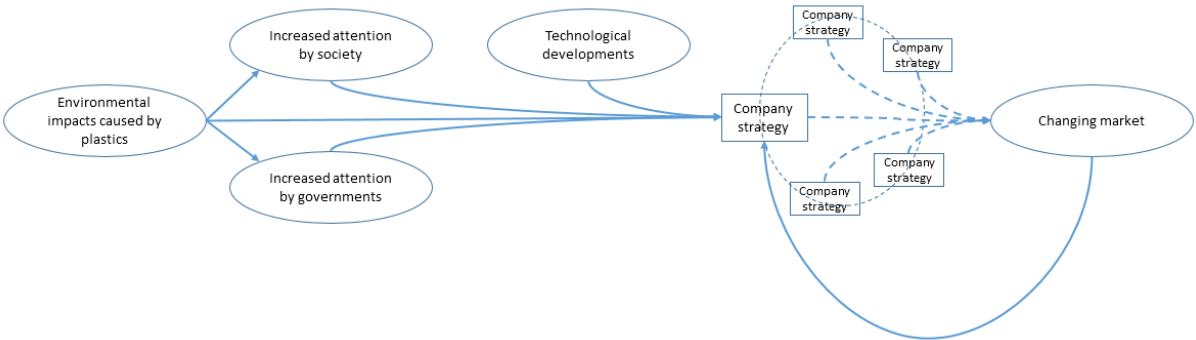


Figure 5: External factors and their interlinkages that influence companies their plastic strategy.

This section will first explore the factor of environmental impacts of plastics. Proven environmental impacts influence plastic strategies. Some companies base their strategies on scientific facts of plastics or outcomes of environmental impact assessments. A sustainability manager of a brand owner argued that illustrating the amount of CO₂ to which packaging is responsible, in combination with the already set company targets on CO₂ emission reduction, helped to make plastics a strategic topic. In addition, obviously without impact on the environment plastics would not be a problem. So the environmental impacts can also be seen as the factor that initiated increased attention from government and society.

First, the effect of the increased attention and policies from governments on plastics will be illustrated. A majority of the interviewed companies, consisting of suppliers, applicers, and waste managers, state that political attention and developments influence their strategy on plastics. These governmental factors consist of the attention and policies by the European Commission, European

countries, and the Dutch government itself. The recent introduction of multiple plastics pacts in Europe, makes clear that governments pay much more attention to the plastics theme. More specifically, companies see these pacts initiated by governments as a step towards possibly more stringent legislation in the field of plastics. As stated by an interviewee *“it is a good underlining or confirmation from the government that these developments matter, and as I see it, the Plastics Pact is a means by which the government shows light pressure [...], if the targets are not sufficiently established at the end, [...] than the government might make things compulsory”*. Besides, a waste management company states that due to increased governmental attention, the company anticipates an increased demand in recycled content. Therefore, this waste management organisation focuses more on opportunities in recycling. Furthermore, companies anticipate the single use plastics (SUP) directive and the prohibited substances list in their plastic strategies. Surprisingly, plastics producers and recyclers do not state that they encounter any influence from politics on their plastics strategy. This might be because the core business of those companies is concerned with plastics. Hence, these companies already had their strategies in place, whereby they experience less influence from government policies since the strategies already correspond with political aims.

The plastics theme is receiving increased attention from media, NGOs, and customers. Whereby media and NGOs surely influence customers' perspective on plastics⁶. As mentioned by a retailer, *“Plastics have really become a topic because there has been a lot of attention on this theme from the media, social organisations, customers, and politics. That is truly the reason why it has suddenly become a topic and not before.”* The increased attention on plastics from society may be an explanation for the fact that packaging suppliers and applicators are using more comprehensive, specific and externally propagated strategies, as applicators are directly connected to the consumer. Therefore applicators experience this environmental factor to a higher extent. Consequently, the packaging and product suppliers are acting towards the directions of the applicators as stated by a supplier *“Our customers take the Plastics Pact as guidance and ask us if we can develop products with 20% less plastics and so forth”*.

Technological developments also influence plastics strategies. Based on technological feasibilities, strategies are set up. According to one of the interviewees this is a process of continuous development *“because technology is developing, the roadmap is continuously changing. And, we will continue to look after our vision and adjust it if necessary when developing new things.”* Moreover, this factor can also act as a boundary condition instead of an inducing factor. Such is indicated by a brand owner who declared that *“because technology develops, the roadmap is continuously moving. So we keep looking for new developments and decide if we adapt our vision on it”*.

Finally, a changing market demand influences company strategies from waste management organisations and recyclers. This factor can be seen as a resulting factor from the other factors. More specifically, suppliers and applicators are subject to increased attention of governments and society on plastics. This consequently leads to a higher amount of recycled content applied in new products. Henceforth, waste management organisations and recyclers anticipate opportunities for the recycling market. As a result, a waste management firm has incorporated recycling as part of their plastic strategy. Next to this, recyclers are changing their scope. One recycler has shifted its focus from bottle-to-tray to tray-to-tray. The other recycler has incorporated post-consumer plastics recycling in its scope. Both recyclers changed in response to market demands. One recycler also noticed an enormous drive from marketing departments to apply recycled plastics. Thus, this factor could be a result of a

⁶ A plastics producer and a waste management organisation criticise the one issue politics of NGOs, in which only the negative sites of plastics are discussed and the beneficial characteristics of plastics are left out. The companies are concerned that companies will move away from plastics regardless of the environmental impacts of the used alternative for plastics.

sort of chain reaction to the other factors. In addition, this factor may be a reinforcing factor leading to a repeated increase in the number of companies setting up a plastic strategy.

Furthermore, internal factors of companies strengthen the focus on plastics, e.g. many interviewees declared that the ambition of intrinsically motivated employees in the company helps to establish a sustainable strategy. Besides, one interviewee states that plastics became a strategic topic because many resources, which are transcending the sustainability department, are required to make it work.

In general, an increased attention from both politics and society led to a major acceleration in the formation of strategies of firms on plastics. Where plastics first were not a priority and then it promptly was and this was unprecedented according to a retailer. This is also reflected in other interviews where interviewees state that the company recently developed a plastic strategy or are working on a plastic strategy because of the increased attention on plastics. One company states for example *“because plastics are receiving so much attention, a plastic strategy is being developed now”*.

Influence of the Plastics Pact on plastic strategies - Among others, organisations are influenced by governmental factors. This includes the introduction of the multiple plastics pacts. The Dutch Plastics Pact contributes to the overall influence the plastics pacts have. Accordingly, certain plastic strategies are influenced specifically by the Dutch Plastics Pact. However, signatories of the pact are recognised as frontrunners within the plastic topic. Henceforth, thinking that the pact has major influences on companies' plastic strategy would be premature.

In general companies are influenced by the different plastics pacts, as the introduction of these pacts are a signal of increased governmental attention on this subject. Stated by an interviewee: *“The different pacts and the initiative by the Ellen McArthur Foundation truly caused an acceleration. Where in 2018 we were still very subtle about all packaging and did not really distinguish between plastic and paper and described it vaguely. We now see that we need to take a more solid stance regarding plastics.”* Subsequently, this clear signal of governmental attention helps companies to place plastics on the agenda. More specifically, a brand owner and a retailer state that the attention of the Dutch government on this subject, has an invigorative effect on the organisation's own plastic strategy. This effect is beneficial for sustainability managers when they want to implement their wish list for plastics on a strategic level.

In more detail, the pact influenced the direction and the scope of companies' plastic strategies. To illustrate, a waste management company declared that the Plastics Pact's recycled content target was a strong signal for them to focus on recycling technologies. Additionally, an on-the-go restaurant declared that the Plastics Pact's target on reduction caused a more specific strategy on plastics reduction in the Netherlands. The national organisation shifted from their general international strategy of eliminating plastics, towards a more target-focused strategy of reducing 20% of their plastics. Accordingly, the company also focuses more on reuse concepts. Furthermore, they have included business to business packaging in their scope whereas they first only focused on business to consumer packaging. Another example to illustrate the Plastics Pact's influence on company's plastic strategy is the strategy of a supplier. As stated by the interviewee they were already focusing on sustainability of plastics before the introduction of the Plastics Pact. Nonetheless, as the goals were perfectly in line with the ambitions of the company, the Plastics Pact is used as basis to set up their own strategy. Additionally, a brand owner reasoned their roadmap based on the Plastics Pact targets *“from the targets in the Plastics Pact, okay 20% less plastics. Step one is making an inventory of all*

plastics, so the monitoring [...]. From there we look, what can I reduce, where can I increase recycled content”.

Another interesting finding is that not every organisation sincerely supports all the objectives of the pact. One organisation explicitly does not commit to the recycled content target since they do not expect to achieve the target. On the other hand, the company aspires to achieve the highest possible amount of application of recycled content. More general, a few companies question the reduction target, since the reduction of plastics is not always beneficial for the environment and the application of recycled content. These companies emphasise that more focus should be on meaningful reduction of plastics⁷.

Conversely, the Plastics Pact is not only influencing company strategies but, conversely, the Plastics Pact has also been influenced by a retailer’s strategical targets on reduction and recyclability.

Remarkably, organisations have different reasons for participating in the pact. Some organisations argue that the agreement is a logical continuation on their current strategy or mention that they want to show good will towards the government. Others declare that they want to anticipate market developments, influence the market, inject knowledge and experience, and put challenges on the political agenda via the Plastics Pact.

5.2 Developments in Internal Business Processes

This section discusses the developments in company structure, management practices, organisation culture, monitoring processes, and technology, regarding the facilitation of change towards a CE of plastics. Within these themes the relevant barriers and drivers that exist in the current system are addressed. Consequently, the impact of the Plastics Pact on these developments is explained.

5.2.1 Company Structures Facilitating Change for Sustainability

The changes in companies’ coordination structures focused on intra-organisational collaboration structures regarding sustainability are discussed in this section. Besides, the motives to introduce these changes are explained. Hereafter the influence of the Plastics Pact is evaluated.

Coordination - Organisations have different methods to coordinate their organisation on sustainability varying from establishing a sustainability department to aligning different departments or initiating working groups.

Firstly, the presence of a sustainability department is found at appliers. Organisations that have a sustainability department include big internationally operating organisations. Less internationally acting organisations and smaller organisations among the suppliers and appliers, have appointed a sustainability coordinator. Some of these organisations have recently started to pay more attention to plastics or realised that more capacity was necessary to work on the subject. The difference in the presence of sustainability departments or coordinators in the supply chain could be explained by the relation of the plastics problem to its core business. Sustainability departments are mainly present at the suppliers and appliers part of the value chain. Sustainability of packaging is not part of the core business of suppliers and appliers. Subsequently, this cannot easily be integrated within an existing department without the help and coordination of a sustainability department. Plastics producers, waste managers, and recyclers are more closely connected to the problem with

⁷ The covenant also emphasises meaningful reduction, so some misinterpretation might took place.

their core business than the others. An optimisation in the core business is therefore more often connected to improvements benefiting the environmental impacts of plastics. In these organisations technical and operational functions already focus on these subjects. This corresponds with a statement made by a plastics producer: *“An improvement in the factory is per definition an improvement for the environment”*. Consequently, the organisations that relate better to the plastics problem with their core business are more likely to have the right people in place to set up improvements.

Accordingly, a trend is seen in organisations hiring new people and creating new functions as a result of addressing sustainability in their organisation. This trend is experienced among the whole value chain except for the plastics producers. Nevertheless, another method for increasing capacity is found at a plastics producer. One plastics producer does not create extra functions but is looking for recycling facilities to takeover. A few companies, consisting of a supplier, a couple of applicers, and a waste management organisation, have recently hired a sustainability manager or appointed a specific coordinator for the plastics theme. Companies mention that they have created these functions because of the complexity of the theme, the increasing demand for sustainability, the need for more capacity to lead value chain projects and implement the roadmap in more detail, and the need for formalisation on sustainability in the organisation. Besides, a recycler increases its capacity in commerce and business development to have extra capacity for development trajectories with applicers. Furthermore, two applicers hire external expertise to obtain the right information on the subject.

Secondly, organisations structure their intra-organisational collaboration on sustainability by aligning different departments, and sometimes even different company groups. A common example of alignment is sharing information and knowledge among different business units or companies within the company group. Furthermore, organisations argue that certain departments work closely or closer together e.g. the communications and sustainability department work closer together since these two are both seen as overarching departments. Moreover, the R&D and legal department work together on certain projects which require this expertise and the technical and commercial department work more closely together to align interests. Another interesting alignment between departments of a supplier and an applicer is the co-creation of a roadmap on sustainability of plastics with the different business units. A majority of the interviewees across the value chain argue that the organisation aligns different departments. Though, a variety in results are found at small organisations and one multinational. Small organisations do not align different departments since this is less needed. The internationally operating organisation, an applicer, has little alignment between departments on the plastics topic, probably because this firm still has to formulate its global plastic strategy. Besides, the interviewee argued that very little formal structures are present in the company⁸.

Thirdly, working groups on sustainability of plastics are established. Either formal or informal working groups are initiated. A majority of the interviewed companies are using working groups on plastics or related topics. A few arrange these working groups when needed, others have a structured working group every certain time. Strikingly, bigger and more internationally operating firms have established structured working groups. Among the mentioned working groups, there was a remarkable one: a sustainability strategy club. This so called, sustainability strategy club started recently. This group acts independently from higher management and has the function to approve and give advice on plans, whereby they take market developments and sustainability into consideration. Most of the working groups have a multidisciplinary composition. Although, one exemption on this is seen at a

⁸ This multinational corporation originates from a family business, which might explains its non-hierarchical structure.

brand owner, who recently set up a working group among all technical plastics experts to exchange information between all different product divisions. In general, working groups are set up on topics like packaging, or more technical related topics such as efficiency, recycling, or quality.

