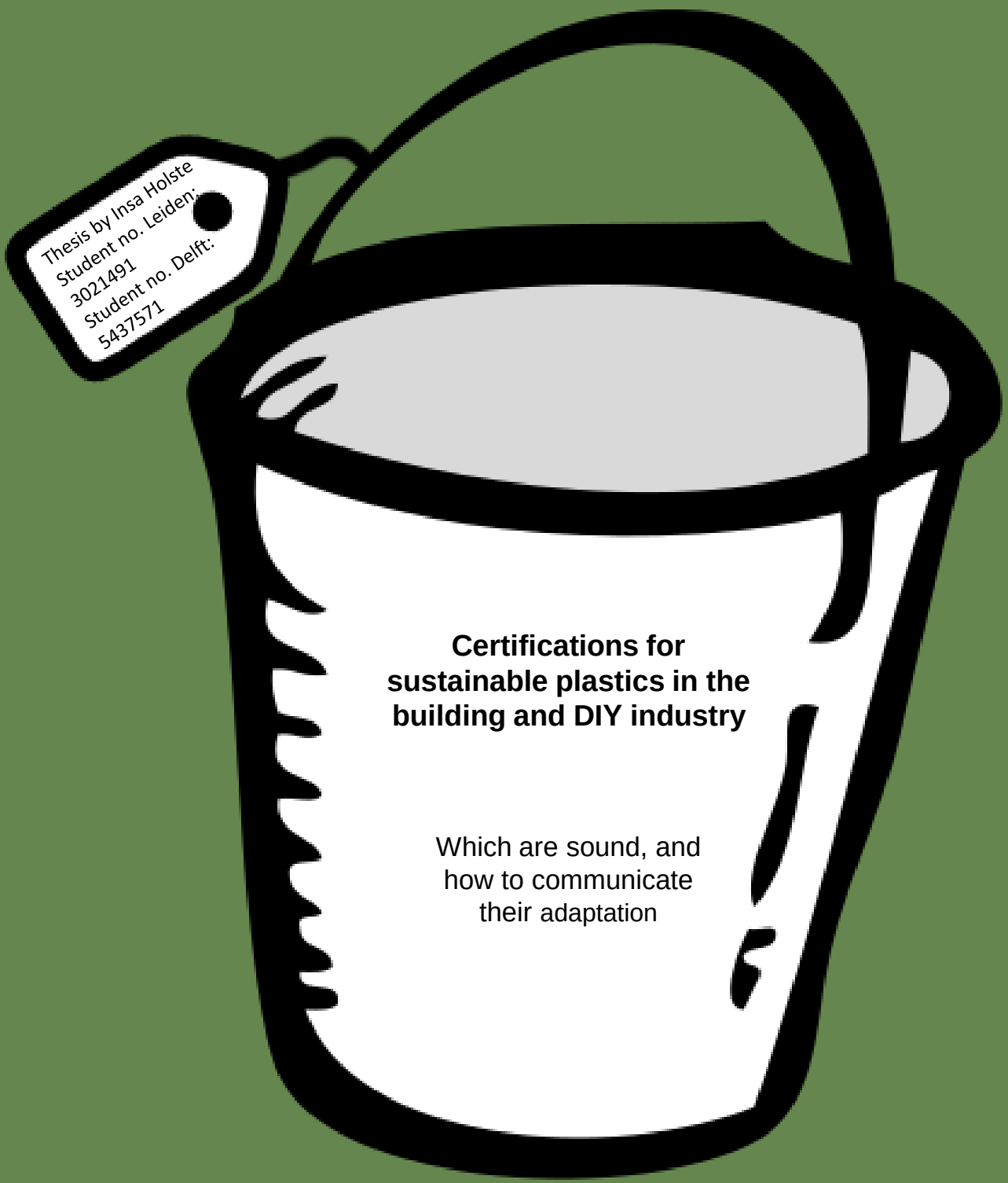

Certifications for sustainable plastics in the building and DIY industry

Which are sound, and how to communicate their adaptation

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Preface

This master thesis is the final product of my graduation project from TU Delft and Leiden University. I hope that the report can add to the ongoing (academic) discussions on both the use of certifications and the future of plastics. Additionally, I hope that reading this report will give some inspiration to practitioners as well, on how to incorporate certifications in their everyday business, and maybe even on how to make this everyday business a bit more sustainable.

In this context, I want to thank Eugene and Bas from Berdal, for making this research in form of a case study possible. Thank you for your time and support, and for giving me a whole lot of new insights and views on sustainability in the plastics industry!

Additionally, I want to thank my supervisors, Stefano and Erik Jan. You always gave me valuable feedback, hinted me towards additional aspects to consider, and encouraged me on days when I felt like the research didn't move forward the way I wanted to.

Last but not least, thank you to my friends and family that accompanied and supported me during the course of this project. You were always there when I needed you to help me stay on track, but also when I needed someone to get my mind off the thesis. Without you, the last months would have been much less fun!

Insa Holste

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Summary

Today's society relies significantly on the use of plastics of all kinds. While the material provides many benefits, plastic pollution poses a heavy threat to the environment. To reduce the environmental impact of plastics while still benefitting from their use, various certifications aim at labelling different plastic products as sustainable. To ensure that those certifications really label plastics that contribute to sustainable development, it is important to analyse which labels are scientifically sound and useful instruments to enhance environmental standards, and which might contribute to greenwashing. However, a certification can only be as good as the practical implication it has. The example of Berdal Rubber & Plastics BV, a Dutch producer of plastic buckets and tubs, shows that a key challenge arises from communicating the importance of adopting such certifications to business customers, in their case, especially in the building and DIY industry.

Hence, this research tackled the following research question: *How can the scientific soundness of sustainable plastics certifications in the European building and DIY industry be assessed and how can the importance of using such certifications be successfully communicated to the buyers and end-users of plastic products?* To answer this research question, inductive research making use of a mixed-methods approach has been conducted, in which Berdal served as a case study. As a first step, this research developed an analysis framework for certifications, then, it researched what a successful communication strategy for certifications that includes said framework can look like.

The framework was developed based on secondary research and was supplemented with insights from primary data from semi-structured interviews. The framework consists of 14 criteria in three categories, namely, (1) organisational, (2) trust and transparency related as well as (3) content-related criteria that determine the soundness of certifications for sustainable plastics. Most criteria were supported by both literature and primary data. To show the potential use of the framework for getting insights on one certification and for comparing it with others later on, the framework has then been applied to the Blue Angel certification for plastics made from recycled material. The application process also showed the applicability of the framework for its intended use. It would, however, be recommendable to apply the framework to more certifications in order to rule out unclarities or identify means of improvement. Overall, it has been found that especially trust and transparency-related criteria are considered to be of main importance in literature, primary data, and application.

In the next step, a communication strategy about certifications that entails the priorly developed framework has been elaborated. To do so, eight barriers that impede the use of certifications, six of which can be approached by communication, and seven opportunities for improved use of certifications have been extracted from primary data. Different communication strategies and theories have been used to identify ways of communication to overcome the barriers by making

use of the opportunities. The theoretical foundations were chosen based on research and assumptions about their suitability for the case study, thus, a more extensive application to other theories could provide further insights. In the process of combining primary and secondary data, some overarching insights have been found. A major challenge is to change the sometimes still unfavourable attitudes towards certifications and sustainability found within the building and DIY industries. Additionally, the low understandability of certifications limits their use, while being difficult to target by communication strategies. However, communication on certifications and sustainability can be more successful when it considers certain aspects. Especially the dialogue with stakeholders and credibility through proactiveness are seen to be important. Target group specific communication that focusses on personal relevance is found to be another aspect to consider. Here, the role of the framework can be to present information in a clear and detailed way, and to be an instrument to point out the advantages a specific certification can have for the communication's receiver. For the specific situation of the case study of Berdal, it has been found that setting up a reciprocal dialogue, especially with their buyers, and emphasising the credibility of their message about certifications by focussing on their reliability and standard setting can be beneficial. Additionally, the focus of communication should lie on the personal benefits of their stakeholders individually. The framework for Berdal as a plastics producer can be used to transparently show why certain certifications have been chosen or how they compare to others.

Following this research, several recommendations apply. First, not all potentially interesting insights from primary data were of relevance for this research, thus, a closer look into other ways to overcome barriers or to investigate improvements for certifications could be of interest. The latter does not only apply to research, but also to policy makers and certification issuing bodies. Even though certifications and sustainability are still of limited importance in the building and DIY industries, a growing trend can already be noticed. Thus, it can only be recommendable to accustom oneself to those topics and communication strategies for them soon and to consider the potential benefits of obtaining certifications earlier than the competition.

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List of Abbreviations

BSR	Business for Social Responsibility
B2B	Business-to-business
B2C	Business-to-consumer
B2G	Business-to-government
CE	Circular economy
CSR	Corporate social responsibility
C2C	Cradle-to-cradle
DIY	Do-it-yourself
EOL	End-of-life
EPDM	Ethylene propylene diene monomer
FTC	Federal Trade Commission
G2C	Government-to-consumer
HDPE	High-density polyethylene
IE	Industrial Ecology
ISCC	International Sustainability & Carbon Certification
ISO	International Organisation for Standardization
LDPE	Low-density polyethylene
OECD	Organisation for Economic Co-Operation and Development
PP	Polypropylene
UBA	German Environment Agency, Umweltbundesamt

Chapter 1: Introduction

With its wide use range, from food packaging and bottles to toys and houseware all the way to buckets and tubs, plastics have become one of today's society's most important materials. Between 1950 and 2015, plastics production recorded an annual growth rate of 8.4% (Geyer et al., 2017). It is not by chance that already as early as 1998, Karel Mulder described the times that we are living in as the "Plastic Age" (Mulder, 1998, p. 105).

This large reliance on plastic products is due to the many benefits plastics have as a material. Apart from the wide-ranging applicability, plastics are resistant and long-living (Geyer et al., 2017). However, the immense use of plastics makes it even more important to look at their downsides, namely: plastics pollution. High amounts of plastics polluting (marine) environments can lead to, among others, increased release of chemicals to these environments, changes in the carbon cycle and changes in marine wildlife (MacLeod et al., 2021). Physical effects include animals dying from eating plastic parts, entanglement and consequently drowning or strangulation (Nkwachukwu et al., 2013).

Those negative effects plastics can have, such as pollution or entanglement, show that while it is a highly useful material, the way plastics are used needs to change. A first step to take is a general reduction of the current consumption levels (Andrady et al., 2015). However, as for all types of waste, reduction might not always be feasible or desirable. In these cases, other steps need to be taken to reduce the environmental impacts of the remaining plastic products (European Commission, n.d.). There are different ways to approach the question of how to make plastics more sustainable, be it the inclusion of circular business models (Dijkstra et al., 2020), increased recycling and recyclability (Shamsuyeva & Endres, 2021), the use of bioplastics (Bhagwat et al., 2020), dematerialisation (Ellen McArthur Foundation, 2016) or changing consumer behaviour (Rubik et al., 2007) to just name a few.

With the growing importance of sustainability challenges also on industry levels, various certifications came up that aim to label plastics as sustainable. Just as there are different approaches to making plastics more sustainable as outlined above, these certifications use different definitions and approaches too. For example, the Blue Angel certifies products that are made from recycled plastics (Blue Angel, 2019). The Nordic Swan ecolabel defines criteria for different product categories rather than materials, and the requirements for plastics range from recycled plastics over plastics from renewable materials to recyclability of plastic products (Nordic Swan Ecolabel, n.d.–a, n.d.–b, n.d.–c). The certification by the International Sustainability & Carbon Certification (ISCC) relevant for plastics, the ISCC Plus, is applicable not only to plastics, but also to all kinds of raw materials, renewable materials as well as recycled materials, and evaluates a product's sustainability based on different factors such as traceability, waste treatments, circularity and others (ISCC, 2021). As the last example, EuCertPlast does not certify end-products, but plastics recycling facilities (EuCertPlast, n.d.).

Given those outlined differences between different certifications that basically all concern aspects of the sustainability of plastics in some form, the question arises on how well suited those different certifications are to mark a plastic product as sustainable. This becomes even more important given the fact that while certifications have shown to be useful instruments to ensure and enhance certain (environmental) standards (Golden et al., 2010), it is also known that certifications can be used for so-called greenwashing (Martín-de Castro et al., 2017). Greenwashing in this context refers to certifications mainly being used to make the product seem sustainable with little to no actual implications (Martín-de Castro et al., 2017).

But even when the quality of the certifications is assessed profoundly, greenwashing is ruled out and conclusions can be drawn on which certifications might be more suitable than others, the problem is not solved yet. No matter what certification, it can only be as good as the practical implication it has on producers and consumers. To achieve said practical implication, various aspects important for the successful implementation in practice can be identified. One aspect can be observed in the following situation: A plastics producer makes sustainable plastic products and gets those efforts certified, proving their product can actually be called sustainable. This leads to the question of how to communicate the importance and soundness of this certification to the producer's buyers while considering the product's end-users and how to stimulate those buyers to regard the certification as an important aspect of their buying decision, even in cases where this might not lead to choosing the product with the lowest price.

1.1. Problem statement and relevance

The case of the Dutch plastics producer Berdal Rubber & Plastics BV (hereafter: Berdal) shows that the sustainability of plastic products is a highly relevant issue not only from a socio-environmental but also from an industrial viewpoint. Berdal, a family company founded in 1972, mainly produces buckets and tubs made from low-density polyethylene (LDPE), high-density polyethylene (HDPE) and polypropylene (PP) for the construction as well as the do-it-yourself (DIY) sector. While this research focusses on said buckets and tubs, Berdal produces not only those but also knee protectors, technical films for roofs and facades, as well as packaging and rubber products (Berdal, 2022a). At present, Berdal is the market leader for plastic products in the building and DIY industries in Europe. Overall, Berdal has 75 employees, 50 in the Netherlands and another 25 in Poland, where the second production site is located.