For a couple of reasons working groups are experienced as very valuable by the companies who use it. Firstly, and most obviously, working groups help to share knowledge among a variety of people originating from different departments. Secondly, it helps to raise awareness and commitment to the theme among employees so that sustainability is safeguarded in the organisation. Thirdly, structured working groups create continuity and overview on the theme. Because of the continuity that working groups create, employees know that results must be delivered at the agreed moments, which in turn increases the commitment. This interviewee argues *"... in itself what works very well is that there is continuity, so that you really know that you have a meeting every quarter and that you have to deliver results. That just always helps really well."* Interestingly, a supplier implemented multidisciplinary working groups, which led to the successful conclusion of a project.

A remarkable development is the establishment of an R&D centre by a supplier. This movement fits with their strategy of continuous innovation and with this stimulating sustainable progress. This development was a response to the increased emphasis on sustainability from R&D perspective. According to this supplier *"showing the presence of a good R&D department, showing you are a frontrunner in sustainability and showing that you are willing to transfer ideas into business, to concrete products, initiates partnerships"*.

Reasons for (re)structuring an organisation with the explained methods is: 1) the need for creating oversight on packaging management inside the company, 2) the introduction of a new plastics strategy in the organisation, 3) the many stakeholders that are involved in this subject, and 4) the means and resources that need to be made available for this theme, because the sustainability department cannot work on this on its own.

Formalisation - A couple of organisations indicate that they have formalised sustainability in the organisation. Businesses formalise sustainability by setting clear targets and quarterly evaluations on these targets, creating structured working groups, and appointing a safeguard for sustainability. Organisations that formalised sustainability to this extent include multinationals. However, not every interviewed internationally acting company has formalised sustainability of plastics in the organisation. Other firms are working towards formalisation of the plastics theme in the organisation. An important note was made by one of the appliers stating the importance of formalisation of sustainability targets - *"in the end, if people have to choose and the theme is under pressure, then the theme is not sufficiently integrated that it is really solid"*. Contrastingly, other companies have not formalised sustainability in their organisation. Among these organisations, a few mention that their organisation is informally arranged, hence they have not formalised sustainability.

No direct influence of the Plastics Pact is experienced by companies on their company structure. Only indirect evidence has been found. A few organisations have changed their strategy as a consequence of the introduction of a plastic strategy or the adjustments made in the company's plastic strategy. Among these firms, one organisation's plastic strategy was strongly guided by the Plastics Pact. In this way, the Plastics Pact might had some indirect influence on the changed structure. Nevertheless, in general no influence of Plastics Pact on company structures is experienced.

To summarise, across the whole value chain companies have established or are establishing structures to facilitate collaborations on sustainability of plastics within and/or between departments. Only substantial divergence is found across the value chain in organisations that have established a sustainability department or have appointed a sustainability coordinator. This occurs mainly at suppliers and appliers. The formalisation of sustainability does not yet take place in many companies, only multinationals have formalised this to a greater extent. Although, most companies have a plastic strategy in which sustainable progress should be safeguarded.

5.2.2 Change of Management Practices to Support Change towards Sustainability

Companies demonstrate a variety of changes in bottom-up and top-down management practices facilitating CE in the organisation. Most of the changes focus on facilitating a transition towards more sustainability in general. Next to this, these general changes are complemented with more specific changes concerning procurement.

Beginning with management practices which are set up to transition the organisation towards a more circular economy in general. These management practices can be divided in bottom-up and top-down approaches. Top-down approaches consist of the chief executive officer (CEO) and higher management showing their commitment for sustainability and, consequently, integrating sustainability in the organisation. A couple of interviewees across the supply chain mention that the commitment on circularity by the CEO is very powerful. In addition to this, the support of higher management is stated as important by producers, suppliers, appliers and waste managers. Supporting this commitment by making resources available is also very important but is lacking at a few of these companies. Although, other companies do support their commitment for instance by integrating targets on circularity in the organisation or by integrating sustainability in more detail in existing functions.

Evaluating the results from the matrix (Appendix F), companies filled out that at least higher management is committed. Furthermore, trainings are often given and a culture for sustainability is supported.

Subsequently, organisations try to insert bottom-up approaches to create a culture for sustainability and to overcome resistance to change. These bottom-up approaches consist of creating urgency, methods to involve employees, giving workshops and trainings, and the deployment of ambassadors. Strikingly, half of the interviewed companies use trainings or workshops to educate their employees. These companies are within the supplying, applying, and waste processing part of the value chain. The results of the training are already noticed at a brand owner. This brand owner has provided a training on sustainability to its processes and continuous improvement department. As a result, this department now takes sustainability as a building block in their conversations on process optimisation with the different departments. Subsequently, this organisational change extends the reach of the sustainability manager. Another remarkable result is obtained at a waste management organisation, which trains its employees on leadership to enable decision-making on sustainability at lower levels in the organisation and stimulate pro-activity. Moreover, a few companies offer external trainings on circularity or sustainability to their customers. On the other hand, more production focused companies, such as a supplier and a recycler, state that trainings are not used by the company since the skillset of employees is too low in most parts of the organisation.

Companies in the plastics applying part of the value chain are frequently involving employees by updating them on sustainability, sharing best practices, or asking them for their input on certain

topics. Furthermore, enthusiastic employees are used as ambassadors to start small changes towards sustainability after which the concepts are rolled out in the whole organisation.

Results from the matrix (Appendix F) show that mainly internationally acting companies are using knowledge sharing systems that relate to the whole industry. Reversely, some companies including small companies and companies that have recently set up plastics strategies do not have knowledge sharing systems at all. No specific connections on this item are found across the value chain.

More specific changes in management practices are experienced at a retailer and a few brand owners, which incorporated sustainability criteria in either their procurement processes or their supplier selection process. Besides, a brand owner has set up a day with their suppliers to discuss sustainability. This involvement of suppliers is important as supplier contracts are sometimes an obstacle to transition to sustainability. An example given by a brand owner is that some technical details are not incorporated in the contracts as these deals are made by procurement employees. As a consequence suppliers are not willing to do more than agreed by the contract. This is an obstacle. Another barrier raised by contracts are the yearly contracts which make it hard to set up strategic collaborations. To overcome this, longer contracts of two to four years are now being explored. An alternative approach is used by Unilever. Unilever signed a purchasing contract with a recycler to guarantee the recycler that the recycled plastics will be procured (Unilever, 2018).

And last, management systems like ISO standards and the multiple-year agreement are used by companies.

All in all, different management practices are explored by the companies. Throughout the value chain, suppliers, applicators, and waste management companies are using more management practices to transition towards sustainability. Strikingly, recyclers do not mention the use of management practices except for risk analysis. They state that other management practices are not applicable as they already focus on 100% recycling. More specifically, to achieve the Plastics Pact targets, recyclers need to optimise the activities what they have already been doing, while other businesses have to integrate the CE concept in the organisation, since the core business was not primarily focused on circularity.

5.2.3 Presence of a Culture for Sustainability

In this section the degree of a culture for sustainability among participants' employees is illustrated, together with the factors that influence the organisation's culture for sustainability.

A large amount of the interviewed companies experience that their employees are more aware of sustainability and sometimes even intrinsically motivated to work on it. A link to this with the management practices of the previous chapter is seen. Management practices like sharing best practices, management commitment, trainings, and workshops are proven to stimulate employees in relation to sustainability. Also, the combination of management commitment and societal awareness is mentioned as a strong accelerator for creating awareness on the topic among employees. Although, a supplier and a recycler mention that a culture for sustainability is not really alive among their employees since their employees are mainly low-skilled.

With the sole awareness for sustainability, no impact will be made. Employees actually need to be motivated and be able to make changes that foster sustainability in the company. This is sometimes hard for employees as circularity is a rather complex topic. Next to this, employees

sometimes give resistance to change for sustainability, if the change is introduced from top-down management practices. Conversely, capturing and implementing the ideas employees have is also very important. An example is given by a brand owner, which has not enough resources and does not give sustainability enough priority to implement the ideas on sustainability. This, consequently, negatively influences the motivation of the employees on this topic.

In addition to the factors that stimulate awareness and motivation of employees on sustainability, interviewees mention that current cultures within the company are a driver for sustainability in the company. For instance, a discount culture is automatically facilitating circularity within the company as almost all waste streams are being recycled. Another example is the culture for continuous innovation and the urge to be a frontrunner which facilitates the pathway to sustainability. Interestingly, one company states that the culture for sustainability from the region works contagious. In response to this argument, it would be intriguing to see how such a culture for sustainability within the Plastics Pact could be invigorated across all signatories.

In general employees of companies are aware of sustainability but, more importantly, employees need to be motivated for sustainability and provide sustainable solutions in their specialism. After which, companies need to ensure that these ideas are captured and implemented to maintain the motivation of its employees. An interesting division between plastics producers and recyclers, and plastics suppliers, applicators and waste managers is seen in the activities sustainable optimisation requires from their employees. In the first group sustainability seems more closely related to the primary activities, while in the second group it appears more to be an add-on. This may also translate into the necessity of a culture for sustainability among employees at these two different groups. Evidence of this is seen at a recycler who states that they are not focusing on stimulating a culture for sustainability among employees at this moment.

5.2.4 Application of Monitoring within the Organisation

The way organisations monitor on plastics and on what subjects they monitor within this theme vary. In this chapter the monitoring systems and/or processes and the influence of the Plastics Pact on this are explained.

Monitor

Companies monitor for different reasons, therefore organisations across the value chain have different monitoring systems and are using different Key Performance Indicators (KPI). An overview of the different themes and its corresponding places in the value chain is given in Table 6.

Table 6: Monitored KPIs in the value chain.

KPIs	Part of value chain
Use of plastics types and weight	Suppliers and applicators
Application of recycled content	Applicators
Amount of recycled materials	Waste management organisations
Tracking system on plastics badges	Recycler
CO ₂ emissions	Producer, suppliers, applicators, waste management organisations, and a recycler

The motivations of companies to set up a monitoring system vary. The interviewees state the following motives: 1) internal company motives to track progress, 2) market motives to demonstrate

environmental impacts to customers, 3) legislative requirements, and 4) the Plastics Pact. This section elaborates on the latter.

To be able to track progress of signatories on the Plastics Pact goals, participants are asked to fill out the yearly monitoring request of the pact. This monitoring system requests information on the following subjects:

- *the amount of recyclable plastics;*
- *the distribution of types of plastics used;*
- *which substances of very high concern (SVHC) are phased out;*
- *the amount of plastics used in products/packaging;*
- *the amount of recycled content used in products/packaging;*
- *the amount of bio-based plastics used in products/packaging;*
- *the amount of alternative materials used in products/packaging;*
- *the amount of collected plastics;*
- *the amount of sorted plastics in mono streams;*
- *the amount of recycled plastics;*
- *the amount of burned plastics;*
- *the amount of exported and imported plastics inside/outside Europe.*

These subjects are all relevant for monitoring progress on the pact's goals. These KPIs directly reflect the progress towards the goals. For example, the SVHC KPI is directly connected to the progress on recyclability of plastic products and packaging. Furthermore, the monitor requests qualitative information on actions taken to accomplish the pact's targets. Although, this qualitative information does not directly monitor the progress of the targets, this information is valuable to obtain and evaluate at an early stage. In this way companies can be evaluated whether they are already progressing towards the pact's goals. This facilitates early intervention if there is too little movement by the parties. Additionally, the successes accomplished by participants can motivate and inspire other participants⁹.

While the majority of the interviewed companies are using a monitoring system, these do not perfectly fit with the yearly monitoring request of the Plastics Pact. Most signatories at the suppliers and appliers part of the value chain argue that the pact's monitoring system is more detailed than their own monitoring system. At the first monitoring request, the baseline monitoring, the response was low in all parts of the value chain but especially at the plastics producers, waste management, and recyclers part of the value chain. This is striking since suppliers and appliers need to fill out the most KPIs in the monitoring system.

Participants mentioned a variety of challenges when filling out the form: 1) organisations find it hard to calculate the total amount of plastics used in different packaging and products, 2) companies experience difficulties in obtaining information from suppliers on appliance of recycled content in packaging, 3) businesses encounter complexity in obtaining information on SVHCs, 4) sometimes companies find it hard to assess recyclability of packaging/products when no recycle-check is available, 5) organisations sometimes face difficulties with the definitions, and 6) the scope of the Plastics Pact's monitor was hard for organisations who act internationally. Next to this, some companies were not aware of the monitoring and, consequently did not fill out the form.

Despite these challenges, many companies expect to be able to fill out the form this year. Waste management companies and recyclers state that they already have the right data available to

⁹ To achieve this, a good working inter-organisational knowledge and information sharing system needs to be available and be promoted.

fill out the form. Next to this, a supplier and multiple applicers mention that they are setting up or adapting their current monitoring system accordingly. Most of the companies that need to monitor to the Plastics Pact experience the monitor as valuable, because it sharpens and refreshes existing monitoring systems of the organisation. The monitor also led to some extra insights at applicers, which subsequently led to extra measurements for improvement. The movement of the retail industry is interesting. Under the leadership of the branch organisation, retailers are setting up a monitoring system in which harmonisation is sought with the monitoring of the Plastics Pact.

An interesting remark has been made by two applicers who state there is a lack of a quantitative decision-making tool for packaging in their organisation. Simultaneously, they desire to have a simplistic tool. Nevertheless, they also admit that decisions in this field are not easy. Henceforth, the simplification of certain items is not possible as not all answers are available yet and certain decisions depend upon other factors which strongly differentiate among regions.

5.2.5 Technological Developments within the Plastics Pact and among Signatories

This section discusses the direction of technological developments and harmonisation on which the pact's working groups are focusing. In addition, the technological developments regarding the goals of the Plastics Pact of the individual companies are indicated.

Plastics Pact NL Working Groups

Working groups of the Plastics Pact are working towards technological developments and harmonisations which cannot be achieved by individual companies but need to be empowered by collective action. Within the working groups Design for Circularity, the working group Collecting, Sorting and Recycling, and the working group Reduce and Reuse, the biggest barriers for a circular economy in the current system have been identified. Consequently, these working groups want to start pilots led by a combination of company representatives and process facilitators to address these bottlenecks. These consist of the following:

1. sorting and recycling of company waste;
2. redesign and recycling of polyethylene terephthalate (PET) trays;
3. harmonisation of non-food bottles;
4. application of recycled polypropylene (PP) in food-to-food rigid;
5. beverage cartons (recyclability and recycling);
6. watermark technology;
7. legislation and stimulation of applying recycled content;
8. loop-a-cup Utrecht (city wide reusable coffee cup system);
9. Ozarka meal delivery (ready-made meals in reusables);
10. smart supermarkets, minimal waste; and
11. closing the business to business (B2B) loop (B2B packaging solution).

These pilots are a first step to overcome systematic barriers in the value chain. In the next section, the barriers are explained per target of the pact. The initiation of these pilots are a positive move towards establishing concrete collective impact. Nonetheless, these projects still need to be started, so no statements on its developments or results can be made.

Technological developments of organisations without extra support of the pact

Among the interviewed companies, a variety of technological developments and supporting developments take place in different areas. These developments differ in their phase. Some developments are in their exploration phase, while others are already in their experimentation phase by conducting pilots or even accomplished results. Per target of the Plastics Pact, the technological developments together with the barriers that organisations encounter in the system and some potential solutions are explained. An overview of the developments per theme is illustrated in Table 7.

Table 7: Overview of technological developments per theme.

<i>Target</i>	<i>Theme</i>	<i>Technological developments</i>
Recyclability	Design for recycling	Guidelines, recyclable products and adhesives.
Reduction	Reduction of plastics	Reduction of plastics in different products.
	Reuse concepts	Reusable cups, pilots on reuse systems in hospitality industry, exploration of reuse models.
	Watermark technology	Holygrail pilot, and exploring.
Recycling	Sorting	Increased sorting capacity and quality, and NTCP.
	Recycling	Vertical integration by takeovers, vertical integration by own company actions, developments in mechanical recycling in quality and capacity, and exploring options and developments in chemical recycling.
Recycled content	Bio-based plastics	Exploring appliance and generation of bio-based plastics.
	Application of recycled content	Growth in application of recycled PET (rPET) in bottles and recycled content in non-food contact materials.

100% Recyclable packaging - All packaging should be at least 100% recyclable and if possible, reusable. Suppliers and appliers have made some developments in design for recycling. A few developments are more practical, while other developments are purely technical. The practical development consists of the introduction of guides by companies¹⁰. Moreover, the Plastics Pact has developed a recycling guideline based on already existing guidelines made by among others KIDV, CEFLEX, RecyClass. This Plastics Pact recycling guideline is experienced as very helpful by the on-the-go restaurant. She stated that the guideline helps to find the balance in *“what to address by design and what to address by sorting. We need to discuss this a lot more together because we are in between this but we do not know who is right and I think this guideline is going to help with that a lot”*.

The more technical developments originate from a supplier and a brand owner who made a couple of developments, e.g. by designing a 100% recyclable product, by adjusting a packaging that consist of laminates, and by creating a recyclable adhesive. Within this theme, design for recycling for laminates is seen as a challenge. Besides, interviewed companies consider their material choices and packaging and product designs regarding recyclability. An interesting addition to design for recycling is the consideration that the product can become litter.

¹⁰ For instance a packaging supplier made a basic information sheet on whether or not to choose for certain material types. Likewise, but in a more demanding way, a couple of retailers have set up a style guide for their suppliers to support them in their decision-making in packaging.

Furthermore, watermark technologies are receiving interest from a variety of companies. This technology claims to facilitate better sorting of materials thus leading to better reuse and recycling possibilities. One supplier is already running a pilot on this¹¹. Interested appliers are still exploring their options for watermark technologies. Even though this technology could be a solution, waste management companies are not ready to apply it yet according to an interviewee. This is mainly due to the need for investments in new scanning technologies for the sorting installations. Therefore, the involvement of these parties in the developments of watermark technology is very important. Henceforth, the pilot of the Plastics Pact on watermark technologies is valuable since all parties of the value chain are involved in the pact.

Several interviewees argue that interventions such as harmonisation or standardisation in design and material types are helpful to increase the amount of packaging/products that are 100% recyclable. Besides, interviewees suggest stricter action against companies which bring products to the market that are hard to recycle¹² to increase the recyclability of plastics waste streams.

20% Reduction of plastics usage - Reduction of the amount of plastics used can be achieved by light weighting plastic packaging and products, eliminating unnecessary plastics usage, introducing reuse concepts, or using more sustainable alternatives.

Concrete results of plastics reduction are noticed at suppliers and appliers with examples of up to 40% plastics reduction in specific packaging. These results are showing progress in the right direction¹³. A challenge within this theme is sustaining the desired material properties, e.g. rigidity and strength. Besides, a brand owner states that by only light weighting of packaging the 20% target will not be accomplished - *"... you know that with only tweaking your current packaging, you will not get there. [...] so we also need to develop disruptive innovations. Those disruptive innovations are rethink."* On top of this, recyclers argue that thinner packaging is harder to recycle. Moreover, thicker packaging also makes applying recycled content easier.

Reuse concepts are being explored by suppliers, an on-the-go restaurant, and, strikingly, a waste management company. The stages of development are by way of contrast very different. One clear result has already been achieved by a waste management company who is connected to a festival, where the use of reusable cups led to a reduction of 90% of waste. Furthermore, a supplier and an on-the-go restaurant are both exploring reuse options by conducting pilots. Another supplier is exploring options for reuse systems. A remarkable barrier mentioned by appliers is that reuse systems lead to a reduction of revenues¹⁴. Besides, the on-the-go restaurant argues that implementing reuse concepts sometimes leads to many organisational changes.

A remarkable finding is that two interviewed companies are now replacing single use plastics, among which some products are covered by the SUP directive, by thicker products such that they can be reused. However, the environmental benefits of these reusable products depend on the behaviour of the end user. More precisely, when a product is intended for single use, changing the design to multiple use will not help, if the end user is not willing to use it again. That is why producers should inform the end users appropriately on its intended use.

¹¹ Via the Holygrail initiative a supplier is already running a pilot, together with a retailer, on a variety of products to return these products after waste collection.

¹² An agency as KIDV could transition from an advisory role to a more rule enforcing role to prevent that an incorrect designed packaging or product contaminates a whole badge of plastics.

¹³ Additionally, a brand owner of non-food products expects that maybe a reduction of 50% in plastic packaging can be accomplished.

¹⁴ A reduction in revenues is noticed at an event company. The use of a reusable cup system led to a reduction of revenues as the reuse system was very time consuming for bartenders. The same argument was given by a retailer which argued that retailers focus on revenue per square metre. Reuse systems often take more space which is unfavourable for the revenue per square metre.

70% Recycling - To achieve 70% recycling of plastics single use products and packaging, better sorting and recycling capacity needs to be built. The developments on sorting and recycling are discussed following the order of the value chain, beginning with the plastics producers.

One of the interviewed producers is also a recycler, who focuses on increasing the recycling capacity. The other producer is working in collaboration with other value chain partners on setting up a shared recycling facility of PLA.

Similarly, a supplier is considering to set up a recycling system within their own business. Another supplier is working on closing the loop projects with value chain partners a lot.

Two appliers are focusing on sorting and recycling techniques, among which a retailer is focusing on good sorting practices inside the company and an on-the-go restaurant is conducting tests on sorting techniques with partners. These same organisations also invest and test in recycling practices. Remarkably, a lot of vertical integration on recycling is happening in the market currently. Two types of vertical integration are observed: investments in recycling companies and internalisation of recycling practices in the company. Firstly, investments are found at a plastics producer and a couple of appliers. These firms are investing in or buying the whole company. Companies vertically integrate recycling companies to be assured of recycled content and to have cost savings. Secondly, businesses including a plastics producer, a supplier and an applier, are (considering) setting up a recycling system. Motives for internalising recycling activities are mostly born out of necessity¹⁵. Moreover, suppliers and appliers show interests in watermark technologies which could be beneficial for the 70% recycling target as it creates better sorting capacity.

Furthermore, a special development is the National Test Centre Circular Plastics (NTCP). The NTCP is a centre where companies can test their plastic packaging and products on its recyclability. Accordingly, packaging and product suppliers and appliers can develop better sortable and recyclable products. Accordingly, NTCP offers test opportunities for the pact's pilots.

Both waste management organisations and recyclers invest in and develop sorting and recycling techniques. All waste management companies made investments in sorting technologies focusing on capacity and/or quality. One waste management organisation has built a recycling facility for plastic foils. Another waste management company expects that with the investments made in sorting, the separation ratio of a little less of 75% will increase to 80% - 85%. However, to accomplish the 70% recycling target of the Plastics Pact, a sorting percentage of around 90% needs to be achieved. A few waste management organisations and a recycler argue that the system should change to be able to establish the 70% recycling target. According to them the current from-waste-to-resource (VANG) system should focus more on quality instead of quantity¹⁶, the system for waste managers and recyclers should be better connected¹⁷, and Afvalfonds Verpakkingen should extend its scope by including business waste¹⁸. In addition, major challenges for waste management companies are the many types of plastics. Hence, harmonisation or standardisation in material types and design will help to achieve higher sorting percentages and decrease the amount of mixed plastics. Furthermore, waste management companies are exploring their options on chemical recycling¹⁹.

¹⁵ Three projects are mentioned that were born out of necessity. The first one was mentioned by an event company, which has initiated a collaboration with a Belgium recycler on PLA cups. They initiated this collaboration since there was a lack of recycling possibilities for PLA cups as the traditional waste management companies were not willing to come up with solutions. Similarly, a PLA producer is involved in the first developments of a shared recycling facility for PLA. In the same way, a waste management company has set up its own recycling practices for plastics foils as a result of lack in demand of post-sorted foils from recyclers.

¹⁶ In the current system the focus on reducing residual waste leads to more contamination in the waste streams. Henceforth, focusing on both quality and quantity will subsequently help waste management organisations and recyclers to receive good quality input streams.

¹⁷ The system of waste managers and recyclers do not connect well with each other, since recyclers are charged on their quality while waste managers are charged on their quantity by Afvalfonds Verpakkingen.

¹⁸ The system of Afvalfonds Verpakkingen does not include business waste while this stream actually provides a purer stream of plastics than consumer waste according to a waste manager. Currently, only consumer waste is being subsidised by the fee parties pay to Afvalfonds Verpakkingen to sell their packaging on the market. Consequently, the separate disposal of plastics is more expensive for companies than disposal of residual waste. This results in companies only providing residual waste as this is the cheapest option. A positive development is that a directive to include business waste in the EPR program is currently being set up, which will hopefully help to overcome this barrier.

¹⁹ One waste management company is already working in collaboration with two other parties on chemical recycling of mixed plastics.

Continuing with recyclers, in general, recyclers are expanding capacity and increase the quality of the output. Recently, one recycler has developed an advanced sorting technique for plastics on polymer and colour level. Additionally, one mechanical recycler is also looking into options for chemical recycling. In recycling two major barriers are experienced: quality and efficiency. Quality of the streams are influenced by add-ons of packaging such as inks, adhesives, and labels. The quality of the input determines to a great extent the efficiency of the recycling process. One way to deal with this barrier by recyclers is to set up quality requirements on the input. Moreover, the above mentioned solutions of Afvalfonds Verpakkingen and VANG targets focusing more on quality of streams instead of quantity, would also be beneficial for the quality of the input for recycling.

A couple of companies suggest that a common R&D agenda on chemical recycling would be convenient since a lot of developments are happening in this field lately. Such an R&D agenda would help to coordinate all the different innovations and share the obtained knowledge²⁰. Another remark on chemical recycling is made by a waste manager who mentions that they would like to have more clarity on how chemical recycling will be seen with regard to the recycling targets of Afvalfonds Verpakkingen in the future. A roadmap that incorporates future policy developments and technological developments would be helpful.

35% Recycled content - Signatories need to apply at least 35% recycled content and as much as possible sustainably sourced bio-based plastics in their products and packaging. The section starts by discussing the application of recycled content, followed by the use of bio-based plastics.

A couple of companies stated that they currently apply recycled content in their products. Two of them are applying this in non-food contact materials, in which one of them even applied 100% recycled content. Another business is applying rPET in bottles and aims to apply 100% rPET in the near future²¹.

Despite the progress that a couple of parties are making, companies are also facing barriers to apply recycled content. Firstly, companies which want to apply recycled content are facing technical barriers. An interesting solution is stated by a brand owner which argued that redefining the requirements of the plastics was important to find the appropriate recycled material. He stated that many requirements on materials for products are overqualified. Therefore, materials originating from recycled content could not meet these requirements. Subsequently, these requirements were redefined to the actual required criteria for the products²². Another interesting example, in line with this, is seen at a retailer in the United Kingdom, which accepts the colours of recycled content that are available at that moment (Waitrose, 2019). In the same way requirements can also be redefined for reuse concepts, in which packaging requirements are adjusted to the actual requirements they need to meet.