Already since the 1980s, Berdal products are made (partly) from recycled materials. In the last years, sustainability has been growing in importance. Today, the buckets and tubs are produced only from recycled plastics from household waste and are certified by the Blue Angel certification since 2014. In 2020, Berdal's roof coverings, waterproofing strips and waterproof ethylene propylene diene monomer (EPDM) films became cradle-to-cradle (C2C) certified, while the C2C certification for the buckets and tubs is currently underway (Berdal, 2022b).

However, as outlined above, several possible certifications could be applicable to Berdal's products. While there have been reasons for Berdal to choose the Blue Angel and C2C, sustainability performance is, as Apostol et al. (2021, p. 860) put it, "a relative and fluid notion" that might change depending on time, context and systemic circumstances. As such, it is important – for Berdal, but also in more general terms – to have a tool at hand to check former choices made and to evaluate the certifications at use.

A connected challenge that Berdal is facing is how to show their stakeholders, and amongst those mainly their buyers, the importance of the outlined sustainability efforts the company has taken, specifically their certifications. Berdal is a business-to-business (B2B) company. As such, they sell their products to stores selling to professionals, which, in the Netherlands, are known as ironware and material stores, as well as to DIY stores. In DIY stores, the products are either sold to private users or the professional market as well. Either way, those end users, be they professional or private, that buy Berdal's buckets and tubs from the intermediate sellers, need to be considered in the present research as well.

While communication on sustainability is growing in importance (Hoejmose et al., 2012), in the case of Berdal, the company started communicating about sustainability as a company value both internally and externally five years ago, but it remains unclear how the importance of certifications can be incorporated in this communication.

The outlined problem, against the background that finding solutions for more sustainable plastics is becoming more and more important, is also relevant for the field of Industrial Ecology (IE), in which the present research is located. In its first mention, IE was defined as a shift of systems, from traditional processes where manufacturing uses raw materials and produces products, towards processes that optimise energy and material use and reduce waste, in other words, an industrial ecosystem (Frosch & Gallopoulos, 1989). To do so, concepts of ecosystems, such as the natural cycle of resources and materials, are applied to industrial systems (Graedel, 1996). IE is characterized by a high degree of interdisciplinarity (Li, 2018). Arguably, however, the focus of IE is currently still on the technical aspects, while social science-related insights are still coming relatively short (Boons, 2009). Following that, this research aims at taking such a solution-oriented approach in the technical field of plastics in the building and DIY industries, by taking a more social scientific perspective to facilitate change in a field that benefits from an interdisciplinary point of view.

1.2. Research goal and questions

Consequently, this research aims at providing scientifically based solutions for a problem that is evident both on the theoretical and the practical level. As the research is conducted in cooperation with Berdal, their specific situation serves as an exemplary situation. The results of the research should both be specific enough to be applicable to Berdal directly, and broad enough to be of scientific relevance and generalisable to other similar situations.

To achieve this aim, the scope of the research needs to be narrowed down further. First, certifications can differ for different types of plastic products. This research focusses on the certification of plastic products in the building and DIY industry, such as buckets and tubs, the main production area of Berdal. Secondly, the communication strategy focusses on the Netherlands and Germany, as interviewees come from those countries, but is broad enough to be applicable to Berdal's main areas of business.

Building on the general aim and scope, different objectives of this research can be pointed out. First, this research aims at providing a framework for analysis of certifications for sustainable plastics in the building and DIY industry according to their scientific soundness. For said framework, it is necessary to include different aspects that can determine the quality of the certification, which will be identified and explained in more detail in chapter 3.2. Additionally, this research has the objective to analyse the communication of the importance of such certifications. It assesses how successful communication strategies towards buyers of plastic products can look like to show them the benefits of products that are labelled with a reliable sustainable plastics certification. Resulting from those objectives, the following main research question can be formulated:

> **How can the scientific soundness of sustainable plastics certifications in the European building and DIY industry be assessed and how can the importance of using such certifications be successfully communicated to the buyers and end users of plastic products?**

Following this, four sub-research questions are developed:

1) What are relevant criteria that are to be included in a framework to analyse the soundness of certifications for sustainable plastics?
2) How can these criteria be used to analyse an existing certification?
3) What are the barriers and opportunities for sustainable plastics certifications?
4) Which communication strategies can be successful for approaching barriers and opportunities for sustainable plastics certifications?

1.3. Research approach

The research as described in the previous chapters is approached in four overall phases. These should be seen as conceptual rather than time phases. The first overall phase of this research is about data collection, followed by a theory-building phase. Phase three is the analysis phase, whereas phase four deals with the results and conclusions. Each phase contains one or more steps, which correspond to and help answer one or two of the sub-research questions. More details can be seen below in Figure 1.

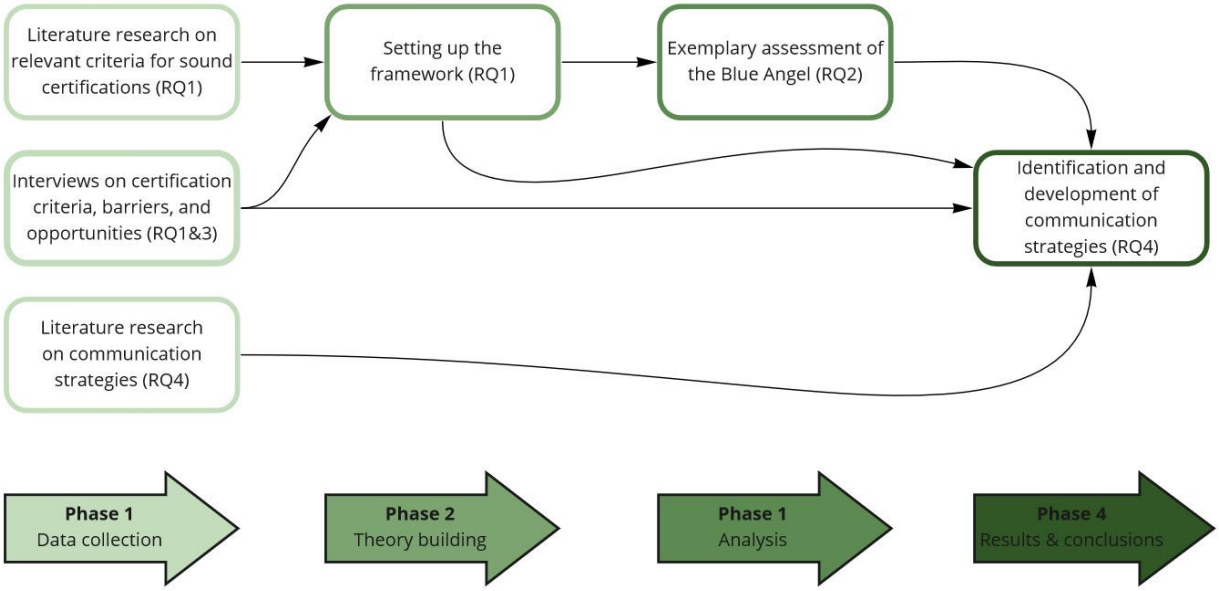

Figure 1: Research flow diagram (own illustration)

At the end of phase four, two main outcomes are produced as the final deliverables of this research. First, a framework to be used as an analysis tool for the scientific soundness of certifications of sustainable plastics in the building and DIY industry. This framework consists of a set of criteria that can be applied to different certifications in a relatively easy manner so that it can be used by a wide range of prospects. In the main body of this report, the development of the different criteria is described, and the analysis tool itself is delivered in form of a table, as well as a figure. Secondly, a communication strategy built on combining theoretical with insights drawn from primary data collection. Patterns that can be identified in the interviews throughout one or several stakeholder groups that can be connected to a specific theory or theoretical strategy from literature allow recommendations for communication for Berdal, but also in a more generalised way.

1.4. Report outline

In order to approach the above-explained problem and to answer the sub- as well as the main research question, the report is structured as follows.

First, an overview of the methods used is given. Then chapter 2.1. explains why Berdal is the case study for this research, and what this entails. Afterwards, the use of secondary as well as primary data for the research is outlined, with the focus on primary data. Chapter 2.3. and its subchapters give detailed information on the data collection and analysis process.

Following that, chapter 3 revolves around the analysis framework for sustainable plastics certifications. First, a literature base needs to be created. This is done in chapter 3.1. and its subchapters on the definition of certifications (3.1.1.), possible criteria for good certifications and how they have been identified (3.1.2.) and a definition of sustainable plastics, tailored for the present research (3.1.3.). Following that, chapter 3.2. presents the relevant criteria for the analysis framework, based on both the literature review and primary data. To make the analysis framework more approachable, it is applied to one exemplary certification, namely the Blue Angel, in chapter 3.3. Finally, chapter 3.4. discusses the findings of the chapter.

Chapter 4 concerns the communication strategy. Again, building a theoretical base is the first step of the chapter. The theoretical considerations of chapter 4.1. first deal with sustainability communication in general, before turning to the meaning of consumer attitudes and behaviour in chapter 4.1.2., which form a justification for the following explanation of more concrete communication strategies. Then, chapter 4.2. presents the barriers and opportunities for successful communication about certifications extracted from primary data. Those insights combined with the theoretical background allow for the development of possible communication approaches and strategies including the analysis framework first in a general manner and then tailored for the case study. Lastly, the findings are being discussed.

In the end, chapter 5 points out the limitations this research has. Then, it draws conclusions from the research and gives recommendations for its use as well as for further investigations.

Chapter 2: Methods

Before diving into the content of the present research, it is important to outline how the research is conducted methodically. For the different sections and corresponding sub-questions of this research, different methods are applied for data collection. Additionally, different types of data are needed. This chapter outlines these methods and data types in detail for each section. However, first, a general overview of the research methodology and approach is given.

For this mainly social scientific research, a mixed-method methodological approach is chosen. A mixed-methods approach refers to research in which both quantitative and qualitative methods can be used (Leedy & Ormrod, 2015). Qualitative research aims at understanding people's attitudes and behaviours, it can provide detailed and flexible but subjective data, which is well-suited for building new theories and concepts (Mohajan, 2018). Quantitative research, on the other hand, focusses on generalizable predictions and explanations. Mostly, theories are tested through the identification of relations of predefined variables (Leedy & Ormrod, 2015). This mixed-methods approach is chosen as the present research includes different objectives that require different modes of analysis. Neither a purely quantitative nor a qualitative methodology alone would be able to provide the necessary range of methods and data needed to answer the questions asked.

Furthermore, the nature of the research aim indicates that inductive research needs to be conducted. This implies that rather than testing existing theories, this research builds new theories and concepts based on the collected data (Bhattacherjee, 2012). This is relevant for building the analysis framework for the existing sustainable plastics certifications. There is not one theory claiming clear criteria to evaluate the soundness of the certifications. Rather, based on own (desk) research, those criteria are built during the research. A similar approach is needed for the communication strategy, as there is no pre-defined strategy that shall be tested. Instead, the goal is to develop such a strategy based on information from relevant stakeholders, combined with theoretical insights.

After establishing the general approach and nature of the present research, the next step, before explaining the use of primary and secondary data, is to introduce the case study method to point out why Berdal is the case study for this research.

2.1. The case study

In order to be clear on why Berdal is the case study for the research, it should be outlined what a case study is, where its benefits and limitations lie, and, subsequently, why it has been chosen as a relevant method for the current research.

According to Baškarada (2014), the case study method is the most commonly used research method for qualitative research. In a single case study, one specific event, organisation or person is being studied over a specific time (Leedy & Ormrod, 2015). Ellram (1996, p. 94) defines "case studies as a research methodology [that] explain, explore, or describe a phenomenon of interest". To be of interest for a case study, said phenomenon needs to have a specific relation to its context and cannot be seen separately from that context (Rashid et al., 2019; Yin, 2003). Furthermore, case studies mostly follow a predominantly inductive approach (Perry, 1998) and as such can be used to build and expand theories (Vissak, 2014).

The main point of criticism towards case studies, especially single case studies, is its unknown or even limited generalisability that occurs from the fact that only one specific example is studied (Leedy & Ormrod, 2015; Vissak, 2014). While Yin (2018) agrees that improperly generalising research findings from case studies is one of the main pitfalls for researchers, he also points out the difference between statistical and analytical generalisation. While a single case is indeed not suitable to generate statistically relevant generalisations, generalisation can be successful when using existing theory as a base to combine with the case studies findings in order to come to an analytic generalisation. This form of generalisation can occur through either advancing theoretical concepts used as a base for the case study, or through building new concepts based on the study's insights (Yin, 2018). The relevant point to be reached is a conclusion that can be drawn from the case study that is placed on a higher conceptual level than the specific case itself (Yin, 2018).

There are several attributes of case studies that make the method suitable for this research, despite the challenges arising from difficulties with generalisation. Case studies can be seen as appropriate to study complex issues in depth (Vissak, 2014; Zainal, 2017). They are useful for looking at causal relations, understanding backgrounds and forming deep understandings of specific phenomena (Vissak, 2014). Thus, case studies are suitable to explore relatively new topics, also because they are a method that is flexible when it comes to the timing of theory and literature research, empirical research and the (re-)formulating of questions (Vissak, 2014). As such, they can form a useful connection between academia and industries (Vissak, 2014) and have been identified to be especially suitable for B2B research (Järvensivu & Törnroos, 2010).

This chapter points out what a case study is, and why it has been chosen for this research. However, this does not yet explain what kind of data is required for it, and where it comes from. This is the topic of the next chapters, first, looking at the meaning and relevance of secondary data, before turning to primary data.

2.2. Secondary data collection

Secondary data is data that has been collected by other research and is now available for reuse (Hox & Boeije, 2005). For the present research, it is needed for both building the framework and formulating the communication strategy.

In the case of the framework, preliminary criteria were developed based on secondary data. Data sources were existing papers that evaluate certifications, define important criteria, or identify shortcomings of current certifications. Furthermore, criteria for certifying sustainable plastics are defined on the basis of literature. Chapter 3.1 describes in detail how this literature has been chosen and what it entails.

Similarly, for the communication strategy, secondary data serves as the theoretical base. Therefore, chapter 4.1. entails a literature review on sustainability communication, consumer attitudes and behaviour, communication strategies and general aspects of importance for all those strategies, with a focus on a B2B context. A detailed description of the process follows in said chapter. The literature review serves as a theoretical base for the development of a communication strategy. Barriers and opportunities identified in primary data are linked to strategies identified in the literature, and these are, in turn, applied to the specific context found in primary data. Thus, the following subchapter outlines how said primary data has been collected.

2.3. Primary data collection – Qualitative interviews

Primary data is data which is collected for a conducted research specifically (Hox & Boeije, 2005). For the present research, primary data is needed, again, for both building the framework and the communication strategy. The framework criteria initially developed based on secondary data, are then refined and expanded based on insights from primary data. In the case of the communication strategy, primary data is needed to identify problems and barriers to successful implementation and communication of the certifications. Combining those insights with the theoretical background retrieved from secondary data collection allows the development of a communication strategy.

There are several ways in which one can collect primary data. For this research, qualitative, semi-structured interviews have been chosen. Each type of interview involves communication between an interviewer and one (or more) interviewees and can take place in person or through other means of communication (Singh, 2007). The main advantage of interviews for data collection is that they allow the collection of in-depth data (Ryan et al., 2009). They are aiming to explore experiences, perceptions as well as (subjective) information from the interviewee.

The three main types of interviews are structured, unstructured, and semi-structured interviews. In semi-structured interviews, the general topics and an interview guide with corresponding questions are set beforehand, but there is room for unexpected topics that might arise, so

interviewees may point out topics of importance not covered by the guide (Ryan et al., 2009). The semi-structured interview allows the researcher to modify questions and their order to a certain extent to ensure the best response possible. Interviewees, in turn, have the possibility to respond on their own terms (Qu & Dumay, 2011). Thus, the semi-structured interview gives room for freely flowing discussion, while at the same time the guide allows to re-direct the interview to the relevant topics (Singh, 2007). As Qu and Dumay (2011, p. 246) put it: "The semi-structured interview enjoys its popularity because it is flexible, accessible and intelligible and, more important, capable of disclosing important and often hidden facets of human and organizational behavior".

Interviewing involves several different steps. First, the interview needs to be prepared. This includes decisions on who to interview, the contacting of potential interviewees and the design of the interview guides. When conducting the interview, certain standards need to be followed and after, the interview has to be transcribed. This serves as the base for the actual analysis of the interviews through their coding. The following chapters give a more detailed outline of the interviewing process.

2.3.1. Preparation

Before being able to start with the interviews and thus, the data collection, several preparatory steps are required. First of all, possible relevant interview partners need to be identified. To do so, this research uses the method of stakeholder mapping. Then, the interview partners need to be recruited and, simultaneously, the interview guide needs to be set up.

2.3.1.1. Stakeholder mapping

The first step before the start of the actual interview process is to identify relevant participants so that the interview questions can be set up fittingly. To do so, a stakeholder map has been used. Stakeholder mapping is a tool with the objective of developing a useful stakeholder list (Bourne & Weaver, 2010). To do so, the relevant stakeholders need to be identified first. After that, a power interest grid is used to identify and display their role and characteristics in order to assign priorities (Bourne & Weaver, 2010).

Following the described approach, Figure 2 first gives an overview of the most relevant identified stakeholders that are connected to certifications for sustainable plastics. Here, each stakeholder group with its subgroups is represented in the same colour palette. It can already be seen that the network clubs are in a special position between the producers and buyers, which will be explained in more detail below the Figure.

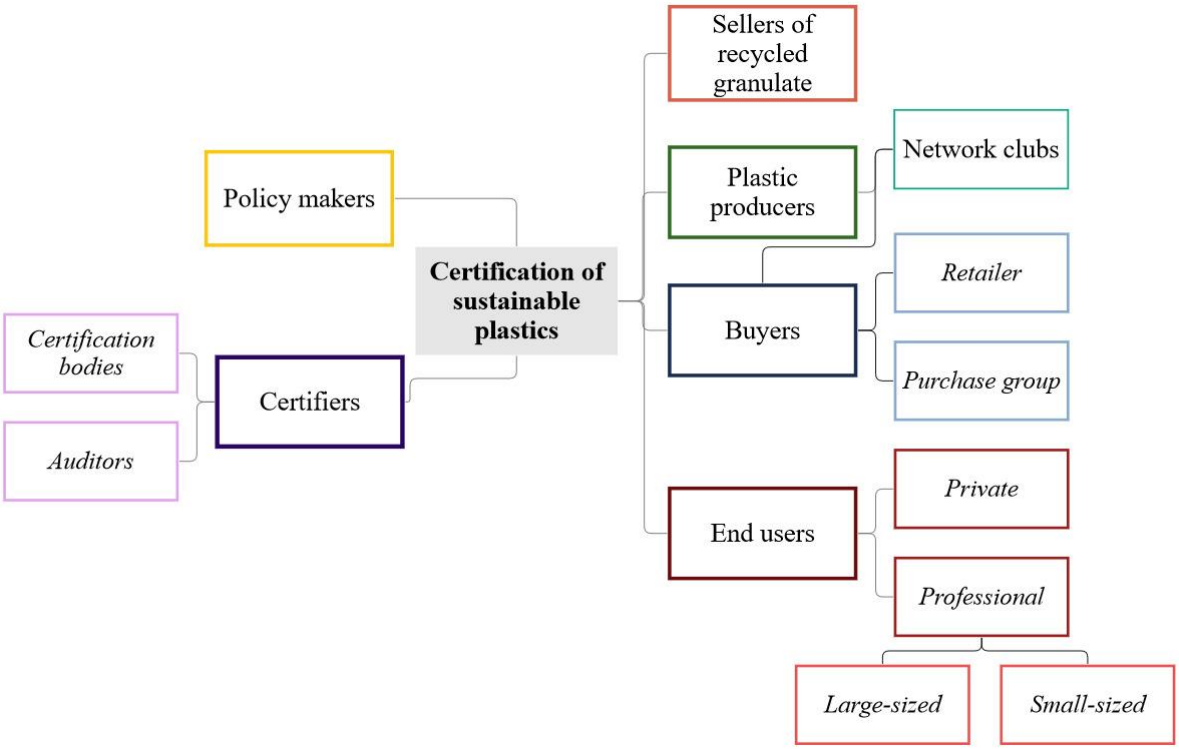

Figure 2: Overview of relevant stakeholders. Source: Own depiction

In the process of certifications for sustainable plastics in the building and DIY industry, one relevant stakeholder to consider is the group of **producers of plastic products** for said industries. As producers, they can choose how sustainably they produce their products, and whether they want their products to be certified.

As will be established in chapter 3.1.3., one way of producing plastic products more sustainably is to use recycled plastics. Thus, companies that produce and **sell recycled granulate**, for example to producers of plastic products in the building and DIY industries, are of relevance for the process as well.

On the other end of the plastic producers are the **buyers of plastic products**. In the building and DIY industries, it is common practice that those buyers are retailers, such as DIY shops, that then offer the bought products in their stores to both private and professional clients. Another kind of buyer present in the relevant industries is so-called purchase groups. These are groups representing several retailers, who create purchasing conditions and contracts for their members.

Stakeholders closely affiliated with the buyers are the so-called **network clubs**. While their main purpose is to provide a network of members and suppliers, in this case, producers of plastic products and no direct contracts are built, affiliated suppliers get prime access to the network club members, thus, having some indirect influence on sales.

Then, the **end users of plastic products** need to be considered as well. They are buying products from the retailers and then use them for their projects. The end users can either be

private or more often, professional clients. Professional clients can then be further divided depending on their size, ranging from small companies to internationally operating construction firms.

Furthermore, some stakeholders are of relevance for the certification of sustainable plastics without being directly involved in the production and selling process. **Policy makers** can be identified as one of those stakeholders. Their role is to develop legislation to steer the industry in certain directions, for example by fostering sustainability or restricting the use of plastic products.

Another such stakeholder are the **certifiers**. These can be either bodies that develop and issue certifications or auditors that award or review the certifications at company or product level. The certification bodies are the ones to set up the certifications, their criteria and guidelines, whereas the auditors work directly with the companies and check whether the setup criteria are adhered to, and following that, decide whether or not to grant the certification.

All those stakeholders have been then placed on a power interest grid (Figure 3).

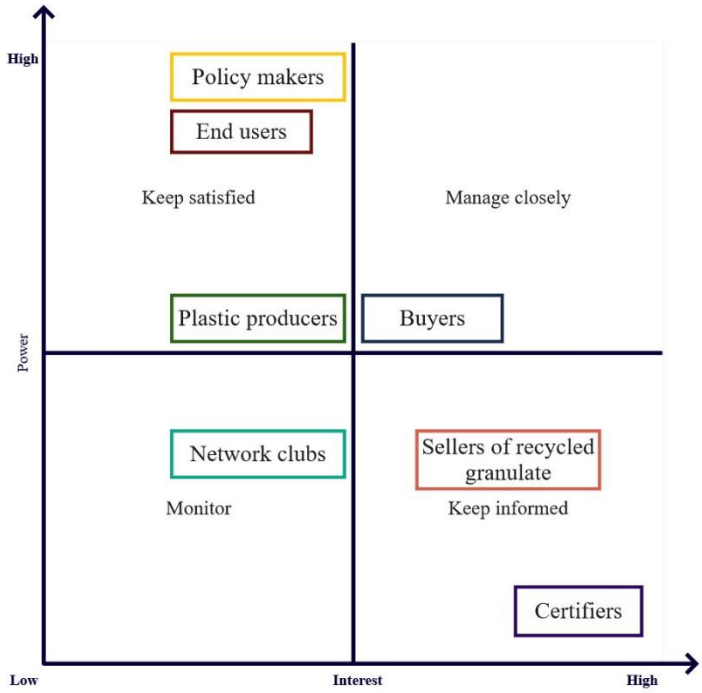

Figure 3: Power interest grid, source: own depiction

A relevant factor that classifies the power of the presented stakeholders is their influence on the demand for certified plastic products. This demand is primarily determined by the end users, giving them relatively high power, which might be lowered due to the fact that the end users are not centrally represented, but build a scattered picture of many single end users. The buyers, however, are usually bigger players, but due to their intermediary role and their dependence on the end users, their power can be classified as intermediate. At the end of the chain are both plastic producers and sellers of recycled granulate. The plastic producers still have a higher

influence, as they do have the opportunity to opt for certifications, regardless of the demand. As for the network clubs, these can be identified as stakeholders with relatively low power, as they can only exert indirect influence.

For each stakeholder group in the plastics chain, there are single players that have a high interest in sustainability and certifications, some have medium interest, and others low. Thus, a general medium (to low) interest should be assumed. This only differs for the sellers of recycled granulate, as their whole business model relies on more sustainable and certified plastics, leaving them with high interest.

Next to that, the stakeholders outside the main chain need to be classified as well. First, these are the policy makers. They have high power, as they can change legislation regarding sustainability and certifications, but currently, their interest should be classified as medium. This medium interest of policy makers is due to the fact that while plastic is becoming a key factor in sustainability legislation, the focus is currently more on single-use plastics (European Commission, 2022b). Second, the certifiers only have low power, as they are service providers and rely on demand, but they have a high interest to increase said demand for their services.

The main takeaway from the stakeholder mapping procedure was to, first of all, become aware of the existent stakeholder groups that could be of interest when conducting the interviews. Furthermore, the classification regarding power and interest gives an indication of those stakeholder groups that could provide the most insights and should thus be focussed on, which, consequently, have been the focus of recruiting.

2.3.1.2. Recruiting

At the beginning of the recruiting process, the desired range of interviews has been set at ten to 15. The main stakeholders of relevance have been identified to be the plastic producers, buyers, and end users, as well as the certifiers, as those are the stakeholders most directly involved in the process of certifications of sustainable plastics. The research does not consider the sellers of recycled granulate as interview partners, as they are relatively independent of the industries considered in this research. Possible participants to be contacted have been sourced from existing contacts from the case study partner, Berdal, as well as through own research regarding companies and people fitting into the stakeholder groups identified. The recruiting process for companies targeted possible participants from differently sized companies in order to get a more diverse answer range, but due to low response rates, the focus had to shift to finding participants from companies regardless of their size. During the recruiting process, the first email to possible participants already disclosed the fact that the research is conducted as a case study. After agreeing to participate, each interview partner signed an informed consent form, also entailing all relevant data protection measures. At the same time, to move from recruiting to interviewing, a semi-structured interview guide had to be developed. The following chapter describes said development process.

2.3.1.3. Developing the interview guide

Such as recruiting, the development of the interview guide can also begin as soon as the desired interview partners have been identified. An interview guide can have different degrees of scriptedness. What is important is that the guide's main purpose, to make sure certain topics will be covered in all interviews, is served (Qu & Dumay, 2011). Therefore, one should first be clear on which topics need to be covered and how they will help to answer the research questions (Magnusson & Marecek, 2015). Thus, it is important to first develop relevant categories, and then questions based on those categories (Ryan et al., 2009). When developing the questions, another aspect to keep in mind is appropriate sequencing. An interview should start with context-setting questions (DeJonckheere & Vaughn, 2019) and easier, less cognitively demanding topics that do not touch upon sensitive matters (Magnusson & Marecek, 2015). Following that, the essential questions can be asked (Ryan et al., 2009), whereas the interview should end in a way that allows the interviewee to reflect (Magnusson & Marecek, 2015). Furthermore, especially when asking the core questions, it needs to be ensured that there is a flow from one topic to another (Magnusson & Marecek, 2015) and that it is always clear for the interviewee which specific area they are asked about (Ryan et al., 2009).