Secondly, the European Food Safety Authority (EFSA) legislation constitutes a major barrier in the application of recycled content in food-contact materials for multiple businesses. Because of this, only rPET, and rPP originating from a closed loop system, can be applied in food contact materials. Other types of plastics have not received an EFSA approval yet.

Thirdly, the price of recycled plastics is not compatible with the price of virgin plastics (Patel et al., 2000). Therefore, a few companies including a plastics producer, waste manager, and recycler,

²⁰ Right now, a consultancy firm, Rebel, is developing a roadmap on chemical recycling until 2030, on behalf of a Dutch CE accelerator, het Versnellingshuis. This roadmap gains insight in how much recycled content will be used in the future and subsequently how much recycling and plastics feedstock capacity is needed and available for this. However, this roadmap focuses only on the Netherlands, while it would be powerful to connect all European developments and make a roadmap on this.

²¹ A sustainable packaging specialist at an applier is very sceptic about selling products consisting of 100% recycled content since this is an illusion, as recycling is always subject to losses. According to her, aspiring a recycled content target of 80% would be better.

²² This development was about a product outside the scope of Plastics Pact NL. However, the feedback is interesting to consider for single use plastic products and packaging.

suggest government interference on recycled content to stimulate the application of recycled material. This could be in the form of creating financial incentives for applying recycled content or obligating the application of recycled content in products where possible²³.

Resuming bio-based materials, developments on bio-based materials are found in its application and in its creation. An event organisation and a brand owner are using bio-based plastics in their products. Additionally, a supplier is exploring options to replace fossil-based plastics with bio-based plastics. Interestingly, a supplier, a brand owner and a waste management company are separately exploring options to generate bio-based plastics. An obstacle within this theme, is the diffused information and the resistance from the traditional waste industry. This makes it unclear which information is right or wrong²⁴.

Overarching barriers - On top of the already mentioned barriers, three more general barriers that overarch the themes are observed. Firstly, technical feasibility is a barrier. Sometimes companies want to progress on a certain topic, but it is not technically feasible yet. Another barrier is capital investments. For instance, the costs of adapting a new packaging line are relatively high. Furthermore, a lot of differences between countries' waste management and recycling systems exist, which makes it very difficult to determine which material or design is best in which country. Even more, multinationals sometimes have to design different designs of packaging for the same products to ensure the packaging can be recycled in the specific country. At last, sometimes financial barriers are faced by companies when collaborating with multiple companies. An agency for EPR of the Belgian industry is actively taking away the facilitation and testing costs. Henceforth, diminishing the financial barrier. An interviewee argues, that this works very well and it would be interesting to have this in the Netherlands as well.

Analysing the developments per target of the Plastics Pact, a lot of different developments are observed. This shows positive movement towards the targets. Little remarkable differences in progress is observed. Basically, every target shows concrete results and projects in their exploring and development phase. Only the themes bio-based and reuse are an exemption in this. These themes have no or minor concrete results among the interviewed companies but these themes show developments in exploration and pilot phases. This could perhaps be explained by the fact that reuse is a very new concept and bio-based and/or biodegradable materials are facing a lot of diverse information and resistance by the traditional waste industry.

Remarkably, substantial systems barriers are indicated by interviewees on the recycling and recycled content target. However, through analysing the developments in recycling no lack in development can be indicated. In contrast, the recycled content target clearly shows that interviewed companies are only applying rPET. Other developments cannot be made because of the EFSA systems barrier.

To return to the pilot projects of the Plastics Pact, the pilots are attempting to overcome certain systems barriers but also more specific barriers that are encountered by multiple businesses. Pilot one is addressing the ineffective system of Afvalfonds Verpakkingen. Recyclability and harmonisation of the variety of plastics types will be part of pilot two, three, and four. Recyclability of laminates and the EFSA legislation barrier are included in respectively pilot five and six. The latter four

²³ Currently, the government takes action to accelerate the process to implement legislation on mandatory application of recycled plastics at EU level (Van Veldhoven-van der Meer, 2020).

²⁴ At the moment, the government is developing an assessment framework which determines how to handle bioplastics in which situations.

projects, pilot eight till eleven, focus on reuse concepts and help companies overcome inertia which they might encounter due to the newness of the subject.

Evaluating the technological developments throughout the value chain, most progress in the different technological areas takes place at suppliers and appliers, in terms of different projects or orientations and not in size or impact (see Table 8). This can be logically explained as these parts of the supply chain are directly connected to multiple goals (reduction, recyclability, and recycled content), whereas plastics producers, waste managers, and recyclers are only directly connected to the recycling target. On the other hand, this does not mean that organisations only should focus on the goals to which they are directly connected. Most of the companies, except for the recyclers, involve technological areas to which they are indirectly connected to as well. To illustrate, producers, suppliers and appliers are for example also focusing on sorting and/or recycling and conversely, waste management companies focus for example on reuse concepts. Noticeably, recyclers do not focus on e.g. recyclable adhesives or better removable inks for plastic packaging, while this could improve the quality of the input for recycling a lot, thus improving efficiency. Although, some recyclers show initiative to think along with suppliers and appliers by advising them. This will be explained more elaborately in chapter 5.3.1. In contrast, all parts of the supply chain focus on recycling. The difference in extended focus might be because recycling is such an essential part of the value chain and producers, suppliers and appliers feel obligated to take their responsibilities.

Among the interviewed businesses very little direct evidence can be found of the Plastics Pact influencing an organisation in its individual technological developments. The only proof found, are the recycling guidelines and the connection with the company Filigrade that develops watermark technology. Both can be very helpful to achieve total life cycle improvements. The minor influence of the Plastics Pact on technological progress was to be expected since the organisations signed the voluntary agreement only a year ago at the time of the interviews. Despite, the Plastics Pact is about to exert influence by setting up and running pilots on the bottlenecks that are experienced in the value chain. These pilots have a potentially large impact on harmonisation, and perhaps even standardisation, of designs and materials in the future. When these pilots demonstrate to be successful it is important to share the results among the industry, to not only have impact on the pilot's participants but to also have a large impact on the entire industry.

Table 8: Overview of technological development areas per organisation.

Technological development/ organisations	Recyclability	Reduction			Recycled content		Recycling	
	Design	Reduction	Reuse	Watermark technology	Bio-based/biodegradable	Recycled content	Sorting	Recycling
Producer Producer					X	X		X
Supplier Supplier Supplier	X X	X X	X X	X	X	X		
Applier Applier Applier Applier Applier	X X X X	X X X	X X	X X	X X X	X X X	X X X	X X X
Processor Processor Processor			X X		X		X X X	X X X
Recycler Recycler							X X	X X

5.3 Interactions throughout the value chain

This chapter discusses the connections throughout the value chain made by the interviewed participants. These connections consist of having contacts, conversations, and collaborations on topics concerning sustainability of plastic packaging and products. First, the coverage of these connections throughout the value chain is explained, together with the topics on which these connections are formed. After which the facilitating factors and barriers involved in collaborations are addressed. And last, the experienced influence of the Plastics Pact by interviewees is shown.

5.3.1 Scope of collaborations across the value chain

Contacts, conversations, and collaborations are made by the interviewed companies. Per part of the value chain the connections will be discussed, in which the connection itself and the main topics for collaboration are illustrated. An overview of the different value chain collaborations per interviewed company is illustrated in Table 9. The shown multi-actor collaborations in Table 9 involve three or more actors from different places in the value chain.

Table 9: Collaborations across the value chain per company.

Place of collaboration in value chain/ company	Producer	Supplier	Applier	Processor	Recycler	Multi-actor collaboration
Producer		X			X*	
Producer			X			X
Supplier			X	X	X	X
Supplier			X	X		
Supplier	X		X	X	X	X
Applier		X	X		X	
Applier		X	X	X	X	
Applier		X		X	X	X
Applier		X		X	X*	
Applier	X			X	X	
Applier		X	X	X		
Processor	X	X	X			
Processor	X		X		X	X
Processor	X		X		X	X
Recycler		X	X	X		X
Recycler		X	X**	X		

* They have their own recycler in the company group

** Their parent company is an applier

Plastic producers - To begin with plastics producers. Different results are obtained among the interviewed plastics producers. One plastics producer mentions that they have already been collaborating for over 20 years with suppliers on recycled content. Contrastingly, the plastics producer does not collaborate nor converse to retailers since a previous attempt failed. This failed because there was too less capacity available at the retailers on this subject a couple of years ago. On top of this argument, this producer values collective projects on European level more than individual approaches as these individual approaches are not sufficiently contributing. Therefore, the company is participating in PET Core Europe, an interest group, to make arrangements with the PET industry on

European level. Strikingly, retailers are also missing in this collective. On the other hand, the other plastics producer is working together with brand owners and retailers. An explanation for this can be the size and the experience of the company. Whereas the first producer is a well-established market player, the second producer is a new player in the market with bio-based plastics which needs to prove itself on the market. Interestingly, the resistance that this company received on bio-based plastics from the waste management and recycling industry forced them to consider setting up their own shared recycling facility and collaborate with brand owners and PLA producers. Furthermore, a packaging supplier mentions *“big chemical companies [...] are searching for partners that want to test new resources”* and is also collaborating in multi-actor projects with plastics producers. Remarkably, except for the collaboration with brand owners on the shared PLA recycling facility, none of the interviewed appliers are working together with plastic producers.

Packaging and product suppliers - All suppliers are collaborating with companies that apply plastics. Topics vary between concrete recycled content projects and collaborations on return systems but also exist of more basic activities like processing requests of business customers on sustainability and advising them on sustainability of packaging. In addition, all interviewed suppliers collaborate with waste management companies. Suppliers connect to waste managers to optimise the recyclability of products and to collaborate on specific projects. For example one supplier mentions that they collaborate on a specific project with a waste management organisation on shrink foils for the building industry. Furthermore, suppliers collaborate with recyclers. One supplier has established multiple projects involving recyclers. Another supplier specifically mentions a project focused on rPP, where they are currently working on together with a retailer.

Plastic packaging and product applying companies - Correspondingly, almost all interviewed appliers are working on the same topics where plastic suppliers are working on with plastic appliers. Interestingly, a few appliers recently started the conversation on sustainability of packaging with their suppliers²⁵. Besides, appliers connect with waste management companies and recyclers. Connections with waste managers are mainly made to optimise the recyclability of products and packaging. Whereas, collaborations with recyclers are mostly made for specific projects on closing the loop of a specific product or material type. Remarkably, one applier mentions that they have not connected with waste managers and recyclers yet. The interviewee states a reason for this disconnection *“I think that this is an underdeveloped area. These are typically parties where we normally do not talk to that much. Of course, we already have a relationship with suppliers. With customers too. But the recycler is actually only after this part. So, currently, we notice that you have to bring all these parts of the value chain together, because the recycler eventually needs to recycle the material in such a manner that my supplier is able to use it. And, we saw at our plastics cup project that does not work out yet.”* Furthermore, only one applier is collaborating with a plastics producer, which collaborates on the previously discussed topic of recycling bio-based plastics. Another striking result when looking at the connections that have been made across the value chain, are the connections among the appliers themselves. These connections are made to exchange knowledge and to collaborate on specific issues. Such collaborations among parties of the same part of the value chain are not mentioned by other parts of the value chain.

²⁵ One of the appliers that converses with suppliers has organised a day for their biggest packaging suppliers to converse about sustainability. Another example of how such a relationship can be structured, is given by a supplier who has every two weeks a call with their packaging supplier on the progress of applying recycled content.

Waste management companies - All interviewed waste managers mention that they are connected in some way to plastics producing companies to work on recycling opportunities²⁶. Additionally, all interviewed waste management organisations are connected to appliers but in different ways. One is connected via actively communicating on design for recycling. Another one is collaborating in a Sustainable Food Initiative Fieldlab led by Unilever. And, the other company is participating in a specific project with a brand owner and a recycler. Besides, two waste managers mentioned that they are being approached by brand owners to help them improve the recyclability of packaging.

Remarkably, only one waste manager does not collaborate on specific projects with recyclers but has its own recycling facility. More precisely, the lack of demand for this company's post-sorted plastic foils led to the establishment of a new recycling facility.

Recyclers - A positive finding is that the interviewed recyclers are collaborating across the entire value chain except for plastics producers. A big difference between the two recyclers is seen. One recycler has a variety of collaboration projects with suppliers, appliers, and waste management companies, whereas the other recycler focuses more on communication on design for recycling to suppliers and appliers. Although, the latter recycler has established a collaboration with a waste manager to increase the purity of the material stream. Noticeably, this recycler has been taken over by a supplier. This positively influences the impact they have on the market as this supplier has direct contacts with appliers, which in the end decide on the designs.

Other parties - Value chain parties not only collaborate with parties within the value chain but also collaborate with facilitating parties outside the value chain. Consisting among others of interest groups, initiatives, NGOs, knowledge institutes, and technology companies. Interest groups are sometimes used to tackle specific problems collectively. Another interesting approach by a supplier is to actively participate by taking leading roles in a broad variety of interest groups and initiatives to guide and influence the market towards sustainability. *"We need to show that it is possible. Henceforth we say, we need to give leadership to the sector, thus I am in the board of partners of MVO Nederland, I am in the Steering Committee of the Plastics Pact. I am chairman of the working group CE of NRK, [...]. So how do we, as the entire plastics industry, proceed with that."* Moreover, a few suppliers and appliers are exploring the application of watermark technology with a technology company.

An interesting movement is seen by two players in the value chain that initiated a consortium and a platform. The consortium is initiated by a recycler that wants to achieve a better quality of plastic material streams by collaborating with different value chain partners. The initiation of a plastics cluster is focused on increasing the chance of matchmaking and innovations among plastics companies. This plastics cluster is being built by a waste management organisation together with companies situated in the region.