The interview questions themselves should be particular and motivate the interviewees to tell about their experiences and their personal reflections on the relevant topics (Magnusson & Marecek, 2015). As such, the items need to be easily understandable, short and unambiguous (Magnusson & Marecek, 2015; Qu & Dumay, 2011; Ryan et al., 2009), while at the same time not being closed-ended or too general (Qu & Dumay, 2011; Ryan et al., 2009).

Based on these propositions for a suitable guide, two interview guides have been developed. While a similar range of topics is covered by both guides, one has been made specifically for interviews with companies along the supply chain of a plastic bucket or tub, whereas the other one entails questions for certifiers and their experience with certifying plastic products. Before applying the guides in the actual interviews, both have been pretested and adjusted according to the feedback and the experience made. Furthermore, the process of conducting the interviews allowed to identify further improvements that were implemented accordingly. As both guides have been used in English and German, Appendix I entails a total of four interview guides. Based on those interview guides, the semi-structured interviews have been conducted. The following chapter, therefore, describes the collection phase in detail.

2.3.2. Conduction

At the end of the data collection phase, a total of eleven interviews, with an average duration of the content-related parts of 39 minutes and 49 seconds, have been conducted. Table 1 presents an overview of the different interviews, the role of the interview partners, the duration as well as the mode of conduction. Despite high efforts to win sufficient interview partners for all the relevant stakeholder groups identified through stakeholder mapping, it has not been possible to conduct interviews with policy makers. However, one further interview has been conducted with a marketing company. Even though the stakeholder mapping did not identify marketing companies as stakeholders in the process, they have found to be valuable interview partners due to this research's relation to communication.

Table 1: Overview of conducted interviews

Interview identification	Role of participant	Way of conduction	Duration
Network 1	Network club	Video call	38:39
Buyer 1	DIY market	Video call	36:58
Buyer 2	Building materials trading company	Video call	45:24
Buyer 3	Building materials retailer	Video call	36:24
Certifier 1	Certification assessor	Video call	47:00
Certifier 2	Certification assessor	Phone call	01:01:51
Marketing 1	Marketing Company	Video call	32:48
Producer 1	Plastic producer	In person	45:18
Producer 2	Plastic producer	Video call	31:18
User 1	Construction company	Video call	39:07
User 2	Construction company	Video call	23:10

Due to the improved COVID-19 situation and the relaxation of hygienic measures during the interviewing phase in Spring 2022, participants in the Netherlands could participate in the interview either in person or through (video) call. For international participants, (video) calls were possible means of interview conduction. For interviews that were conducted through video calls, the software of Microsoft Teams has been used. In each case, the interviews have been audio recorded. While face-to-face interviewing has the advantage that mutual understanding might be higher due to nonverbal cues, phone and written interviews can be seen as less intrusive, possibly leading to less restriction and socially wanted responses (Ryan et al., 2009), while interviews via video call can be seen as intermediate between those. However, due to the still ongoing COVID-19 pandemic, the most relevant factor for choosing the interview mode was the participant's preference, next to feasibility in terms of location. It can be concluded that technology-reliant interviews only experienced minor disruptions, and all interviews were held in a good atmosphere.

The careful preparation and conduction of the interviews helped reach a sufficient quality in all the interviews so that all eleven interviews have been used in the data analysis process.

2.3.3. Analysis

Before being able to analyse the collected data, it had to be converted into a more easily analysable form. Therefore, after the conduction of the interviews, a voice-to-text converting software preliminarily transcribed the audio recordings. Afterwards, each transcript has been checked and corrected manually. The transcription was done verbatim, thus, the transcription represents exactly what has been spoken without any form of summarization (Dresing & Pehl, 2018). Furthermore, all parts that would allow an indication of the identity of the participant have been anonymized. Then, the data analysis process started based on those transcripts.

Data analysis followed the principles of Grounded Theory, a method to analyse qualitative research data. Here, data is collected and analysed inductively, and hypotheses and theory are built based on that process (Charmaz, 2006). Most importantly, data collection, analysis and evaluation happen interchangeably and simultaneously when following Grounded Theory (Charmaz, 2006). Thus, the research remains open to new insights and solutions. Central aspects of Grounded Theory are furthermore the use of memos to track the coding process and related thoughts (Rädiker & Kuchartz, 2019) as well as starting data analysis through open coding (Birks & Mills, 2015). The final results, hypotheses or theory are developed through coding and therefore in the course of the research (Strübing, 2011).

Following the principles of Grounded Theory, the first five interviews were coded openly, making use of the auxiliary software atlas.ti to keep track of the used codes while keeping additional thoughts and ideas in the form of memos. When coding openly, the focus was on looking at the most relevant aspects of the interviews, such as aspects that have been mentioned repeatedly, that are connected to theory or that have been emphasised as important by the interview partner. After that, the generated codes were reviewed again, and code groups were created. The coding process of the following interviews used the already created code groups while staying open-minded towards new insights that did not seem to fit into existing codes. Then, new codes and code groups were created accordingly, and code groups that turned out to be too broad were split up. The interchangeability of the different research steps has been guaranteed by starting the coding while the data collection was still active (Saldaña, 2021). At the end of the coding process, a total of 34 code groups remained. By analysing the relations between those code groups, eight categories have been defined, which, in turn, have been linked to create four core categories. Appendix II presents the full list of codes. Chapters 4.2. and 4.3. entail the created core categories, which are the foundation for the data presentation and analysis.

Having explained in detail which data will be used and why, as well as how it will be collected, analysed and connected, allows actually doing so. Thus, the next chapter starts by introducing the analysis framework based on the methodological base described in the last pages.

Chapter 3: A framework to analyse certifications for sustainable plastics

Before introducing the framework to evaluate sustainable plastics certifications, several aspects need clarification. First, it needs to be clarified what exactly a certification is. It should also be outlined how an evaluation framework can be built, what the framework building process looks like and which assumptions are taken. Lastly, an outline is needed on how sustainable plastics are defined in the context of certifications in the building and DIY industry. Based on these prerequisites, the literature that will be introduced, as well as on practice-related insights retrieved through interviews, this research built a framework consisting of 14 criteria.

3.1. Prerequisites

3.1.1. What are certifications

Generally speaking, certifications for sustainable products or processes, also referred to as eco-labels, provide information about the environmental impact of a product or process in order to inform customers and enable them to base their decisions on such environment-related information (S. Basu & Bidanda, 2014). When a company claims that its product is sustainable, it is difficult for customers to verify this claim, leading to an information gap (van Amstel et al., 2008). Certifications help to close this gap by "helping consumers to identify those products and services with a better environmental performance in comparison with other functionally equivalent products or services." (Gazulla Santos, 2014, pp. 84–85). The International Organization for Standardization (ISO) differentiates between three different types of environmental labels and declarations. For this research, only type I and type I-like labels are considered. Type I labels are third-party certifications, which rate the environmental attributes of a product over its life cycle, awarding those products that are more environmentally friendly (Gazulla Santos, 2014). Type I-like labels refer to third-party certifications awarding more environmentally friendly products that are considering one environmental attribute instead of the whole life cycle (Minkov et al., 2020).

3.1.2. How to build a framework for certifications

As indicated above, both literature and insights from interviews form the base for the analysis framework presented in this research. The first step of developing the framework is dedicated to the literature. Extensive research has been conducted to identify already existent similar approaches. A paper by Minkov et al. (2020) entails the most detailed framework, which classifies certifications of forest and paper products in a way that helps characterize and group different kinds of certifications, building on and moving beyond the classification undertaken by the ISO. The authors identify a total of 18 criteria, grouped in four categories (see Table 2).

Table 2: Certification analysis criteria, adapted from Minkov et al. (2020)

Categories	Characterisation attributes
Communication characteristics	ISO typology
	Awarding format
	Aspects diversity
	End-user focus
Life cycle characteristics	Life cycle perspective
	Multiplicity of covered aspects
	Operation scope
Standard characteristics	Sector scope
	Geographic scope
	Verification
	Compulsoriness
	Governance
	Financing
	Purpose
	Longevity
Conclusive characteristics	Transparency
	Comparability
	Environmental excellence

Most, but not all of Minkov et al.'s (2020) criteria are applicable to the framework of this research as well. The criteria that have not been considered are ISO typology, geographic scope, compulsoriness, comparability, and purpose. As this research only considers ISO type I and type I-like labels, the criteria on ISO typology and compulsoriness are not applicable. Similarly, the geographic scope is also already predefined for Berdal's business area. Comparability is, in general, an important aspect of a certification. However, this research considers a specific product category only, thus, comparability over different product categories is of less importance in this context. For the criterion purpose, Minkov et al. (2020) find that type I labels should be defined as ideals-centric, thus, a distinction to other purposes is not needed, as only type I labels are considered in this research. The remaining 13 criteria have been used for the framework proposed in this research. In some cases, they have been adjusted to the scope of the present research, and in many cases, they have been double-checked or extended through information from other sources and the criteria of governance and aspects diversity have been incorporated into new criteria, namely credibility and sustainability consideration.

Criteria for sound ecolabels coming from different perspectives are provided in several papers. Among those, Golden et al. (2010) have taken the broadest approach. One aspect of their study is to assess the certification through a survey asking about the structure and composition of the participating labels. Table 3 shows an overview of the topics covered by the survey that are related to structure and content, and thus the criteria considered important by the authors.

Table 3: Quality criteria for certifications, adapted from Golden et al. (2010)

Time to certification
Duration of certification
Impact measurement
Organisational structure
Transparency
Financing
Rigor

Golden et al.'s (2010) criteria overlap and add to several of the used criteria by Minkov et al. (2020). This is rather clear for the criteria transparency and financing, that are mentioned in both papers. Furthermore, Minkov's longevity can be supported by Golden's time to and duration of certification, some aspects of how Golden defines rigor add to the verification criteria by Minkov and there is an overlap between the definitions of governance (Minkov) and organisational structure (Golden).

Rubik et al. (2007), on the other hand, assess the effects that labels can have on consumers and based on that, identify criteria that can make labels more effective. Coming from this perspective, they claim that the success of an eco-label is determined by cost, fees, and verification as well as credibility, thus adding to the priorly defined categories of financing and credibility. Apart from costs, fees, verification and credibility as general success criteria, they identify a number of factors that are of importance for the success of eco-labels, but that differ for different product types. These include, for example, the determination of environmental impacts, consumer awareness, considered criteria or policy targets, which are connected to the criteria of end-user focus, environmental excellence and the life cycle perspective used by this research.

Basu and Bidanda (2014) focus more on the procedural levels than on the concrete product-level criteria. They identify four criteria as necessary requirements for good certifications. A certification's comprehensiveness, credibility, and customer focus link to this research's criteria of sustainability consideration, credibility, and end-user focus, respectively. The fourth criterion introduced by S. Basu and Bidanda (2014) is a label's clarity, which forms a new criterion of relevance for this research.

Bratt et al. (2011) assess the labelling organisation rather than specific labels for one product. They use the framework for strategic sustainable development to assess how criteria for eco-labels have been developed. By doing so, they identify gaps in current eco-labels that they consider as important aspects, such as missing regular reviews of the applied criteria, different life cycle stages not being taken into account or criteria not being published, which correspond with the previously defined criteria of credibility, transparency, longevity as well as a life cycle perspective.

An example of an analysis of the soundness of different certifications can be found in a paper by van Amstel et al. (2008), where they analyse and compare five different agrobiodiversity labels. Their main criteria of analysis are the trustworthiness and reliability of a label, the enforcement mechanisms for compliance as well as measurement and monitoring of the environmental impacts of a labelled product, mainly adding to the discussion about a label's clarity and verification.

Galarraga Gallastegui (2002) conducted a literature review on the demand, supply as well as market impact of ecolabels. By doing so, he identifies potential weaknesses of labels that should be addressed for the label to be reliable. These are a lack of objectivity in the awarding criteria, the environmental standard of the label, its financing as well as the period of validity, corresponding with the criteria of financing, longevity, and environmental excellence.

Bleda and Valente (2009) contribute to the discussion on different awarding formats of eco-labels. They argue in favour of rankings or graded labels over the more commonly used seals.

After combining the findings of the papers mentioned above to form preliminary criteria for an assessment framework, insights from the interviews further defined these criteria. The interview insights were used to support the criteria and add a more practice-related perspective to them. Chapter 3.2. shows an overview of this process.

To this point, the criteria developed are not yet specific to a plastic product but rather more general ones applicable to the scope of the existing research. Therefore, the following chapter outlines how the more content-related criteria have been developed.

3.1.3. Definition of sustainable plastics

In general terms, sustainable plastics can be understood as plastics that "provide societal benefits while enhancing human and environmental health and safety across the entire product life cycle." They are "managed within a sustainable materials management system to avoid the creation of waste, toxics and pollution." (Organisation for Economic Co-Operation and Development (OECD), 2018, p. 5). Figure 4, which shows seven steps that can determine the sustainability of a plastic product, illustrates this definition.

Figure 4: Framework on sustainable plastics (OECD, 2018)

For the present research, it is important to link this generic definition to the context of certifications to get to a more specific and applicable definition. Not every aspect might be equally important or equally well suited for certifying a plastic product as sustainable. Importantly, Rubik et al. (2007) point out that for a certification, the main environmental impacts of a product, and related to this the most relevant life cycle stages for the specific product, should be identified. To improve the certification's credibility, those most relevant life cycle stages of a product should be the focus of certifications for this product. Considering the classification provided by Rubik et al. (2007), plastic buckets and tubs can be categorised as energy-passive durable goods, similar to furniture or textiles. Following that, the main impacts occur during the production phase, the maintenance phase and at the end-of-life (EOL). Thus, the notion of sustainable plastics used in this research should focus on those three life cycle stages with the highest impacts.