5.3.2 Facilitating factors and barriers for value chain collaboration

In this section the requirements, the enabling factors, and the drivers to establish relationships across the value chain are illustrated. Barriers are addressed, together with the place in the value chain where these barriers occur. Finally, some solutions to overcome these barriers are discussed.

²⁶ One of these waste managers recently initiated a partnership with a chemical recycler and a plastics producer on chemical recycling of mixed plastics. Another organisation, established a multi-actor partnership with a chemical company on recycling of foils.

Some requirements on the characteristics of a potential collaboration partner were identified by interviewees. The starting point is that partners must be trustworthy and intrinsically motivated for sustainability. Next to this, a partner should be innovative and willing to take some risk since collaboration projects often involve uncertainty on return of investments. Therefore collaborating in such projects require boldness and an innovative mind-set. Additionally, a focus on long-term relationships instead of short-term profits are mentioned as requirement for collaborations. This requirement complements with the former partner characteristic of being innovative and willing to take risks, as the focus on long-term relationships reduces the risk of a loss-making partnership. In contrast, another company argues that the proven technological feasibility of the technique their value chain partner is using, was a driver for them to join forces with this party. This actually shows risk averse behaviour. The two projects differ in content and value chain actors. Where the innovative risk taking characteristic is used in a project focusing on application of recycled content in a product on which a brand owner, a waste manager, and a recycler work on. The risk averse behaviour is noticed in a project on chemical recycling of mixed plastics in which a waste management business and a chemical company work on. The latter is often seen as a traditional industry which could explain the risk averse behaviour.

Three main enabling factors for establishing new connections and collaborations are addressed by interviewees. Firstly, active external propagation on the company's eagerness to collaborate on sustainability is working well. Companies demonstrate their keenness to collaborate on sustainability by: 1) actively communicating about the activities they are undertaking on sustainability, 2) attending a lot of network events that focus on related topics, and 3) participating in leading roles at initiatives. Secondly, having a reputation as an innovation or sustainability focused company, facilitates attracting partnerships. This is a logical consequence from the previous set requirements on partner characteristics since companies appreciate organisations who are innovative and intrinsically motivated for sustainability. In addition, the presence of an R&D centre supports the reputation of being an innovator. Next to this, companies located in a very innovative environment are trying to improve their chances on match making for collaborations with this. Thirdly, interviewees mention that having a common goal enables parties to look beyond their own interests.

Two drivers have been experienced by the interviewees. The most common experienced driver is obviously the necessity to collaborate throughout the value chain, since individual organisations cannot progress the change towards a more circular value chain alone. Furthermore, the business opportunities that arise are a driving force to set up collaborations across the value chain. These business opportunities arose in this case by a lack of initiative and willingness of existing value chain parties, thus resulting in companies taking control of the situation by setting up collaborations themselves to overcome this barrier.

Despite the facilitating factors for collaboration on sustainability, organisations experience certain barriers. These barriers vary in their severity. Some organisations express barriers that show difficulties but are controllable, while other barriers are harder to control.

Starting with a few barriers that are controllable. Companies state that connecting with the right parties is sometimes difficult. In general, businesses find it hard to meet partners that are intrinsically motivated for sustainability and are able to commit to the set quality requirements. Another containable barrier is that companies need to get used to working with parties they would normally not work with. This involves getting accustomed to the different technical languages, the

involvement of multiple parties in contracts, the size of the contracts, and more generally getting used to a different structure of the value chain.

Another barrier that is maybe a bit more difficult to manage, but is still containable inside the organisation, is the current contracts with suppliers. Suppliers state their difficulties with incorporating their demands on sustainability in supplier contracts. There are two reasons for this. First of all, deals with suppliers are made by the procurement department by people that normally do not have knowledge on technology. As a result certain gaps in contracts with regard to technical aspects of sustainability are experienced. A retailer solved this problem by having someone from the sustainability team looking at the contracts every year. Another difficulty with current contracts is that a lot of technology evolves in time, so these developments cannot be incorporated in agreements. As a consequence new contracts have to be established to incorporate updates in technology, which may involve additional expenses. Nonetheless, this has led the company to focus more on long-term partnerships, which is in line with the previously stated desired partnership characteristic to focus on long-term relationships.

Another, generic, barrier is capacity in time and money. Although, the results in section 5.2.1 on company structures illustrate a positive trend of companies hiring more people in the field of sustainability resulting in more capacity in time.

Next to the controllable barriers, less manageable barriers are observed. The less controllable barriers relate to other parties in the value chain and, therefore, are less controllable by individual organisations. In general, organisations in different parts of the value chain experience the barrier that different interests are alive among companies. This sometimes makes collaboration and aligning interests difficult. Nonetheless, the establishment of a common goal at the beginning of the collaboration is helpful. Additionally, some parties are not willing to change²⁷. This is experienced at almost all parts of the value chain except for the interviewed suppliers and plastic producers within the value chain. Underlying reasons for this are sometimes the investments or the efforts that need to be made, or the characteristic of an industry to act conventional. Therefore, a movement can be seen that companies are trying to play off these parties. An example of this is a recycler who used to go to suppliers to approach them to use recycled content; unfortunately without much success. Therefore, this recycler now often skips this part of the value chain and goes directly to the decision-making party, e.g. the brand owner and retailers, which obliges the suppliers to cooperate. Another barrier that complements the different interests among the value chain is the lack of transparency between suppliers and waste management organisations experienced by suppliers. Suppliers are in the middle of these two parties and cannot indicate which party is honest. An supplier already stated that the recycling guideline compiled by the Plastics Pact is very valuable to estimate what items can be assigned to suppliers. However, not everything is straightforward. With some items it is negotiable who should take responsibility and who should make certain compromises. This is recognised by a waste management company in their collaboration with a recycler.

Furthermore, development projects on sustainability are associated with a lot of uncertainty. Uncertainty in projects is experienced in two different ways. First, uncertainty forms an obstacle since development projects give no assurance of sales. This causes a high risk of loss for certain organisations. The other way that organisations experience difficulties by uncertainty of development projects is the contract. When setting up an agreement, the parties are used to incorporate a safety margin. However, when all parties in the collaboration incorporate this for their own part of the value

²⁷ Three examples on lack of willingness at other parties were mentioned: 1) waste managers or recyclers are not willing to make certain investments, 2) a company that fills packaging with products is not willing to make basic modifications to its process so that thinner packaging can be used, and 3) suppliers are not willing to apply recycled content.

chain no valuable business case can be made. These parties solved this problem by establishing one agreement incorporating all three value chain partners. Another obstacle is the difficulty in setting up a collaboration contract while there is still uncertainty on what roles each party will fulfil.

Finally, some difficulties are encountered in value chain collaborations in making financial investments, e.g. material tests to assure its safety and process facilitation costs. A supplier argues that for certain financial investments it is difficult to decide who needs to pay for it. In these cases, a certain fund which is raised by industry via an EPR program would be valuable. Such a system is already implemented in Belgium.

5.3.3 Influence of the Plastics Pact on value chain collaborations

At this moment no additional collaborations among participants are formed due to the Plastics Pact. The initiative has only been launched a bit more than a year ago, so this does not necessarily mean a lot. Nevertheless, one supplier is now conducting research for the Plastics Promise initiative. This collaboration is partly initiated via the Plastics Pact. Although, not many collaborations have been formed yet, interviewees indicate that the Plastics Pact eases the process of making connections. First of all, interviewees mention that the participation of parties all over the value chain is very valuable. Next to this, the pact facilitates to meet like-minded organisations, which work towards common goals. On top of this, appliers argue that by participating in this voluntary agreement, they meet organisations they would normally not be in touch with such as suppliers and recyclers.

Multiple organisations, mainly consisting of suppliers and appliers, declare that they have obtained new contacts via the Plastics Pact. These newly obtained contacts are very divergent and vary between a knowledge organisation, a technological innovation company, and connections in the supply chain itself.

Another result of the Plastics Pact experienced by a supplier is the prioritisation of plastic projects. This supplier argues that because of the introduction of the Plastics Pact, projects are receiving more attention, while normally they would have obtained less priority. As mentioned by this organisation *“we notice that the targets of the Plastics Pact work as a sort of catalyst for projects that normally receive less attention but now receive more attention with the Plastics Pact targets”*. Another supplier declares that its clients take the targets of the pact as guidelines to progress towards greater sustainability and asks them to develop products and packaging that meet these requirements.

In general, a few companies declare that the common vision created by the Plastics Pact is valuable. A common vision is experienced as important to align different interests of parties when collaborating with each other. Moreover, a waste management organisation appreciates the facilitation of collective action by the Plastics Pact²⁸.

On the other hand, two organisations express some concerns about the impact the Plastics Pact will have. One organisation does already collaborate in the interest group PET Core Europe for several years. This organisation is sceptical about the capability of participants to solve the problems faced by the value chain. According to this interviewee, participants, mainly appliers, lack the required technical knowledge or do not understand how the value chain system works²⁹.

The other organisation, a waste management company, is arguing that organisations are well willing to contribute to mapping bottle-necks but often do not reveal their know-how since this is a

²⁸ This organisation believes in collective approaches and solutions because this organisation cannot advise or approach every single company. So this business also strongly values the establishment of frameworks where businesses has come to an agreement on the sectoral level, after which these sectoral frameworks can be aligned on value chain level.

²⁹ This is an important remark. However, every part of the value chain is necessary to establish change towards sustainability. For this reason, these sometimes less knowledgeable parts of the value chain actively need to be involved.

company its unique selling point. At this moment, it is too soon to evaluate if this is the case, because companies only have been mapping the challenges and have come up with a roadmap to tackle these challenges until now.

5.3.4 Functioning of working groups within the Plastics Pact

At the beginning of the Plastics Pact four different working groups have been established, consisting of the following:

1. Working group Design for Circularity;
2. Working group Collecting, Sorting, and Recycling;
3. Working group Communication, Education, Behaviour; and
4. Working group Reuse and Reduce.

At the launch of the pact on the 21st of February 2019, each signatory could indicate in which working groups they wanted to participate in. Participants had the choice to actively or passively participate in the working groups. All working groups have been assigned a process counsellor and an ambassador from the Steering Committee, who have knowledge on a specific working group topic. Together with the counsellor and ambassador, the working group participants are establishing a roadmap that guides them to the achievement of the pact's targets. However, the approaches of establishing such a working group vary. While the counsellor of the working group Design for Circularity, already had in mind which topics certainly needed to be addressed during the working group sessions, the counsellor of the working group Reuse and Reduce took a more process facilitating role which required more input from participants.

Looking at the participants of the working groups, only one third of all signatories actively participate in one or more of the four working groups. Complementing this with applicants that want to only participate passively, little less than half of the number of the signatories is reached. This is remarkable because signatories have committed to the targets of the pact, but do not necessarily want to be involved in the developments of roadmaps compiled by the working groups that could lead to some valuable developments. This raises the question whether the Plastics Pact should be less non-binding and should introduce actions in which mandatory participation is expected.

Recently all four working groups have compiled their roadmaps. The roadmaps were compiled in around four months. However, the start of these working groups was around one year after the launch of the Plastics Pact. This explains the lack of concrete collective results by the Plastics Pact working groups at this moment.

One specific individual company result has come out of the working group Design for Circularity. This is an applier who is currently evaluating all packaging on recyclability, in response to the working group Design for Circularity in which the recycling guideline was compiled. After this assessment, this applier will provide feedback to its corresponding suppliers when packaging does not align with the recycling guidelines.

To summarise, not many notable deviating results are seen when you compare the different parts of the value chain on their reach of collaborations through the chain, except for one. Plastics producers show collaborations on less parts in the value chain than other parties. Plastics producers are interesting parties for waste management companies to collaborate with on chemical recycling.

However, other parts in the value chain are not necessarily connected to this, which might explain this difference.

Furthermore, the results show that a lot of the connections made between suppliers - appliers, suppliers/appliers - waste management companies, and appliers - appliers are based on conversations about optimisations for sustainable packaging and products. The conversations between the different actors can have a potential major influence on making the value chain more circular and hence, are not inferior to collaboration projects. Although, the value chain must ensure that it is not just a matter of talking, but that action is also taken.

Taking the different topics into account on which companies form connections, a balance towards projects that focus on applying recycled content and closing material and product loops is observed at multi-actor collaborations. This may be easily explained as these projects require the involvement of the entire value chain, whereas this is less needed on other subjects that suffice with the involvement of for example two parts of the value chain.

Taking the factors that influence value chain collaborations and the influence of the Plastics Pact together, some overlap can be seen. First of all, positive influence of having a common goal in collaborations is facilitated by the Plastics Pact. Interviewees appraise this of high value in the pact. Next to this, the Plastics Pact facilitates enablers for establishing collaborations. An example of an enabler is the network events involving all parties of the value chain, but also then supports the reputation of companies to be sustainable and a frontrunner. Not only drivers and enablers for collaboration are supported by the pact but also barriers are overcome by actions of the covenant. The lack of transparency and the difference in interests of a variety of parties are addressed by the EVA. At the moment, the Plastics Pact already has facilitated more transparency by compiling a recycling guideline. However, more potential can still be fulfilled by exploring together with the value chain which actors can solve which problems. This will partly be fulfilled by the implementation of two of the pilot projects. Consequently, sharing and harmonising these solutions with the whole industry could lead to a major increase in transparency across the value chain. In addition, the alignment of different interests of parties will always be challenging but the formulation of common goals and the collective action by signatories will help in aligning these interests.

6. Discussion

This discussion reflects upon the similarities and differences of the results in this research regarding the used BPC framework and other theories. After which, remarks and suggestions are made on the Plastics Pact. Finally, the limitations of this research are explained.

Theoretical reflections

As a result of this research, the impacts of the Dutch Plastics Pact in terms of strategy, internal business processes and value chain collaborations have become clear. Generally, results illustrate that companies have formulated a strategy/vision and in most cases a roadmap to implement the strategy. This is in line with the first steps of change of the combined theory framework of Kettinger & Grover (1995) and Kotter (1996). All companies also show changes in their internal business processes, and sometimes even show concrete progress. These results indicate that companies are mostly located in step five or six, empowerment of broad-based action and generation of short-term wins, of successful change to accomplish the pact's goals (Kotter, 1996).

The overall political factors to which the Dutch Plastics Pact contributes, are experienced as external factors that influence the plastic strategies of suppliers, appliers, and waste management companies. This corresponds with Kettinger & Grover's framework of BPC. In contrast, the interviewed plastics producers and recyclers do not experience the current political factors on their plastic strategy explicitly since these companies already had their strategies in place before. Note that based on the conducted interviews, and the fact that these producers and recyclers participate in the pact, these companies can be characterised as frontrunners. Therefore, this result may not be generalised to all plastics producers and recyclers. Moreover, the pact has also influenced monitoring systems and led to revitalising existing or obtaining new contacts. Thus, the pact does not only influence the strategy as suggested by Kettinger & Grover (1995) but also affects the transformational subsystem and inter-organisational business processes. The influence the Dutch Plastics Pact has, is visualised in Figure 6.

Similarly, such a split within the value chain is noticed with regard to the transformational subsystems. Where plastics producers and recyclers focus mainly on the technological progression, suppliers, appliers, and waste managers also look at the structure, management practices, and cultural components which can drive change in the organisation. The lower use of transformational subsystems of the BPC framework of Kettinger & Grover (1995) by producers and recyclers may be understood from two possible explanations which are found in the results. Firstly, a producer and recycler argued that the organisation is structured in such a manner which is favourable for sustainability. From this, the argument can be made that these organisations are further in the transition phase towards a CE than others³⁰. Secondly, one recycler mentions that they have not been developing management practices for sustainability since this is still a step too far currently.

Another remark can be made on the BPC framework. Where Kettinger & Grover (1995) only illustrate the connection of the transformational subsystems with the business processes, the results of the interviews illustrate connections among the different subsystems. An example of this is given in section 5.2.2, where a brand owner gave trainings to employees as part of stimulating bottom-up management practices. Consequently, this management practice led to other behaviour and improved the skills of employees. Moreover, this management practice improved the structure of collaboration between the sustainability department and the processes and continuous improvement department.

³⁰ The same remark as stated in the previous paragraph needs to be made. The interviewed organisations are frontrunners and, hence, are not a good representation of the whole plastics producing and recycling sector. For this reason the results found in this research on plastics producers and recyclers cannot be generalised.

Among the different interviewees a wide variety of items are found which companies use to integrate a CE regarding plastics in their organisation. The items used are corresponding with theory (see Table 2). For instance, the incorporation of sustainability criteria in the procurement process discussed in section 5.2.2 corresponds with Hallstedt et al. (2013). Another example is the collaboration throughout the value chain, which is in line with De Koeijer (2018) who argues that cross-functional actor integration is important to establish integration of CE in packaging processes.

Moreover, the results show that suppliers and appliers have extended their plastic strategy and technological developments more towards recycling³¹, while plastics producers, waste managers, and recyclers have realised this less thoroughly. The plastics producers, waste managers, and recyclers only communicate about recyclability but do not concretely develop for example recyclable adhesives. So a shift of focus from own operations to improving the performance of the supply chain is noticed, which corresponds with findings of scholars (Kogg & Mont, 2012). However, certain suppliers and appliers are more actively expanding their focus towards the whole value chain than producers, waste managers, and recyclers do. The reduction target, in contrast, seems to receive less attention throughout the value chain. While the pact has introduced four working groups among which two of them are focused on collection, sorting, and recycling and respectively reduce and reuse. It appears that plastics producers, waste managers, and recyclers do not actively work towards the reduction target³².

Remarks on the Plastics Pact

The Plastics Pact creates the opportunity to find more sustainable solutions benefiting the entire value chain by collaborating with actors across the whole value chain. When such solutions are established with value chain actors, the pact has the possibility to harmonise and standardise these approaches beyond the pact which is expected to be the biggest value of the covenant. These expected outcomes are in correspondence with the combined framework of Kettinger & Grover (1995) and Kotter (1996). This is illustrated in Figure 6. In this framework the desired outcomes, in this case environmental improvements of the value chain, can be anchored in the culture of the plastics value chain by harmonising and standardising the outcomes of the covenant.

However, the expected outcomes of the pact could possibly also be linked to different innovation theories such as the multi-level perspective of Geels & Schot (2007). Within this framework the pact could create a window of opportunity for niche innovations to develop and be taken up by the existing socio-technical regime to establish new configurations in the industry.

The connection with the Ministry of Infrastructure and Water Management is very powerful in this pact, and in general in covenants, since it generates the opportunity to harmonise and standardise these configurations in the industry. Taking the results generated by the covenant further than the participants of the Plastics Pact is of great importance to actually establish structural change that benefits the environmental performances of the value chain among and beyond the pact's frontrunners. After completion of the pact, it would be interesting to research if the Plastics Pact has actually established harmonisation and standardisation of new configurations in the value chain.

Results among participants' plastic strategies show that not every company has (fully) internalised all the Plastics Pact's targets to which they are directly connected. This emphasises that

³¹ The attention of suppliers and appliers on this theme, actors which are not directly connected to the target, is caused by different reasons. Sometimes unwillingness of other parties to implement solutions is the driver to take up recycling practices by sometimes internalising recycling.

³² Obviously producers, waste managers, and recyclers have no direct influence on the reduction of plastics used but a reduction in the amount of plastics would be environmentally beneficial for the entire value chain. Besides, the reduction of the amount of plastics used is not in their interests since this does not fit in their business model.

building and maintaining the commitment to the pact's targets is essential. Bressers et al. (2011) argue that investments in process measures such as the deployment of a process facilitator and helping the group to remain focused and unified could lead to successful implementation of the covenant. Considering this argument, the Plastics Pact should carefully monitor the pilot processes led by commercial parties of the pact instead of independent process facilitators. Besides, the pact also needs to make sure that follow-up processes after conducting the pilot projects are carried out well.

The pact positions itself as a frontrunner. Indeed the pact includes frontrunners on the plastics theme. These participants mentioned during the interviews that the agreements in the covenants are in line with what they have already been working on. Therefore, the added value of the Plastics Pact on frontrunner organisations can be questioned. However, the impact the Plastics Pact has on less severe frontrunners is expected to be larger which is also observed during the interviews. At the same time, the pact should be precautionary with these latter organisations, since these are more likely to perform free riding behaviour. To resume to the frontrunners, these participants will experience effects of the pact as well. More precisely, frontrunners will experience the side effects the pact has, together with the increased societal and governmental attention to plastics. These side effects include an increased attention of customers to the sustainability of plastics (section 5.2.2). Consequently, this is beneficial for frontrunners' revenues and the level of trust which is necessary for future investments.

Furthermore, the goal of the Plastics Pact is not only to improve individual company performances but also to collectively achieve solutions that are beneficial for the whole value chain. The participation of frontrunners in these developments are hence very important since frontrunners will bring knowledge and expertise to the community which helped retrieve successful solutions.

Remarkably, not all targets of the pact fully correspond with each other. The recycled content target and recycling target do not perfectly fit. The recycled content target is aiming to apply 35% recycled plastics in products and packaging, while the recycling target aspires to have 70% recycled. This implies that half of the recycled plastic packaging and products will not be applied in the same kind of products, and could potentially be downcycled. This misfit helps maintain the current system of low demand for recycled plastics and raises the question if the recycled content target should not have been set higher to truly generate a circular economy, in which materials are recycled on the same level. Although, this issue is complex. The recycled content target encounters major system barriers such as the prices of recycled versus virgin plastics and the EFSA legislation. Therefore, setting a target to apply 35% recycled plastics, instead of a target that is closer to the 70% recycling target, might be more effective as this target is more likely to be achieved. The importance of setting achievable targets in covenants is also supported by scholars (Bressers et al., 2011).

Limitations

This research was conducted one year after the launch of the Plastics Pact on February 2019. Meanwhile, the pact has formed working groups and roadmaps for every main target and is about to implement the roadmaps now. For this reason little progress has been made collectively with the pact yet. Besides, technological developments take time and often do not occur within one year. For this reason, no technological developments as consequence of the pact have been notified. Therefore, analysing the covenant's impact one year after the launch might be too soon to see any substantial influence of Plastics Pact on companies' intra-organisational and inter-organisational processes. Accordingly, it is recommended to conduct this research again after the completion of the covenant.

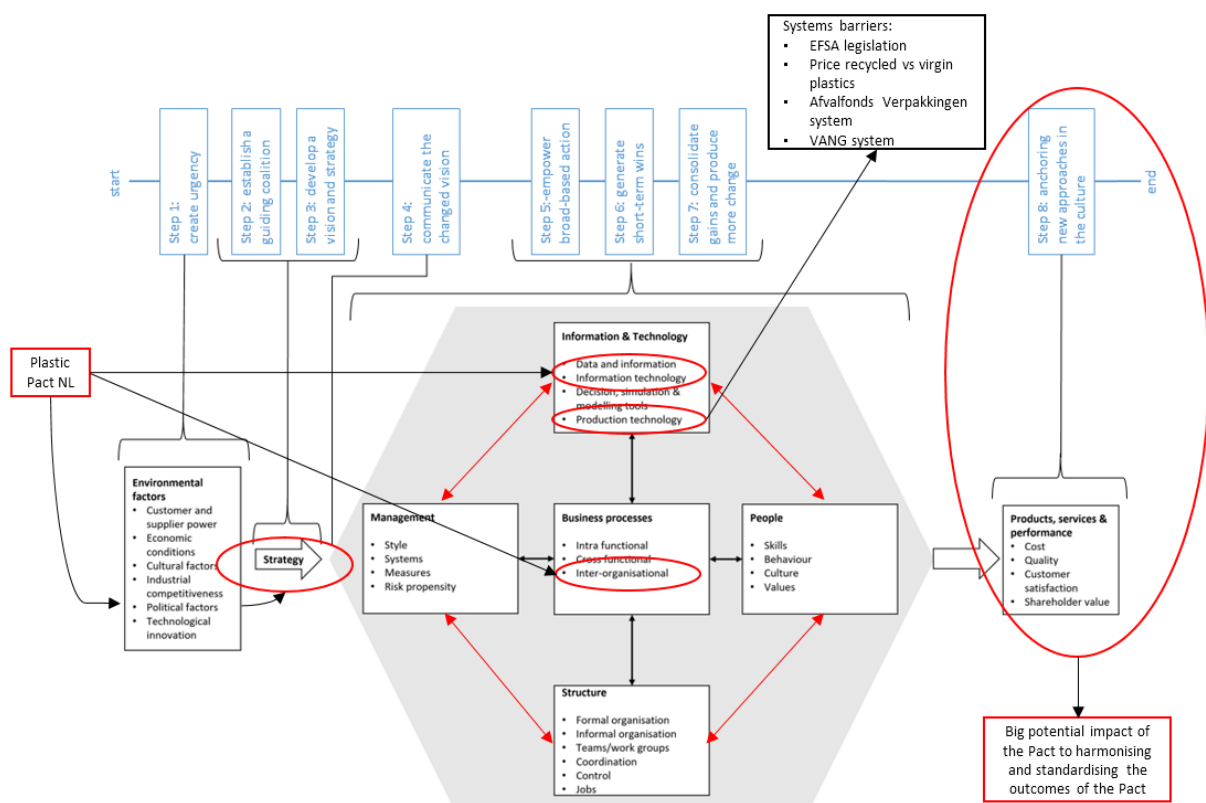


Figure 6: Visualisation of the influence of the Dutch Plastics Pact on business process changes and corresponding systems barriers.

In an ideal situation, participants and non-participants of the pact would have been examined to increase the internal validity of the study (Yin, 2003). The non-participants would have been a control group in the research. The use of a control group can help to separate the influence of participating in the Plastics Pact from the overall political attention to plastics on national and European level. Nonetheless, due to the scope of this research it was not feasible to conduct interviews with both participants and non-participants while covering the whole value chain.

Within this research sixteen different participants have been interviewed, covering the whole value chain and securing a diverse group of organisations in terms of commitment to the pact, sector, and frontrunner position. Despite the research including a wide variety of organisations, not all participants were interviewed. Although, sixteen organisations were interviewed to answer the research question, theoretical saturation did not occur. This means that additional interviews would possibly still have provided additional insights which are not included in the current research outcome. However, this research has developed insights in how participating organisations change to achieve the targets of the Plastics Pact and indicates how the covenant influenced these organisations in their change process. Therefore, this study adds new ideas and insights to existing theory of change management and effectiveness of EVAs.

Participants of the Plastics Pact are characterised by their frontrunners position. As a consequence, the outcomes of this study cannot be generalised to the whole value chain before further research (Yin, 2003).

Interviewees existed of contact persons of the Plastics Pact which might led to bias to the pact's successfulness. However, such statements are not signalled during the interviews. Moreover, across the interviewees persons with different responsibilities in the organisations are present. In general, among the appliers less technological knowledgeable persons were interviewed than at other parts of the value chain. This might have led to the bias that appliers emphasised more the cultural,

managerial, and structural aspects of the organisation, while recyclers and producers were mainly focused on technological progress. At the same time, these functions correspond with the identity of the organisation, which reflects the priorities in the company.