Starting from this point, several papers and studies have been used to identify relevant aspects of sustainable plastics in those life cycle stages related to certifications and possible certification criteria, namely production, maintenance and EOL. The base for the definition process were papers that take a more general stance on developing and assessing a circular economy (CE), material efficiency, sustainable design or circular business models. Tecchio et al. (2017) propose a framework to increase material efficiency to enhance a CE from a life cycle perspective. They give an overview of measures to improve material efficiency in different life cycle stages, which, in part, can be transferred to the context of plastics due to the overlap of the main identified life cycle stages (Figure 5).

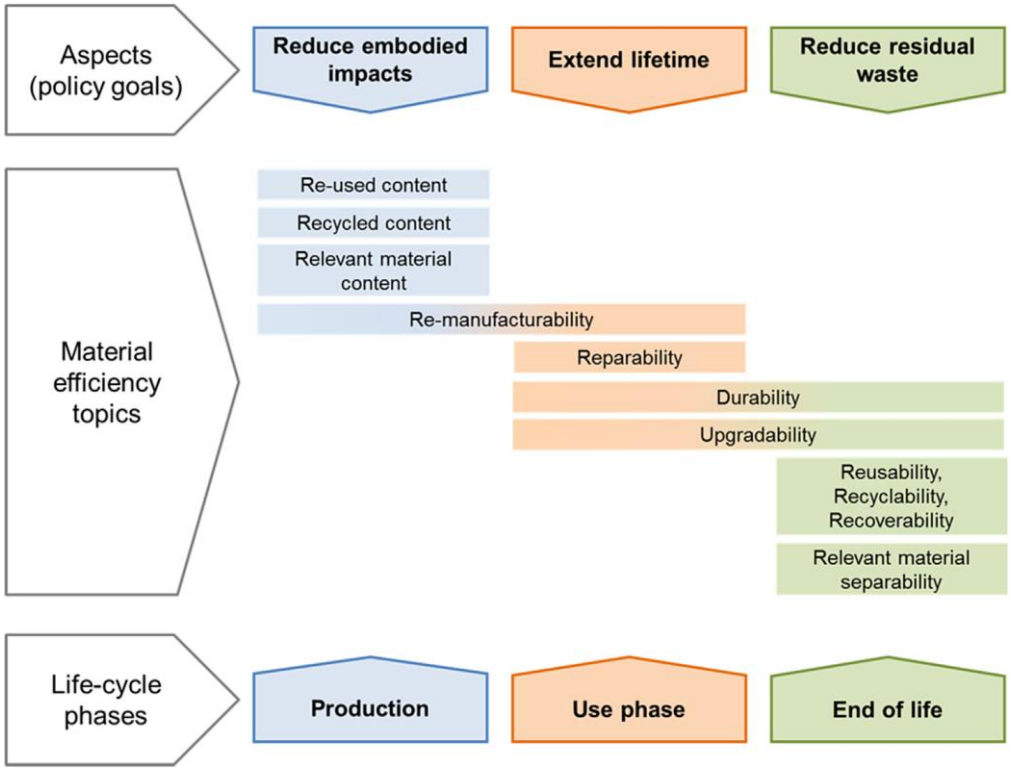

Figure 5: Connection of policy goals, life cycle phases, material efficiency topics (Tecchio et al., 2017)

Bocken et al. (2016) propose strategies for a circular product design and circular business models. Their distinction between closing, slowing, and narrowing resource loops resembles the three main life cycle stages relevant for plastics certifications. The paper by Rossi et al. (2020) provides a bridge between more general elaborations on CE as outlined above and plastics-specific aspects. They develop 18 circularity indicators by linking existing criteria for a CE, the three pillars of sustainability, namely environmental, economic, and social sustainability (Brundtland, 1987), and concepts of circular business models. One case study they use to validate and apply the developed criteria is the case of a Brazilian plastics recycler and producer, therefore showing the applicability of their criteria in the context of plastics. For the context of certifications, this research only considers the indicators by Rossi et al. (2020) that regard the material dimension (see Table 4).

.

Table 4: Circularity indicators, adapted from Rossi et al. (2020)

Dimension	Indicator	Sub indicator
Material	Reduction of raw materials	Manufacturing; Product
	Renewability	Renewable energy; Renewable raw materials
	Recyclability	Recycled materials; Recyclability potential
	Reduction of toxic substances	
	Reuse	Manufacturing process; Product
	Remanufacturing	
	Refurbishment	
	Product longevity	
	Stakeholder structure and diversity	Structure; Stakeholder
Economic	Financial results	Cost reduction; Revenue generation; Profitability
	Taxation or regulatory milestones	
	Circular investment	
Social	Job creation	
	Income generated by jobs	
	Employee participation in the circular model	
	Client mindset	Client; Value; Communication
	Involvement of stakeholders in decision-making processes	
	Mindset/ cultural change	

In 2016, the Ellen McArthur Foundation, a known actor in the field of promoting a CE, published a report titled "The new plastics economy. Rethinking the future of plastics" in which they identify several important aspects and possible solutions to reduce the environmental impact of plastics (Ellen McArthur Foundation, 2016). The three main areas they point out to be essential to change are the after-use phase, impacts caused by plastics leakage as well as the current connection between plastics and fossil feedstocks (see Figure 6). While the dependence on fossil feedstock is not the focus of this research, the other two aspects are highly relevant. According to the Ellen McArthur Foundation, the after-use phase is currently most important for improving the sustainability of plastics. Proposed changes for the after-use phase include improved collection, sorting, and recycling as well as increased reusability of plastic products (Ellen McArthur Foundation, 2016)

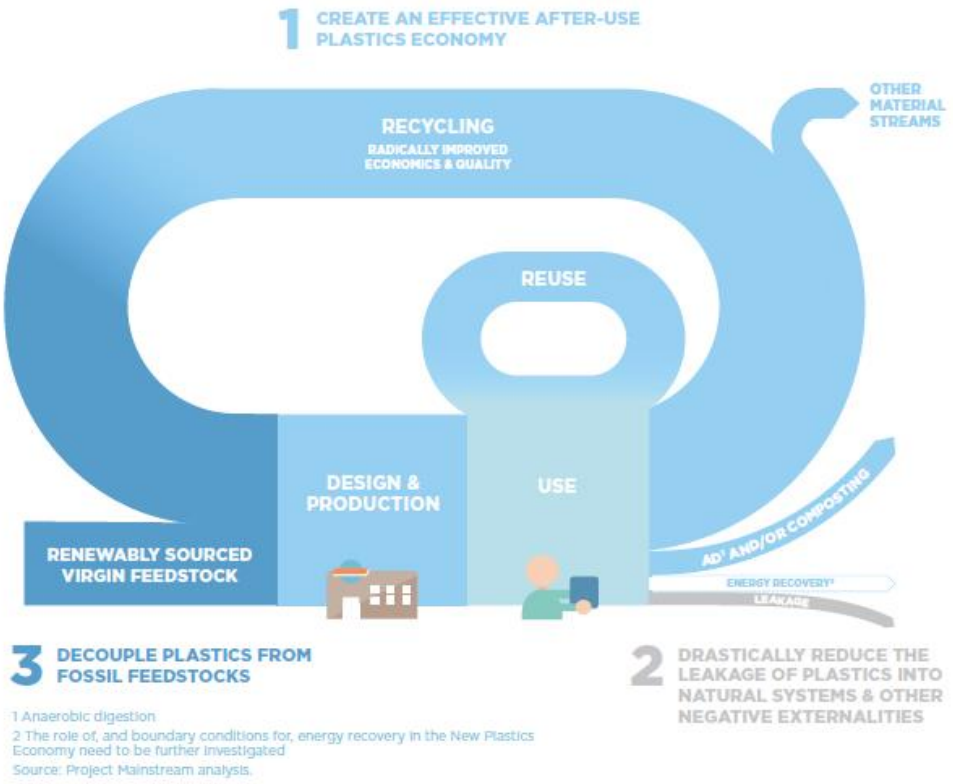

Figure 6: Relevant aspects for a "new plastics economy" (Ellen McArthur Foundation, 2016)

Consequently, chapter 3.2.3. presents which concrete aspects of sustainable plastics a certification can and should include, based on the papers presented above. Additionally, practical aspects retrieved from the interviews need to be considered too. Again, this is outlined and combined with the insights from literature in chapter 3.2.3. Now that relevant concepts of sustainable plastics and the way of research to develop corresponding criteria have been outlined, the next chapter starts to introduce the actual analysis framework and its criteria, beginning with an overview of all relevant criteria.

3.2. Relevant criteria

Chapter 3.1. pointed out that several criteria of sustainable plastics are reflected in scientific literature, as is the necessity of standards and the relevance of certifications. However, while there is research on general criteria that are of importance for valid and successful certifications, there does not seem to be a scientific framework analysis of the existing certifications for sustainable plastics. In order to avoid issues of uncertainty on which certification to trust, use and promote, a comprehensive analysis of existing certifications is needed. Such an analysis has therefore been done based on the procedures and definitions outlined in the previous chapter. The framework defines a total of 14 criteria and groups them into three categories, namely (1) organisational, (2) trust and transparency related as well as (3) content-related criteria. Table 5 presents an overview of the criteria and their representation both in literature and throughout the interviews, whereas they will be outlined and explained in detail below.

Table 5: Criteria for sound plastics certifications

Group	Criteria	Characteristics	Representation in literature	Representation in interviews
Organisational criteria	Awarding format	Seals, rankings	Seals are more common, rankings more comprehensible (Minkov et al., 2020)	Preference for rankings (Certifier 1, User 1)
	End-user focus	B2C, B2B, B2G, G2B	Important to include stakeholders in the process (Horne, 2009)	
			Label needs to be easily understandable by the target group (S. Basu & Bidanda, 2014)	Labels are currently difficult to understand for consumers/ target groups (Certifier 1, Marketing 1)
	Operation scope	Product level, production process, company level	Clarity about operation scope is important (Minkov et al., 2020)	Demand for certifications that go beyond products (Buyer 1+3, Certifier 2)
	Sector scope	Single or multi-sectoral	Multi-sectoral more applicable for plastics certifications (Minkov et al., 2020)	Multi-sectoral allows learning from other sectors (Certifier 1), single sector can be more detailed and applicable (Certifier 1, Producer 1)
Trust and transparency-related criteria	Verification	Internal, external by the certification body, external by a third party	Accredited external assessment is preferred (Minkov et al., 2020)	Preference for third-party verification (Buyer 1+3, Certifier 1+2, Producer 1, User 2)
		Long-term measurement, monitoring and enforcement	Should be high-quality measurement and monitoring (van Amstel et al., 2008)	Importance of long-term monitoring (Certifier 1+2), regular tests and measurements (Buyer 2+3, Certifier 2, Marketing 1, Producer 1, User 1+2) that can be quantified (Buyer 2)
	Credibility	Through awarding entity	Independent, trustworthy bodies such as NGOs or consumer organisations preferred (Rubik et al., 2007)	By an independent, trustworthy third party (Buyer 3, User 2)
		Of the labelling criteria	Public, clear and sufficiently strict (S. Basu & Bidanda, 2014; Bratt et al., 2011)	Should be strict (Certifier 1, Marketing 1, Producer 1+2, User 1), clear for every side (Buyer 3, Certifier 1+2, User 1), scientifically based (Buyer 3, Certifier 1+2)
	Financing	Funding, donations, fees	Fees are standard, and undeclared (industry) financing should be avoided (Minkov et al., 2020)	
	Longevity	Lasting time, reassessment, necessity of improvements	Regular reviews are important (Bratt et al., 2011)	Regular reassessment of the certification holders (Certifier 1+2, Producer 1, User 1); regular checks of the criteria (Certifier 2)
	Transparency	Through information on each aspect of the label	Information on labelling process (Minkov et al., 2020)	Mentioned as important by Buyer 3, Certifier 2, Producer 1+2
			Information on funding (Minkov et al., 2020)	
			Information on those responsible for awarding (Golden et al., 2010)	Mentioned as important by Certifier 2
			Information on criteria development (Golden et al., 2010)	Mentioned as important by Buyer 3
			Information on considering stakeholder concerns (Golden et al., 2010)	
			Public criteria (Bratt et al., 2011)	Mentioned as important by Buyer 3, Marketing 1

	Clarity	Clear to understand what is labelled (S. Basu & Bidanda, 2014) No wrong impressions (van Amstel et al., 2008)		Clarity of what a label means (Buyer 1+3, Network 1, Producer 2) and what product it is put on (Certifier 2) is currently lacking
Content related criteria	Sustainability consideration	Inclusion of environmental, social and economic aspects	Wide focus is preferred as long as it is feasible (S. Basu & Bidanda, 2014)	Currently focussed on the environment, could be desirable to extend (Buyer 3)
	Environmental excellence	Labelling of most environmentally friendly products or somewhat sustainable products	Truly superior products should be labelled (OECD, 2005)	Labels should only be awarded for superior products (Certifier 1, Producer 1+2, User 1)
	Life cycle perspective	Inclusion of one or several life cycle stages	Preferably inclusion of several stages (Gazulla Santos, 2014) Focus on production, maintenance and/ or end-of-life (Rubik et al., 2007)	Preference to include several life cycle stages (Buyer 2+3, User 2) and to include the whole process (Certifier 2)
	Plastics-specific aspects	Production criteria	Recycled content (Tecchio et al., 2017)	Important feature of sustainable plastics (Buyer 1+3, Certifier 2, Producer 1+2)
			Reused content (Tecchio et al., 2017)	
			Dematerialisation (Ellen McArthur Foundation, 2016)	Reduce resources used (Buyer 3, Producer 2, User 2)
			Reduce toxic substances (Rossi et al., 2020)	Should be done to avoid contamination (Certifier 1)
			Reduce potentially harmful substances (Ellen McArthur Foundation, 2016)	
		Use phase criteria	Design for durability (Bocken et al., 2016)	Durability and increased lifetime can determine the sustainability of the product (Network 1, User 1)
			Design for reliability (Bocken et al., 2016)	
			Design for maintenance and repair (Bocken et al., 2016)	
			Increase reusability (Ellen McArthur Foundation, 2016)	
		End-of-life criteria	Design for recyclability (Rossi et al., 2020)	Important aspect that needs to be improved (Buyer 1+2, Certifier 1+2, Network 1, Producer 1+2)
			Design for sorting (Ellen McArthur Foundation, 2016)	Improved collection as a prerequisite for recycling (Buyer 3, Certifier 2, User 1)
			Standardisation of materials and formats (Ellen McArthur Foundation, 2016)	

3.2.1. Organisational criteria

The first group of relevant criteria to assess a certification regards the organisation of said certification. This entails aspects such as how the is certification issued, who it is directed to or what sectors it covers.