The used matrix in this research filled out by participants illustrated the phase of transition the organisations are in (Appendix D and F). Although, some variations in interpretation took place on the items strategy and external collaborations. On these items, persons sometimes filled out the matrix slightly more positive than the actual situation illustrated in the interviews. Sharpening of the text frames, which limits the scope for interpretation would have helped. The use of the matrix by the Plastics Pact among participants could help to make an inventory of the status of companies. This is more comprehensive than only asking organisations about the actions they took and are going to take this upcoming year to achieve the pact's goals. The update, participants give to the pact, on the actions the company will take the upcoming year is mostly interpreted by companies as an update about the technological developments instead of the developments on all business processes. Requesting an update about the status of the overall organisational readiness of participants would be useful since literature has proven that this is essential to transition towards a CE for packaging (see Section 3.3). More precisely, the matrix explicitly addresses the organisational readiness to change towards achieving the goals by e.g. inquiring the status of the company's strategy/vision, internal organisation structure, and external collaborations (see Appendix D). By requesting information on the items in the matrix, a greater understanding can be generated on where companies are in the change process towards reaching the goals.

7. Conclusions

This paper has sought to indicate the influence of the Plastics Pact on signatories their intra-organisational and inter-organisational change towards the pact's targets. On three items the influence of the Plastics Pact has been found: 1) strategy in terms of direction, targets, and scope, 2) internal business processes mainly on monitoring processes, and 3) connections through the value chain in terms of revitalising existing or making new contacts.

Signatories of the pact mention a couple of reasons to participate in the agreement. Some argue that the covenant was a logical continuation or a demonstration of good will, while others want to influence and anticipate market developments and the political agenda. Furthermore, participants appreciate the framework the Plastics Pact creates that everyone can work towards.

Most companies have created urgency for change and established a strategy and/or vision on plastics which is communicated in the organisation. The overall movement of increased attention from society and governments in plastics has led companies to set up a strategy. Nevertheless, plastics producers and recyclers did not mention the influence of governments or society on their strategy. The increased interests of governments in this theme is supported by the introduction of the different plastics pacts, which are recognised as a driver for a few companies to set up a plastic strategy. Next to the bolstering effect of the plastics pacts on companies, the Dutch Plastics Pact has influenced the plastic strategies of a few signatories in terms of its direction, more precise targets, and scope. These signatories include suppliers, appliers, and waste management organisations. Although, the majority of the signatories argue that no influence by the pact is experienced since they were already working on these issues. Some organisations, mostly suppliers and appliers, include the recycling target in their plastic strategy to which they are not directly connected to by the pact. Recyclers on the other hand have set up more ambitious targets in their strategy than the Plastics Pact. Interestingly, not all companies have internalised all targets of the pact completely in their plastic strategy. Some companies have not fully internalised all the pact's targets to which they are directly connected. An incomplete strategy regarding the Plastics Pact's targets, does not necessarily mean that a company does not act towards the goals since these businesses signed the pact to commit to the targets. However, the commitment of these companies is questionable and should be monitored by the Plastics Pact to assure the commitment of all signatories and avoid free riders behaviour.

A variety of internal business process changes can be seen across the value chain. Suppliers, appliers, and waste management organisations focus respectively more on the organisational structure, management practices, and culture than producers and recyclers do. In contrast, technological developments are emphasised by everyone. However, organisations do not make technological progress on every Plastics Pact target to which they are directly connected to by the pact. This is mainly seen at appliers, which are connected to many targets and sub targets of the pact. Considering the four main targets of the pact, the recycling and recycled content targets are facing system barriers which make it more difficult to accomplish these targets. The Plastics Pact could take a leading role in overcoming these system barriers. Most of these barriers are addressed by the pilots that are being set up by the pact's working groups. Remarkably, suppliers and appliers are extending the technological developments more towards recycling, while the extension of technological development areas to which an organisation is indirectly connected is happening less often by producers, waste managers, and recyclers. The Plastics Pact have had minor influence on the internal business processes. The covenant mostly influenced the monitoring processes of organisations, among

which applies were arguing that the monitoring led to sharpening of existing monitoring systems, extra insights, and measurements based on those insights.

Across the value chain there is a wide spread of collaborations. Half of these collaborations exist of sharing information and giving advice on sustainability of packaging. Among the concrete collaboration projects of individual companies a balance towards recycled content/closing the loop projects is seen. The Plastics Pact facilitates enabling factors for value chain collaborations, including: 1) a common goal to work on, 2) network possibilities involving all value chain actors, and 3) propagation of a sustainable reputation. Currently, this has resulted in a couple of organisations obtaining new contacts or revitalising existing contacts. In general, one supplier experiences the Plastics Pact as a sort of catalyst for the initiation of plastic projects. Although, the pact has not caused any concrete collaboration projects until now. In the near future eleven pilot projects will be set up among participants initiated by the pact's working groups. Three of these pilots build on existing projects while the other projects are initiated by the Plastics Pact. These pilots aim to remove a couple of bottlenecks experienced by the value chain. Implementing the changes suggested by the future outcomes of the pilots will potentially lead to structural change that will contribute to the pact's targets.

8. Recommendations

Recommendations for further research are given. Additionally, recommendations are provided for EVAs, systems changes, and more specifically for both the Plastics Pact and the Ministry of Infrastructure and Water Management. The latter contains advice on optimising functionality of the Plastics Pact.

Recommendations for further research

Some suggestions for further research have already been made in the discussion. These suggestions are complemented with additional recommendations for further research and are shown below.

1. After the completion of the Plastics Pact, the accomplishment of harmonisation and standardisation of new configurations (e.g. new collaboration structures, agreements on material types or product designs) within the value chain could be studied. Moreover, the new configurations among participants (in terms of internal business process changes and collaboration structures) could be studied. These two aspects are of interest to research in order to determine to what extent the covenant caused lasting change.
2. Research that involves both participants and non-participants of a covenant would be interesting to conduct. In this way, the influence of the Plastics Pact can be determined more thoroughly. This would help to isolate the effect of the political movements on the subject from the influences of the pact.
3. A comparative study of the Plastics Pact, which involves all value chain actors, and a covenant that only involves actors from one sector would be of interest to perform. This research could indicate if a covenant that incorporates all value chain actors works better than covenants that only incorporate a (more homogenous) part of the value chain. A comparative study of covenants regarding the involvement of participants would be interesting. Research could be conducted on whether the incorporation of certain value chain actors is dependent on factors such as the subject of the covenant, the dynamics in the value chain, and the region.

EVAs

In the past, a lot of EVAs have been implemented on the sectoral level. However, the Dutch Plastics Pact characterises itself by the incorporation of all value chain actors. Participants state that this is very valuable as this makes it easier to discuss value chain problems with all necessary actors. At this moment, the success of incorporating all value chain actors is not clear yet since the recent start of the pact. Evaluating if the involvement of all parties has led to the successful implementation of the covenant is valuable to research after the completion of the pact since other EVAs could learn from this.

Furthermore, the deployment of working groups and corresponding process facilitators seems to be very valuable, as a way to collectively work towards the pact's goals. The process facilitators can help steer the working group in the right direction. They can also safeguard the progression and align different interests. Therefore, the deployment of working groups and process facilitators is recommended to other EVAs.

Systems improvement

The current system should be optimised or interfered with to support a more sustainable system. Starting with the waste management system, in which an improvement can be made. Waste management systems should focus more on quality. Additionally, a more holistic approach is needed

to accomplish an optimal system, where not all responsibility rests with the waste management organisations but also with the municipality or province to ensure that citizens make a sufficient contribution.

Furthermore, policies on badly designed packaging/products should be set up and enforced to avoid that badly designed packaging/product combinations pollute the plastics waste stream which can negatively impact the recycling of a whole stream. Accordingly, badly designed packaging and products have more serious consequences for the producing parties. To implement this, a public inspection authority at the European level should be assigned to fine these parties. In order to enforce this, first corresponding legislation needs to be introduced by the government. Another important item that relates to Afvalfonds Verpakkingen, is generating more clarity on the incorporation of chemical recycling within the recycling targets to avoid the stagnation of innovation on this subject³³.

An overarching issue, that surpasses the plastics industry, is the internalisation of environmental impacts in market prices of products. This also applies to the price of virgin plastics and therefore constitutes unfair competition for recycled plastics. This must change and the Plastics Pact can play a role in this. This could include incorporating a threshold for the minimum quantity of recycled plastics to be applied in products and packaging via Afvalfonds Verpakkingen, or requesting the government to develop legislation to regulate a threshold.

At this moment, investments with regard to process facilitation and tests in value chain collaboration projects are not subsidised. This sometimes forms a barrier. Therefore, actively taking away this barrier by subsidising these investments is important.

In addition, the development and consistent use of a good measurement system would be valuable to determine whether plastics are truly useful and to determine which material is best to use in which situation. At the moment, the European Commission offers the International Reference Life Cycle Data System (ILCD) Handbook. However, this handbook does not address the chance of materials becoming litter, which is a big problem. Therefore designing a method that incorporates this would be valuable in determining which material is best to use for specific packaging.

Plastics Pact NL and Ministry of Infrastructure and Water Management

Harmonisation and/or standardisation

The opportunity for harmonisation and standardisation is seen as one of the biggest values of the Plastics Pact. Thus, sharing information obtained within working groups and pilot projects with all organisations across the value chain is important to achieve harmonisation. Consequently, the government should take the results of the pact further than the participants of the pact and take the right actions to facilitate harmonisation, or even standardisation by establishing guidelines or regulation on the specific items. An organisation such as International Organisation for Standardisation (ISO) may also play a role in future standardisation by e.g. developing a standard on recyclability.

Commitment

Commitment to the targets and implementation of the conducted roadmaps is important for successful execution of the pact. At this moment, more than half of the signatories are not involved in the working groups. Although the participants that are not actively nor passively involved in one of the working groups (see Section 5.3.4) are not necessarily participants that do not work towards the goals. These participants only do not collectively work towards the goals with the Plastics Pact participants³⁴.

³³ This needs to be implemented carefully since the government should stimulate the value chain to always recycle the plastics in a way that causes the least environmental pressure. Thus these rules should not prefer chemical recycling above mechanical recycling.

³⁴ If participants do not work together towards the goals, they miss out on the added value of the pact.

In order to avoid this behaviour, expectation management would have been helpful. By more explicitly stating the expected commitments from organisations prior to signing the pact, such as compulsory participation in one or more working groups, the covenant can more easily remind these organisations to their commitment later on the covenant. However, changing the conditions to participate in the Plastics Pact at this stage to make the pact more binding (by e.g. introducing rules to participate in at least one working group) is not recommended as participants did not sign up for it at the beginning of the pact.

The pact also states that the covenant is voluntary but binding. However, at this moment the pact does not act as binding. Therefore, actions should be put in place to avoid free riding behaviour, if the goal of the pact is to not only achieve the four goals but also to take collective action. Sometimes organisations do not know how they can contribute to collective pilots. Henceforth, emphasising the urgency to collectively work on topics addressed by the working groups and pilots from specific company perspectives is valuable, to involve the participants in the pilot trajectories (Kotter, 1996). According to Steg & Vlek (2009) actions like asking participants about their action plan to establish the covenant's targets also seems to be effective. Recently, the pact asked its participants what actions they took until now, what actions they will take next year, and which successes they have accomplished. This corresponds partly to the suggestion of Steg & Vlek (2009). However, focusing on long-term actions triggers participants to think about whether their plans and strategies are sufficient to achieve the goals. More precisely, asking companies on how to accomplish the goals of the Plastics Pact in the next four years could be valuable. Therefore, a yearly call with participants to discuss their action plan to accomplish the pact's targets by 2025 in combination with, what the pact has already been doing, and an evaluation on what results they have made last year is recommended to keep all participants involved and to avoid free riding behaviour as much as possible.

Furthermore, results on the strategy of firms show that while companies have committed to the targets, not all companies have fully internalised all targets. Therefore, the Plastics Pact is recommended to carefully monitor the commitment of participants. Especially participants that have not internalised all targets and are not actively involved in working groups and pilots should be tracked. Resistance to change at participants which lack behind can be minimised by making achievement of the goals as easy as possible (Benn, Edwards, & Williams, 2014). The Plastics Pact can facilitate laggards by demonstrating how to achieve the pact's goals by taking small steps. The pact could use best practices of other participants for this. Furthermore, smart usage of monitoring results by giving anonymised feedback to the participants on how well the organisation scores compared to other participants of the pact could give an extra stimulus (Steg & Vlek, 2009).

Communication

Right now the information provision of the pact is not optimal. Although, in the near future a new webpage for the pact will be built. This webpage can be used as a fully integrated platform that connects all relevant initiatives, subsidies, information, and knowledge, and provides matchmaking of challenges and solutions of participants. This would generate a comprehensive and interesting platform for signatories and other interested parties.

First of all, information generated by the Plastics Pact should be transparent for all and should be shared publicly. This includes the action plans made by the working groups, the knowledge and experience obtained from pilot projects, and other relevant complementing information like the compiled recycling guideline and advice on what material to use in what type of situation. Sharing this knowledge is important to avoid that parties reinvent the wheel and to already naturally establish harmonisation.

Secondly, the number of initiatives is experienced as overwhelming by some participants of the pact. Creating a platform on the webpage that connects all initiatives and their developments classified by subject can be valuable. In addition, the Plastics Pact should connect as much as possible with projects of other initiatives. Although, the pact is already paying attention to this, a more structured approach to collaborate with these initiatives would be useful to secure continuous knowledge sharing.

Thirdly, placing the accessible subsidies for value chain projects are helpful to share on the webpage to stimulate the use of these subsidies and subsequently encouraging innovations for sustainability in the value chain.