Awarding format

Three main types of awarding formats can be identified, seals, rankings, and declarations. A seal refers to a certification that awards a label when a certain benchmark is reached. A ranking, on the other hand, can make differentiations and award different levels or grades of a label to different products or companies. Lastly, a declaration is the publishing of certain environmental attributes of a product (Minkov et al., 2020). Given the fact that for the present research only ISO type I or type I-like labels will be considered, the awarding format of declarations is not of importance. While seals are the more commonly used, perhaps easier executable awarding format, rankings can be more comprehensible (Minkov et al., 2020) and solve the dilemma of eco-labels that want to avoid criteria being too strict and inaccessible and at the same time being not strict enough and less trustworthy (Bleda & Valente, 2009). While acknowledging the difficulty of implementing a ranking format, User 1 finds that it "would be again this, that for certifications, especially regarding products, it is just difficult to implement as long it is not obligatory, that there would be a ranking so to speak.". Another approach that has been pointed out to be favourable is the use of different levels. "With every level that you're going to be increasing if the company wants that, you're gonna go a little bit more into detail and it's gonna get more strict as well. So, there is sort of a set out in terms of requirements that you need to meet per level and the further you get into the scheme, or maybe the better you have it arranged, the further you can get." (Certifier 1)

End-user focus

Certifications can be directed to and from different stakeholders: From businesses to consumers (B2C), from B2B, from businesses to the government (B2G) or from the government to the consumer (G2C) (Minkov et al., 2020). Either way, it is important for certifications to include different stakeholders in labelling processes (Horne, 2009), as (consumer) awareness can be seen as one key factor for sustainable behaviour change (Rubik et al., 2007). Furthermore, the inclusion of stakeholders also helps to develop a process that is strict enough, while at the same time not too strict to discourage companies to participate, given the fact that for too strict processes "the question is whether that's really gonna help companies to continue the process or whether it's just to demotivate them." (Certifier 1). Therefore, it should be ensured that the certification is tailored towards those it is directed to and can be easily accessed and understood by its target group (S. Basu & Bidanda, 2014). This is identified to be something in need of improvement as "there is a lot of still a lot of unclarity about which certifications are necessary and that's why people don't, or companies don't choose them because they don't know." (Marketing 1).

Operation scope

A certification can be awarded to different aspects of a product. It could be awarded to a certain property of the product itself, for example, the content of recycled material. Another option is certifying the production process and its environmental friendliness, for example through the use of renewable energy. Lastly, the company producing the product could be labelled itself, for example by reducing its overall greenhouse gas emissions (Minkov et al., 2020). It cannot necessarily be said that one of those possibilities is generally superior to the others. Rather, it is important that the chosen possibility is relevant to its context and that the label is clear on what exactly it is labelling. However, different interviewees in the context of plastic certifications point out that a certification beyond the product level might be preferable, and that "the good certificates, in my opinion, do not refer to a single product" (Certifier 2)

Sector scope

A label can either be specific to one sector or applicable to several different sectors (Minkov et al., 2020). So-called multi-sectoral labels are preferred if the label does not revolve around one specific, but a more general problem at hand. Sustainable plastics can be seen as such a broad problem. However, the single sector certification "is really fit for the company that they're asking. There's less to consider, but that allows them to go a bit more in detail in a certain way" (Certifier 1) and allows for a more comparable solution and discussion.

3.2.2. Trust and transparency-related criteria

The second group of relevance includes criteria that assess how far a label, its awarding entity and processes are transparent about themselves, and thus, how far they are trusted. Several aspects play into this assessment, such as regular monitoring, issuing by independent bodies or publicly available information about the relevant criteria, as outlined in the following paragraphs.

Verification

An important criterion to assess the quality of a certification is whether the certification can be verified. This entails that it needs to be confirmed whether an applicant meets the requirements for the label. To do so, standardisation of the requirements is key (Golden et al., 2010). Verification can either be done internally by the applicant or externally, either by the certification body itself or by a third party (Minkov et al., 2020). In order to ensure the quality and trustworthiness of a label, external verification is crucial (Minkov et al., 2020). This is also reflected by several responses from the interviews. In fact, eight out of eleven interviews mention a preference for third-party verification. For example, Buyer 3 emphasises the importance of third-party verification to create trust: "That it's simply not a self-statement, but that it is external, or done by a third party. That of course creates quite a bit of trust as well."

A further distinction can be made between if and how such external auditors are accredited (Golden et al., 2010). Here, the interviews emphasize the need for audits in general and the role of independence, as well as the fact that "the external audit company should be part of the system of certification" (Producer 1).

Part of the verification is furthermore the long-term measurement and monitoring of the environmental impact of the label as well as enforcing compliance with its standards (van Amstel et al., 2008). Here, not only the existence of such measurement and monitoring plays a role, but also how often and how strictly it is conducted. Several interviewees point out that a label should, in their view, have certain quality standards that need to be complied with, which, in turn, should be checked regularly, "and not every five years, but every year or quarter or whatever" (Producer 1). Furthermore, one interviewee raised the point that another factor to improve verification should be the possibility to retract a label: "a good certificate is characterised by the fact that it is registered and managed centrally and independently and can also be withdrawn effectively." (Certifier 2). Inevitably, a profound verification influences the next criterion, the credibility of a label.

Credibility

The credibility of a label should be approached from two directions. First, it can be influenced by the entity awarding the certification. This can either be a government, a private organisation or a nongovernmental organisation (Minkov et al., 2020). The issuing body needs to be credible for both producers and consumers (Gertz, 2005). Usually, credibility in a label is higher when independent, perceived trustworthy bodies such as nongovernmental organisations or consumer organisations carry out the certification and lower when it is done by industry itself (Rubik et al., 2007). The aspect of independence is also mentioned by an interviewee, as a "state certified" or certification checked "from external experts" would lead to the fact that "then one could trust it" (User 2).

The second aspect regards the credibility of the labelling criteria. One aspect to increase this side of a label's credibility is to publish the labelling criteria (Bratt et al., 2011). Furthermore, the criteria should be clear and sufficiently strict and evaluated by third parties (S. Basu & Bidanda, 2014). User 1 summarises this by saying "And if I know that, that it is not thrown after, then for me it is a certification that offers added value." A need for concrete, scientifically based and mandatory criteria is reflected in the interviews as well. As Buyer 3 puts it, important factors are "how transparent is the whole thing, how substantive is it also from a scientific point of view." Another important aspect to make the certification credible is that it should take measures to avoid spill-over effects. That is, labelling one specific aspect of a product or company as environmentally superior should not allow the labelling of the whole company as such. A way to avoid this is to clearly restrict the label to a certain product line or to assess the company as a whole (Dosi & Moretto, 2001).

Financing

Another important criterion is the way of financing a certification. This can be done through funding, for example by governments, (industry) donations or (membership) fees (Galarraga Gallastegui, 2002; Golden et al., 2010; Minkov et al., 2020). Oftentimes, several ways of financing are used. Membership fees are due for most certifications, whereas government funding is often found in type-I certifications (Minkov et al., 2020). While financing through donations might not be seen as trustworthy, high fees are perceived as a hurdle to applying for a certification by companies (Rubik et al., 2007). This is also reflected in the interviews: "Each certification, which brings a new technical specification, causes first of all costs. This is what could hinder the process." (Certifier 2). However, when only looking at how financing plays a role in the trust and transparency of a certification, what matters most is avoidance of undeclared (industry) financing.

Longevity

Longevity regards the question of how long a label lasts, whether and when it is reassessed and whether improvements over time are required (Golden et al., 2010; Minkov et al., 2020). The period of validity can determine the quality of the label (Galarraga Gallastegui, 2002) as it is seen as important to regularly review the applied criteria (Bratt et al., 2011). As described above, regular reassessment is also considered to be important by the interviewees, and regular reviews are being demanded. Furthermore, measurable improvements are mentioned to be desirable: "This is why I only find it meaningful if one formulates concrete goals and measures them in regular intervals" (User 1).

Transparency

The transparency of a certification is an important feature throughout every aspect of the label (Minkov et al., 2020). First of all, transparency should be ensured by providing information on the labelling process (Minkov et al., 2020), which is also mentioned as important for the interviewees: "and then a very large block, transparency actually. So how transparent is it outlined how products are tested and when a product receives certification or not." (Buyer 3). Furthermore, making clear how concerns of stakeholders are treated (Golden et al., 2010) and publishing the labelling criteria (Bratt et al., 2011; Golden et al., 2010) are aspects to increase transparency that are also seen as important by the interviewees, as it has been already pointed out in the section about the credibility of a label. Similarly, being transparent on who is responsible for awarding the certification is regarded as a relevant aspect both in literature (Golden et al., 2010; Minkov et al., 2020) as well as in the interviews: "Making that safe is actually important for me, there to have a complete chain, or the, ultimately to have transparency over the whole chain." (Certifier 2). Another important aspect closely related and reflected upon in the criterion of financing is transparency about said financing (Minkov et al., 2020).

Clarity

Other important aspects of a label are that it is clear to understand what it is labelling (S. Basu & Bidanda, 2014). Its standards should be specific and clear, and should not give wrong impressions or mislead about the labelled product (FTC, 2012; van Amstel et al., 2008). Clarity of the labels is an aspect that has been pointed out by several interviewees to be of importance, but still lacking at the moment, with Network 1 going as far as stating that at the moment, "there is no clear certificate".

3.2.3. Content-related criteria

Lastly, criteria that revolve around the specific content covered by the certification are of relevance. This includes aspects such as the range of sustainability covered, or points that are of relevance specifically for certifications of sustainable plastics.

Sustainability consideration

Sustainability is often defined as a concept resting on three pillars: the environmental, the social and the economic pillar that all need to be considered to reach a sustainable state (Brundtland, 1987). However, it is possible to look at one of those pillars solely. Therefore, a certification can focus only on environmental sustainability, which is currently the standard approach (Golden et al., 2010), or consider social and economic aspects as well (Minkov et al., 2020). It is indeed important that a label is comprehensive and does not only focus on a too small concept of sustainability (S. Basu & Bidanda, 2014). However, there might be reasons, such as feasibility, for limiting the scope of the label to some aspects of sustainability only. The most common approach of focussing on environmental sustainability seems to also be the main demand at the current time, as only one interviewee mentioned that covering social aspects would be of interest too: "And for us it is of course also very important that also social aspects are covered there too." (Buyer 3).

Environmental excellence

Another quality criterion revolves around the question of whether a certification labels only the most environmentally friendly product or all products that are somewhat more sustainable than average (Galarraga Gallastegui, 2002; Minkov et al., 2020). According to the OECD (2005), labels should only be awarded to a small share of products in a category to meaningfully communicate that those are environmentally beneficial, which should be around five to 30% of the products. Consequently, there should be a balance for the awarding criteria between being strict enough to be significant and not too strict so that they create a barrier to sustainable innovation (Rubik et al., 2007). Also, within the interviews, different interviewees mention that a certification should not be rewarded too easily and should provide a means of distinction: "So not somehow a pseudo-certification that does not have a high standard, but it must of course also stand out somehow" (Producer 2).

Life cycle perspective

Life cycle thinking and taking a life cycle perspective is an approach taken by some but not all certifications. Therefore, a difference can be made between labels that only consider one environmental attribute, those that consider several, but not necessarily all life cycle stages and lastly those that are fully life cycle assessment based (Minkov et al., 2020). While those certifications that only consider one attribute are seen as simplifying and limited in their accuracy, they are also easy to understand and applicable on wider ranges (Golden et al., 2010). Multi-attribute certifications, on the other hand, are more exact, but also require more data and might be difficult to understand for consumers (Golden et al., 2010). The interviewees seemed to be more in favour of the multi-attribute certifications, possibly due to the fact that complexity is less of a hurdle in a B2B context. Certifier 2 emphasises that "it is very important that one not just sees at the end, whether it turned into something good, but that one actually keeps the chain a bit on a leash", whereas Buyer 3 makes it even more clear by saying "away from this one-time production view towards a life cycle view". While also several authors argue in favour of a life cycle perspective for certifications (Bratt et al., 2011; Gazulla Santos, 2014; Rubik et al., 2007), Rubik et al. (2007) also emphasize the importance of identifying the most relevant life cycle stage for a specific product, which should be in the focus of a certification. As explained in chapter 3.1.3., certifications for plastic products should focus on the production phase, the maintenance phase, and the end-of-life.

Plastics- specific aspects

Following the notion that the sustainability of a plastic product can be increased at different points of its life cycle, during the production, the maintenance phase or at the EOL (Rubik et al., 2007; Tecchio et al., 2017), concrete aspects to be certified in these three stages are outlined below.