Fourthly, sharing a common European R&D agenda in the recycling field on the webpage would be helpful to indicate what developments take place. The Plastics Pact should observe if other regions are implementing similar development trajectories with whom the Netherlands can join forces.

Finally, the webpage should exploit and promote match making among participants, bringing together challenges and solutions. Next to this, successes of companies could be linked to online profiles of participants to inform companies on each other's behaviour which appeared to be successful in favourable behaviour towards sustainability (Schultz et al., 2007).

Reuse concepts

As a consequence of the reduction target and the SUP directive, organisations start to focus on reuse concepts and develop reusable products as a replacement for single use products. Hereby, a good introduction of these new products to the end user is important to actually decrease the environmental impacts of these products. The Plastics Pact should monitor that reusable products are implemented in the right way. If this is not the case the pact should start the conversation with these parties to ensure that participants of the covenant are not involved in greenwashing practices.

Other

Vagueness in the value chain exists on who is responsible for what optimisations of the value chain. Henceforth, participants of the pact can play a frontrunners role to determine who is responsible for what. After which the government can introduce new requirements on responsibilities of the value chain, and add these to the already existing EPR programs like Afvalfonds Verpakkingen.

As a last note, the Plastics Pact should incorporate a more source-based approach. More precisely, the pact should focus more on minimising the sources instead of reducing the consequences. Of course, the pact incorporates optimisations as much as possible upfront in the value chain by reuse concepts and design for circularity, however less attention is paid to for example promoting eating seasonal vegetables. While this might be a change that will not be made within the five year timeline of the Plastics Pact and is an issue beyond the scope of the covenant, a systems approach is valuable to tackle problems at their root cause.

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Appendixes

Appendix A - Participants of the Plastics Pact at February 2019

Plastic producing companies	Plastic applying companies	Other companies
Indorama Ventures Europe	Friesland Campina Nederland B.V.	Stichting Natuur & Milieu
Total Corbion PLA	Unilever Nederland B.v.	Stichting MVO Nederland
Purac Biochem	Nestlé Nederland B.V.	A New Zero
Ioniqa Technologies	Vrumona B.V.	Plastic Whale
Cumapol	Coca-Cola European Partners Nederland B.V.	Nationaal Testcentrum Circulaire Plastics
Morssinkhof Plastics Heerenveen	Heineken Nederland Commerce	TNO
QCP	Koninklijke Grolsch N.V.	CLICK-NL
Veolia Nederland	Inbev Nederland N.V.	Stichting Polymer Science Park
Kunststof Recycling Van Werven	Albert Heijn	Federatie Nederlandse Rubber- en Kunststofindustrie
4PET Recycling	Jumbo supermarkten	NRK Recycling
Wellman International Ltd	Lidl Nederland	NRK verpakkingen
Renewi Nederland	Aldi Inkoop	Vereniging Afvalbedrijven
Suez Recycling & Recovery Netherlands	Ekoplaza Franchise	BRBS Recycling
Attero	C.I.V. Superunie	Coöperatie Green Events Nederland UA
Afvalsturing Friesland	Plus Retail	ABN-AMRO
Kunststoffen Sorteert Installatie	Vomar Voordeelmarkt	ASN Bank
HVC Group	Hema	Filigrade Sustainable Watermarks
	Sodexo	Obbotec
	ISS catering services	Stichting Holland Circular Hotspot
	Starbucks	NS Groep
	Mcdonald's Nederland	
	NS Stations	
	Pathé Theatres	
	Mojo concerts	
	Air events	
	Apenkooi	
	Stichting Vierdaagsefeesten	
	Coöperatie Royal Floraholland	
	Hordijk SPUITGIETVERPAKKINGEN	
	Hordijk verpakkingindustrie Zaandam	
	PaCombi Group	
	Oerlemans Packaging	
	A TOP	
	Haval Disposables	
	PolystyreneLoop	
	Gampet Plastics	
	Koninglijke Philips	

Appendix B - KPIs of the Plastics Pact

Overview of KPIs to monitor Plastics Pact NL's progress

(All KPIs are copied from Van Veldhoven-van der Meer, 2019)

KPIs plastic applying companies:

The Plastics-Using Companies will report on progress based on the following indicators:

Design stage, relating to the objective in article 1, paragraph 2 (a):

- a) Recyclable plastic products and packaging, per company (by number of products and as a percentage of the total product and packaging portfolio).
- b) Single-use plastic products and packaging that are now fit for reuse, per company (by number of products and as a percentage of the total product and packaging portfolio).

Use stage, relating to the objective in article 1, paragraph 2 (b):

- c) Use of single-use plastic products and packaging, per company (in kg and as a percentage of the total amount of plastic products and packaging used).
- d) Reuse of single-use plastic products and packaging, per company (in kg and as a percentage of the total amount of plastic products and packaging used).
- e) Quantity of plastic waste still being produced, per company.

Closing the loop (use of recycled and bio-based plastics), relating to the objective in article 1, paragraph 2 (d):

- f) Use of recycled plastics (in kg and as percentage of the total amount of plastic products and packaging used, per company with 2017 as the reference year, adjusted for changes in the company's turnover).
- g) Use of bio-based plastics (in kg and as a percentage of the total amount of plastic products and packaging used, per company with 2017 as the reference year, adjusted for changes in the company's turnover).

KPIs plastic producing companies:

Disposal stage, relating to the objective in article 1, paragraph 2 (c):

- h) Sorting into mono and mixed plastics streams through multi stream waste programmes or separation of single stream waste, respectively (in kg and as a percentage of the total volume of collected plastics).
- i) Plastic recycling, divided into mechanical, chemical and feedstock recycling (per company, in kg and as a percentage of the total amount of plastic waste).
- j) Amount of plastic waste in the Netherlands that is fed as residual material to waste-to-energy plants in the Netherland.

Appendix C - Assessed topics in desk research

Format for assessing companies' intra-organisational and inter-organisational change.

- Strategy corresponds with the targets of the Plastics Pact;
- change in strategy;
- announcement of the Plastics Pact on webpage;
- change in internal business processes; and
- strategic partners regarding plastics.

Appendix D - Matrix format

Topic	Little or no evidence	Some elements	Fully implemented	Place to add show case
Strategy/vision	No strategy/vision for plastics has been formulated	A strategy/vision for plastics has been created	A strategy/vision for plastics in line with the Plastics Pact's targets has been created	
Roadmap	No steps/targets has been formulated	Some loosely defined steps and targets are set on circularity of plastics	A detailed plan is made to achieve the targets which are in line with the Plastics Pact's targets. One or more persons are assigned to bear the responsibility for accomplishing the goals.	
Communication	No communication plan for plastics has been created	Communication plan on plastics is activated on internal business level	Communication plan on plastics is activated on internal and external business level, involving the entire organisation and all relevant external actors throughout the supply chain.	
Monitoring	There is no system to monitor progress on plastics	There is a system to monitor progress on plastics within the organisation	There is a monitoring system to track progress on plastics that incorporates the whole value chain	
Determine areas that have potential for improvement	Potential for improvement is not determined	Points of improvement are determined for some projects	Points of improvement are holistically defined throughout the organisation	
Organisational readiness	Sustainability is not broadly supported by management	There is support and commitment from senior management	There is support and commitment from senior management whereby a culture for sustainability and sustainability trainings for employees are put in place	
Internal organisational structure	The different departments are working within clusters and circularity of plastics is not explicitly addressed in teams	Some departments work together to ensure circularity of plastics. This is informally organised within teams	Front-end and product-packaging integration is applied. Besides, multidisciplinary teams are formed to improve circularity, whereby a sustainability specialist is appointed to safeguard circularity of plastics	
External collaboration	No involvement of external actors	Involvement of external actors in the supply chain which are directly connected prior or succeeding to the company's own business process in the value chain	Involvement of all relevant actors in the supply chain whereby good working feedback loops are established between the different actors	
Technology	No technological progress	Some minor technology updates to make the process more circular	Major technological progression in line with accomplishing the Plastics Pact's targets	
Knowledge sharing	There is no effective knowledge sharing system available	Knowledge is effectively captured and shared within the organisation	Knowledge is effectively captured and shared across the industry	

Wat zijn de afspraken van Plastic Pact NL?



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Appendix E - Interview Guide

Interview guide

First of all, thank you for your time and effort to participate in this research. This research is about analysing the influence Plastics Pact NL has on intra-organisational and inter-organisational processes among participating organisations. More specifically, I study how the Plastics Pact influences companies' strategy, management practices, business operations and strategic collaboration across the industry.

Do you give permission to record the interview?

Questions:

Introductory questions

- 1) What does your function entail?
- 2) How many years have you worked at the company?
- 3) How much are you involved in sustainable decision making?
- 4) How much are you involved in plastics?

Strategy and targets

- 5) Has the strategy and/or vision of the firm changed in 2019?
 - a) If yes; how has it changed?
 - i) Why has it changed?
 - ii) Due to which factors has it changed?
 - iii) Was it hard to change?
- 6) Do you find that the company strategy is in line with the targets of Plastics Pact NL? And, why?
 - i) If yes; due to which factors has the company formulated such a strategy?
 - ii) If not; why is it not in line?
- 7) Has the company formulated targets to make the production/use/processing of plastics more sustainable?
 - a) Why has the company formulated these targets?
 - b) Which factors were influencing the target setting process?
 - c) When were these targets set?

Internal business processes and transformational subsystems

- 8) Has the company changed its management practices in 2019? (Management practices: style, systems, measures, risk propensity)

- a) If yes; how did it change?
 - i) Which factors caused this change?
 - b) If no; which management practices has the company in place to achieve sustainability goals?
- 9) Do you expect that the goals of Plastics Pact NL will be reached with the current management practices? Why?
- a) [If the answer was no] Why doesn't the company put the right management practices in place to achieve these goals?
- 10) Has the company changed its structure in 2019? (Structure: in terms of how different departments work together)
- a) If yes; how did it change?
 - i) Which factors caused this change?
 - b) If no; how does the current company structure look like?
- 11) Does the current company structure facilitates sustainable development within the company and supports the achievement of Plastics Pact NL's goals? Why?
- a) [If the answer was no] Why the company doesn't structures the organisation differently to achieve the goals?
- 12) Has the company changed its business processes in 2019? (Business processes: all processes to deliver the product or service)
- a) If yes; how did it change?
 - i) Which factors caused this change?
 - b) If no; how does the current business process look like with regards to sustainability of plastics?
- 13) Does the current business process facilitates sustainable production of plastics and supports the establishment of Plastics Pact NL's goals?
- a) [If the answer was no] Why the company doesn't changes its business process?
- 14) Has the company changed its information and technology processes in 2019? (Information and technology: data and information, measurement tools, and production technology).
- a) If yes; how did it change?
 - i) Which factors caused this change?

- 15) Do you think that the current information and production technologies will support the achievement of Plastics Pact NL's goals? Why?
- a) [If the answer was no] Why the company doesn't develop the right information and production technologies to achieve these goals?
- 16) Has the company changed its organisational culture/behaviour/values and facilities to improve employees' skills towards sustainability in 2019?
- a) If yes; what changed?
- i) Which factors caused this change?
- 17) Do you think that the current organisational culture/behaviour/values and skills will support the achievement of Plastics Pact NL's goals? Why?
- a) [If the answer was no] Why the company doesn't develop the correct information and production technologies to achieve these goals?
- 18) Did other changes in business processes occur that have not been discussed yet, but are in interest of the transition to a CE?

Strategic collaboration

- 19) With whom has the company established strategic collaborations related to plastics or alternatives for plastics across the industry in 2019?
- 20) How were these established?
- 21) What were the factors that drove the establishment of the partnership?
- 22) Do you believe Plastics Pact NL has influenced in any way the formation of strategic collaboration within your company?
- 23) Are there any barriers to collaborate with partners from Plastics Pact NL?
- 24) Do you share best practices with participants of PP NL?
- 25) Does the organisation desire an overarching R&D agenda for the value chain?
- 26) What is the biggest value of participating in the Plastics Pact for your organisation?

Appendix F - Results of Matrix

Results from matrix

Place in value chain	Strategy	Action plan	Communication	Monitoring	Potential for improvement	Organisational readiness	Internal organisation structure	External collaborations	Technology	Knowledge sharing
Brand owner	High	High	Medium/High	Medium	High	High	High	Medium	High	High
Plastic producer	High	High	None	Medium/High	Medium	High	Not applicable	High	High	High
Recycler	High	High	Medium/High	High	High	Medium	Medium/High	Medium/High	High	High
Recycler	High	High	Medium/High	Medium	Medium	Medium/High	High	Medium/High	High	Medium
Retailer	Medium/High	Medium	High	Low	Medium	High	Medium	Medium	Low	Medium
Supplier	Medium	Medium	Low	Medium	Medium	Medium	Medium	Medium	Medium/High	Low
Waste management	High	Medium	High	Medium	High	High	Medium	High	High	Medium
Waste management	Medium	Low	Low	Low	Medium	High	Medium	Medium	High	Medium
Supplier	High	Medium/High	Medium/High	Low/Medium	Medium	Medium	Medium/High	Medium	High	Low
Brand owner	Medium	Medium	Medium/High	Low	Medium	High	Medium	Medium	Medium/High	Medium
Supplier	High	High	High	Medium	High	High	High	High	High	Medium/High
Event organisation	High	Medium	High	Medium	Low	Medium	Low	Medium	Medium	Low
Brand owner	High	High	High	Medium	High	High	High	High	High	High
Brand owner	High	Medium	None	High (in near future)	Medium	Medium	Medium	Medium	None	None
Retailer	High	Medium	Low	Low	Medium	Medium	Medium	Medium	Low	Low