During production, one goal is to reduce the impact of the newly made product (Tecchio et al., 2017). This could be achieved, generally speaking, through the reduction of raw materials required (Rossi et al., 2020) or what Bocken et al. (2016, p. 310) refer to as "narrowing resource flows". Decreasing the raw materials required can be done by using recycled material for production (Shamsuyeva & Endres, 2021; Tecchio et al., 2017), by increasing the reused content (Tecchio et al., 2017) or through dematerialisation, meaning the production of a product of the same quality with a lower mass and therefore less material (Ellen McArthur Foundation, 2016). Especially the use of recycled material for production has been prevalent throughout the interviews. The use of recycled material, combined with making the product recyclable again, an aspect which will be discussed later on, has been characterised as "the most responsible thing you can do as a producer" (Producer 1). Dematerialisation through using "fewer primary resources" (Producer 2) for a product has been mentioned as well. Another important aspect to reduce the impact of a product is to reduce the use of toxic substances (Rossi et al., 2020) but also of such materials or additives that might cause harmful effects, even if a clear proof is still

missing (Ellen McArthur Foundation, 2016). In line with this, Certifier 1 points out that "in terms of colourings that are used or other additives that are used, that can actually complicate process afterwards when recycling." This emphasises the interconnectedness of reducing toxic substances and increasing recyclability later on.

To increase the product's sustainability during the use phase, said phase should be prolonged (Tecchio et al., 2017). This is closely related to the production phase, as a product's lifetime is partly determined by the way it is designed. Slowing down resource loops (Bocken et al., 2016) includes design for durability, reliability as well as maintenance and repair (Bocken et al., 2016), but also strategies to increase reusability (Ellen McArthur Foundation, 2016). Increasing the durability of a plastic product is seen as an important aspect by two interviewees as well. One of them points out the connection between durability and reducing the overall amount of plastics needed: "That is, you try to reach the longest possible life cycles and thus reduce the quantity." (User 1). Furthermore, the EOL treatment can already be included in the production process by designing a product well-suited for recycling (Ellen McArthur Foundation, 2016).

At the end of the product's life, the waste produced should be reduced as much as possible (Tecchio et al., 2017) to close the existing resource loops (Bocken et al., 2016). Again, some overlap to the other lifecycle phases is present, as, for example, (design for) reusability will have an effect on waste production at the EOL as well. However, once a plastic product becomes part of residual waste, the main strategy to close the resource loop is recycling (Ellen McArthur Foundation, 2016). While improvements in the recycling sector require changes on various levels, important interventions on the product level include design for recyclability (Ellen McArthur Foundation, 2016; Rossi et al., 2020) and possibly for sorting as well as standardisation of materials and formats to increase recycling quality (Ellen McArthur Foundation, 2016). Recyclability has been mentioned by different interviewees as well. They emphasise that recyclability is not yet sufficient today and can actually be seen as a major barrier to improved recycling rates: "the biggest problem is basically the mixed capture of plastics, which makes plastics recycling more difficult" (Certifier 2). In turn, better recyclability is also seen as a key goal to improve recycling, because "if it's a clear plastic […] then the chain also knows, ok, we can recycle this" (Buyer 2). Connected to that, improved collection has been demanded by the interviewees as well "that one looks that the materials are led back again, that they are collected once again" (Buyer 3). Applied to certifications, this could, for example, entail certifications for take-back-systems.

For a certification of sustainable plastics, the different aspects outlined above can be those that lead a certification to label a certain product to be (more) sustainable. The United States Federal Trade Commission (FTC) provides guidelines on how and when to award a product with a certain sustainability claim, which are closely connected to the transparency-related criteria of a sound certification, that are also applicable to the more content-related factors of a label. For example, the FTC makes clear that a free-of claim in terms of toxic materials should only be

made and certified in cases where a toxic substance that has formerly been used has now been removed and not been replaced by another harmful substance (FTC, 2012). Furthermore, it is important that the label remains understandable, for example, that a claim of dematerialisation is set in terms that are clearly understandable by the customer, such as comparisons to old product lines (FTC, 2012). Similarly, the FTC requires transparency about the recycled content of a product that should be clearly stated in percentages and indicate which part of the product is considered (FTC, 2012). For a claim of recyclability, they require the actual recyclability in practice, including the existence of relevant technologies and facilities (FTC, 2012).

3.3. Example of application: The Blue Angel

The next logical step after developing a framework is to test the framework's applicability with an exemplary label. The present framework can be applied to serve two purposes. First, when applied to one single certification, it can provide insights into the soundness and quality of this one certification. Second, when applied to two or more certifications, those certifications can also be compared to each other. Both the evaluation as well as the comparison can serve as an indication of whether or not to obtain a certification, or whether or not to buy a product certified with that certification. As the focus of this research is theory building, only one certification has been analysed with the developed framework to give an example of application. The Blue Angel certificate has been chosen for two main reasons: First, Berdal is currently Blue Angel certified (Berdal, 2022b), making it a relevant label for analysis for the case study. Second, as the Blue Angel is an old, well-established eco-label (Blue Angel, n.d.–e), a range of (external) evaluation papers (Gertz, 2005; Hemmelskamp & Brockmann, 1997; Müller, 2002; Stieß et al., 2013) exist on the certification that can serve as a data source next to information from the Blue Angel website. The evaluation has been done in two steps. First, a more concise overview of the criteria and their evaluation, based on the insights from chapter 3.2., has been created. Figure 7 shows said overview, which served as a base and guideline for evaluation. It entails all framework criteria, as well as the main aspects for each of them that would lead to a positive evaluation of the certification. Based on this, the evaluation itself was conducted. Figure 8 gives an overview of the evaluation results. For each of the criteria, it has been checked whether the setup of the Blue Angel corresponds to the preferred specification of the criterion or not. In cases where it did meet the preferred specification, said specification is marked in green, and the checkbox ticked. When the Blue Angel is set up differently than preferred according to literature and interviews, this is marked in red and with a crossed checkbox. For some specifications, no conclusive evaluation was possible, thus, the specification remains yellow, and the box is unticked. The overview gives a first impression of how the Blue Angel scored overall. Afterwards, it is explained in more detail how exactly the Blue Angel is set up, how this corresponds to the evaluation made, and how it is assessed concretely. It should be noted that not the Blue Angel as an overarching label has been assessed, but that the Blue Angel label for products made from recycled plastics has been the unit of analysis.

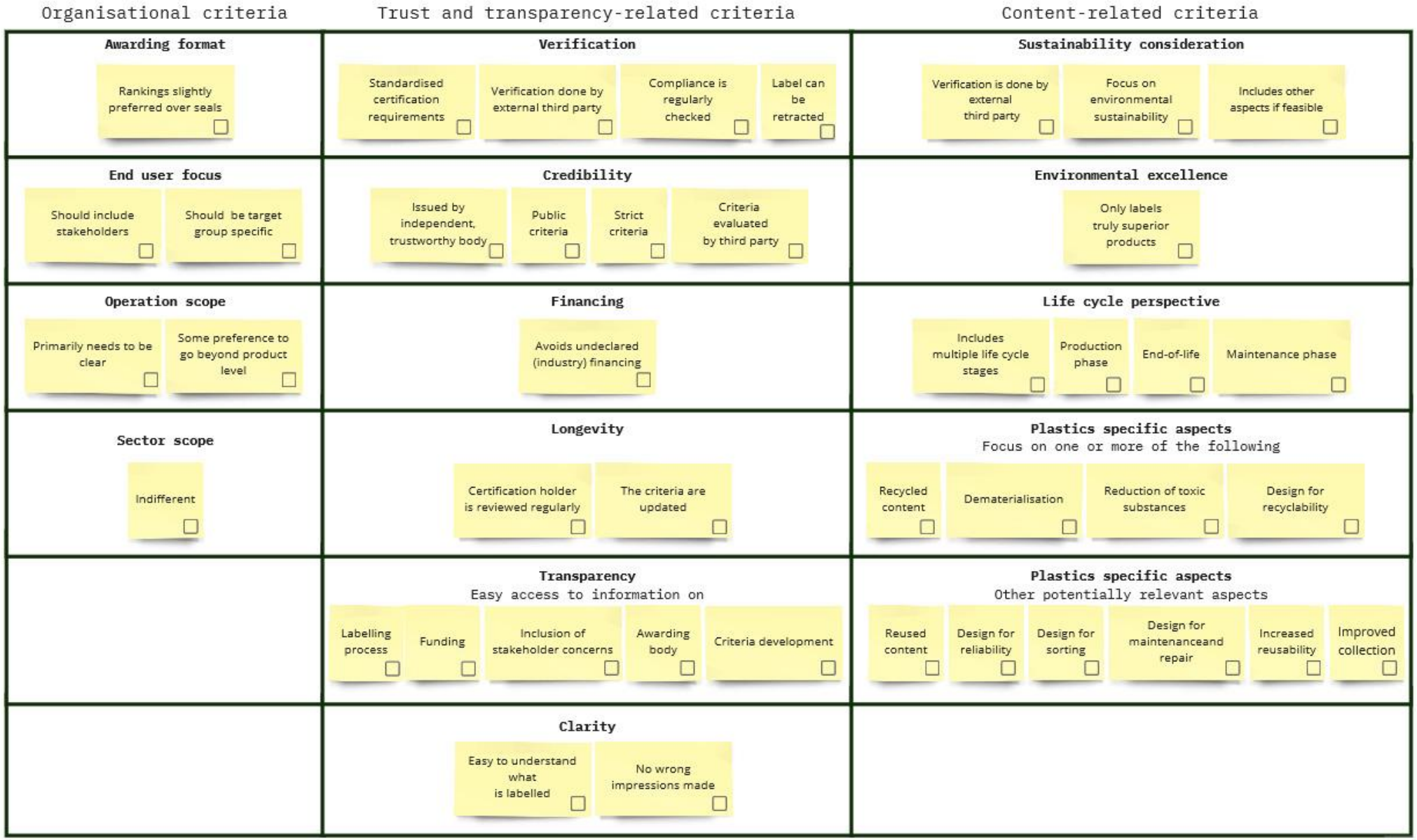

Figure 7: Framework overview as a base for evaluation

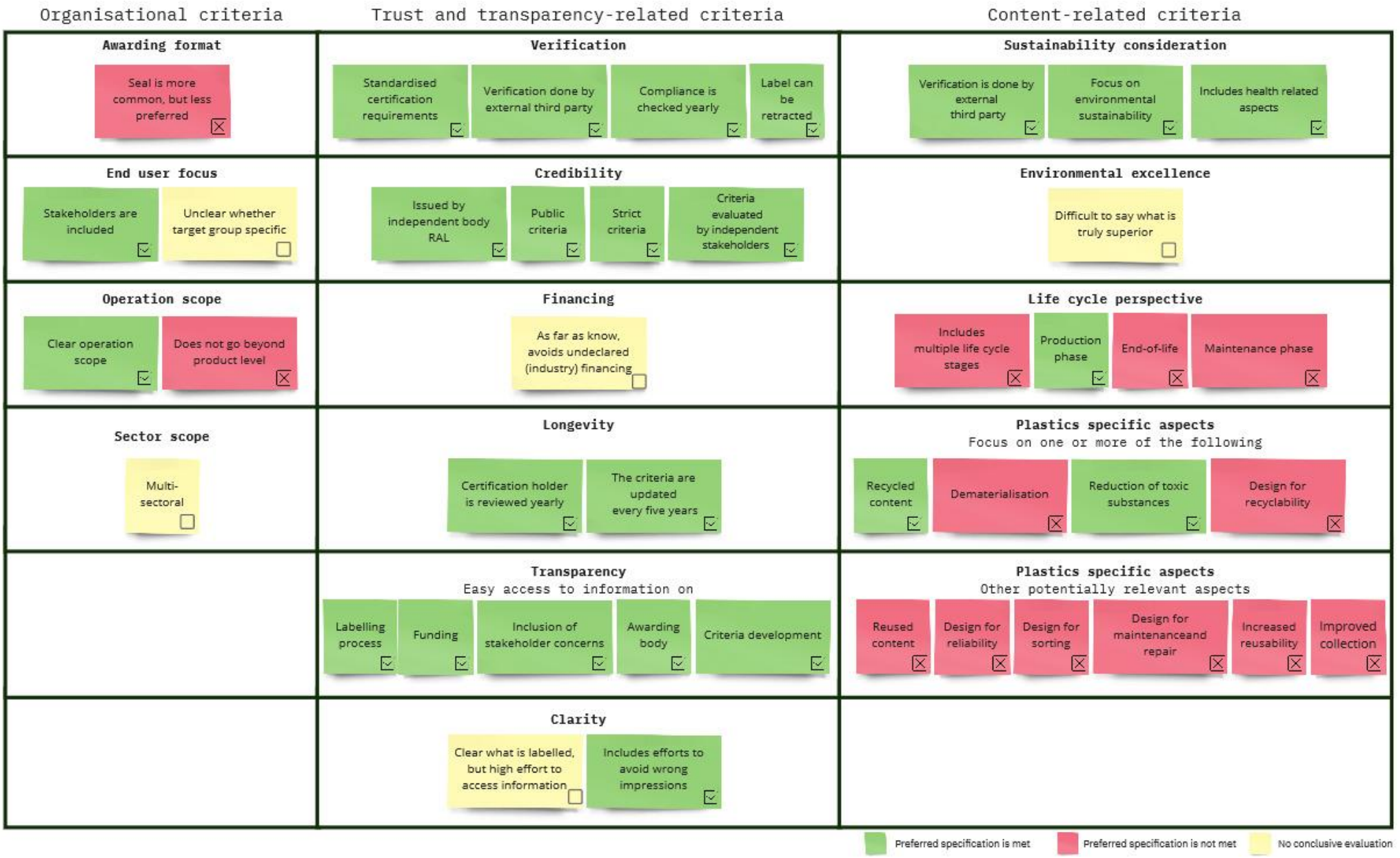

Figure 8: Evaluation results of the Blue Angel

Organisational criteria

The Blue Angel for products made from recycled plastics is awarded, as the name indicates, on the product level in form of a seal. While its main target group are consumers, it also aims to be a guide for businesses as well as public institutions (Blue Angel, n.d.–a). The Blue Angel in its entirety is a wide-ranging label that is applicable to several different product categories in many sectors. However, even when only considering the product category of products made from recycled plastics, it can be identified as a multi-sectoral label, as it is applicable to a wide range of such products, from garden furniture to foil all the way to buckets (Blue Angel, 2019).

Overall, the Blue Angel performs fair regarding the organisational criteria. Its operation scope is clear, and the fact that it is awarded as a seal for products is a common choice, however, not necessarily the most preferred one according to literature and interviews. Regarding the label's target group and sector scope, it can be seen as valuable that clear information can easily be found on both. However, there is no clear tendency to be found in literature or interviews on whether the choices made by the Blue Angel, namely, being a multi-sectoral label that is mostly targeting consumers, should be seen as preferential.

Trust and transparency-related criteria

The Blue Angel is a German state-owned label. Its criteria are developed and updated by the German Environment Agency (Umweltbundesamt, UBA) (Blue Angel, n.d.–f). Both development and updates are based on scientific papers and publications, market research and studies conducted by the UBA. Furthermore, during the development and update processes, consultations with relevant stakeholders are held to consider their inputs in the criteria (Blue Angel, n.d.–c). After the development, the Environmental Label Jury needs to check and approve the criteria. The jury consists of 15 voluntary and independent members from various branches, including consumer associations, trade unions, businesses, academia, and regional governments (Blue Angel, n.d.–f). The Blue Angel exists, as mentioned above, for several different product categories. Therefore, specific criteria are developed for each category. Not only these criteria are published (Blue Angel, n.d.–c), but also detailed reports on how they have been developed or updated, and in which ways exactly stakeholder inputs have been considered, or why not (Wirth & Jepsen, 2019). Following criteria development, companies can apply for the label at RAL, an independent non-profit company which is responsible for receiving and evaluating applications (Blue Angel, n.d.–f). To do so, a one-time as well as an annual fee needs to be paid, which depends on the sales of the company applying (Blue Angel, n.d.–b). In order to be certified, a company must prove that its product complies with all criteria, through test reports, product samples or certificates (Blue Angel, n.d.–c), which, in the case of products made from recycled plastics, cannot be older than one year. When the label is awarded to a company, an external auditor checks compliance once a year (Blue Angel, 2019). If the auditor finds misuse, the Blue Angel can be retracted from the company (Blue Angel, n.d.–d).

The Blue Angel can be seen as a highly trustworthy and transparent certification. Very detailed information on all steps of the labelling process, requirements and financing can easily be found on the label's website. The fact that not only the German state but also several further stakeholders are involved in the label makes it highly credible, which has been verified by different studies evaluating the public perception of the Blue Angel, including its trustworthiness and credibility (Gertz, 2005; Stieß et al., 2013). Further positive points to be mentioned are the regular updates of the criteria, as well as the need to prove compliance regularly, and the possibility to retract the label in case of non-compliance. The only criterion that could be in need of improvement is the clarity of the Blue Angel. The label does, per se, meet both requirements for clarity, making it understandable what is labelled, and not making any wrong impressions. For understanding what is labelled, the labelling criteria clearly state all necessary information, and for avoiding wrong impressions, the latest update of the labelling criteria introduced an improvement. Since 2019, the Blue Angel for products made from recycled plastics is only applicable to products whose weight is at least 90% plastics (with a few exceptions). This change has been made to avoid the possibility that products that only contain a very small amount of plastics are labelled as environmentally superior, thus, creating a favourable perception for the whole product which is not necessarily given (Blue Angel, 2019). Despite these efforts, some problems remain. First, to fully understand what is labelled, relatively high effort is required, as the details are stated in a 20 pages long formal document, which is most likely not going to be read by the majority of the consumers. Furthermore, the Blue Angel faces the problem that the coverage of many product categories can lead to high complexity (Stieß et al., 2013), as consumers are not always aware of what exact product category the Blue Angel on a product refers to.

Content related criteria

In terms of content covered, the Blue Angel aims at certifying only those products that perform best on the environmental criteria relevant to the product category (Blue Angel, n.d.–a). Therefore, during criteria development, all life cycle stages are looked at, and the most relevant stages for the product group are identified (Blue Angel, n.d.–c). Furthermore, on a broad scale, the label does take the relevant aspects next to environmental sustainability into account, for example, health or social aspects (Blue Angel, n.d.–c). With the label for products made from recycled plastics, the Blue Angel wants to facilitate recycling by type of material by promoting sales of products made from these recycling processes (Blue Angel, 2019). Next to the main aim of the label, the reduction of virgin materials in products, the second goal identified is to limit contamination levels. Concretely, this means that at least 80% of the weight of a product needs to be made from post-consumer recycled plastics. Furthermore, certain hazardous products cannot be added to the finished products. In the case of products that will be in direct contact with the consumer, this includes an extended range of additives (Blue Angel, 2019).

The Blue Angel performs well in terms of content-related criteria. While considering only environmental and health aspects and only the production phase is relatively narrow, these are still the main aspects and phases of relevance. When looking at the evaluation of plastics-specific aspects in Figure 8, the Blue Angel does not seem to score very well. However, it is not necessarily desirable for one label to cover all possible aspects of sustainable plastics. Focussing on recycled content, the main aim of the Blue Angel, has been identified to be one of the most relevant aspects when it comes to more sustainable plastics. The label's second aim to reduce toxic substances can be seen as a suitable and beneficial addition which is in line with the European Commission's goal to create a non-toxic environment within a CE (Wirth & Jepsen, 2019).

Concluding, the Blue Angel for products made from recycled plastics can be seen as a relevant and well-applicable certification for sustainable plastics. While improvements could be made in terms of its organisational set-up as well as its clarity, it performs especially well in terms of transparency and trustworthiness.

Through this chapter, it should have become clear how the framework presented above can be applied, not only to the Blue Angel but also to other certifications. As mentioned before, this can help in the decision-making process regarding the use of certifications. However, it is also relevant when it comes to communicating about (the use of) certifications, as a tool for information and communication.

3.4. Discussion

This subchapter discusses the results and implications regarding the analysis framework and its application. It looks at how the knowledge gap could be closed, what contribution can be made to the discussion in literature and what should be considered when interpreting the results.

The previous subchapters showed that the criteria, which have been first developed based on literature, have widely been supported by the results obtained from primary data. In some cases, the interviewees presented more clear opinions on how to evaluate a criterion than was supported by literature, for example, when it comes to the preference for a type of labelling format. At other times, the interviewees provided higher detail about their demands for a certification than the literature did, for example about the requirements for measurements and monitoring. However, for some criteria found in the literature no support was given in the interviews. This could have two main reasons. Either said criteria were of less importance for the interviewees, or they were too specific so that the main construct, but not the concrete specification came to mind. This might have been the case for the transparency-related criterion. While interviewees mentioned transparency itself to be important several times, they did not all sub-criteria found in literature as well. In cases where the criteria were indeed regarded as less important by the interviewees, this could weaken the implication those criteria can have in

practice. Nevertheless, the goal of the framework was set to be scientifically based, to analyse the soundness of certifications. Therefore, the non-mentioning of criteria in primary data does not necessarily invalidate their importance for the analysis of a sound certification.

Especially the combination of non-certification related literature on sustainable plastics with primary data regarding such plastics, their attributes and how to certify those provided new insights that have not been considered in literature in this particularity before. One new criterion that has been identified from primary data without prior representation in literature is improved collection. However, closely related aspects, such as improved sorting, were mentioned in literature, thus, it is not a fully unexpected new measure.

Overall, the findings and the building up of the framework allow for judgement that can serve as a base for the evaluation of certifications. For the evaluation of the Blue Angel, data has been taken mainly from their website and then evaluated at the background of what has been found in both literature and interviews. In most cases, a consistent picture has been found, allowing for conclusive results. In other cases, at least an evaluation has been possible with the data at hand, even though the results have not been conclusive due to differences between literature and interviews, or as no clear preference within one criterion could be found. Sometimes, no conclusion has been found due to a lack of information from the Blue Angel. The fact that this only happened rarely speaks in the certification's favour.

Concluding, the frequency and depth of mentions of trust and transparency-related criteria in the interviews suggest the outstanding importance of these criteria, which is supported by literature and also found to be an emphasis of the Blue Angel itself. Another, related, important aspect that was emphasised was that a certification should only certify efforts that are relevant to a product category. In the end, it might therefore be less important how the label is financed or whether it focusses only on environmental sustainability or also includes social aspects for example, as long it is clear and transparent on the choices made and does not mislead the consumer in any regard.

As mentioned above, those results have an implication for communicating about certifications. While this is outlined further later on, first, the basics for the development of a communication strategy need to be formed. This is done in the next chapter, starting with an overview of the relevant theoretical considerations.

Chapter 4: Towards a communication strategy

After building and discussing the analysis framework, the research now turns to the topic of communication on certifications, in which the framework will play another role later on. First, however, some theoretical specifications are needed in order to get to a communication strategy. It needs to be clarified what communication, and more specifically, sustainability communication, is. In this context, after providing a general definition, the focus should be on concrete strategies as well as general aspects that are applicable to several strategies, so that they can be combined with insights from primary data for a tailored strategy regarding certifications later on. Then, a critical consideration of the results is given. Again, theoretical insights are the base for this process, which are therefore presented first.

4.1. Theoretical considerations

4.1.1. Sustainability communication

First, an understanding of communication and sustainability communication is required. In general, "communication can be understood as symbolically mediated action, with humans constructing their reality on the basis of perceptions and experiences" (Godemann & Michelsen, 2011, p. 6). The importance of communication lies in the fact that it contributes to understanding, which can be seen as a major contributor to legitimacy (Newig et al., 2013). Sustainability communication, then, aims at delivering an understanding of the underlying concepts of sustainability and its meaning for human interaction with the environment (Godemann & Michelsen, 2011). The goal is to make (scientific) knowledge on sustainability publicly available (Godemann, 2011). Given the broadness of sustainability itself, sustainability communication, too, can be applied broadly. Communication can be on different topics, ranging from climate change to sustainable consumption, it can occur on different levels and between different actors and it can happen in different societal sub-systems (Godemann & Michelsen, 2011, Newig et al., 2013). Sustainability communication can be further divided into communication about, communication of and communication for sustainability (Genç, 2017). For the current research, the focus will be on communication of sustainability as it is most relevant for business communication. Communication of sustainability entails sender-to-receiver communication, meaning that a sender, for example, a company, wants to communicate a clear message to its receiver, for example, a client, with a clear objective in mind (Genç, 2017).

Currently, research on sustainability communication, and perhaps also sustainability communication itself, is more present in the context of end-user communication than B2B communication (Kapitan et al., 2019; Sharma et al., 2010). However, there are some exceptions to that. Furthermore, there is a certain similarity to B2B and B2C contexts, as in both cases, a person decides at the end of the process, thus, similar mechanisms of values, beliefs and

motivations apply, leading to a (partly) transferability of research results (Drumwright, 1994). The next step is to look at a specific topic sustainability communication can be applied to.

4.1.2. Consumer attitudes and behaviour

Sustainability communication is not a means in itself. Rather, it has the goal to ultimately lead to sustainability improvements. One such improvement could be increasingly sustainable consumer behaviour. Therefore, it is important to illustrate concepts of consumer attitudes and behaviour in the context of sustainability to understand the relevance of sustainable communication strategies.

Generally speaking, "consumer behaviour reflects the totality of consumer's decisions with respect to the acquisition, consumption, and disposition of goods, services, activities, experiences, people, and ideas by (human) decision making units [over time]." (Hoyer et al., 2016, p. 5). The fact that the definition mentions not only acquisition but also consumption and disposition, emphasises that consumer behaviour goes far beyond just buying a product. First, it can also be acquired through other means, then, it is also relevant how it is used and valued, how it is disposed of after use, and what consumers consider as important regarding disposal possibilities or attributes. Following that, relevant questions regarding consumer behaviour concern the when, why, how, where, and how much to acquire, consume and dispose of products. Understanding consumer behaviour can help to target marketing and business strategies according to consumer needs and wants (Hoyer et al., 2016).

According to Hoyer et al. (2016), four central steps influence consumer behaviour. First, the psychological core, on which decisions are based, and which includes, inter alia, motivation, perception, comprehension, knowledge, or attitudes towards a topic. Second, the decision-making process, which is further divided into problem recognition, information search, decision-making and post-purchase evaluation. Third, the consumer's culture as a combination of the groups a person belongs to, the resulting norms, values, and lifestyles and last, the outcome of the behaviour.

Consequently, the four categories of the psychological core, the decision-making process, the consumer's culture and the outcome of behaviour are also the categories that need to be approached to induce behaviour change. Here, it is important to understand that these four categories should not be understood to be independent. Rather, the whole set of influential factors outlined above needs to be taken into account and targeted (McGeevor, 2009). To form new behaviour, old habits need to be broken, through repetition and enforcement of new behaviours. In order to establish the new behaviour in the long term, it should be easy, repeatable, and reinforced (Bhamra et al., 2011). Conditions that are seen as necessary for behaviour change are sufficient knowledge, a positive attitude to change as well as access to alternatives (BIO Intelligence Service, 2012). Out of these, the relevant conditions for

communication are knowledge as well as attitude. Therefore, these will be assessed in detail in the following paragraphs.

A consumer's attitude towards sustainability is a key factor in whether or not they will consider sustainability in their buying decision (Vesal et al., 2021). Here, it is important to remember that while attitude is a prerequisite for behaviour, it cannot be seen as a definite predictor (Hoyer et al., 2016). However, it remains important to work on shifting consumer attitudes towards sustainability (Vesal et al., 2021), if these are not already present. This is due to the observation that consumers' motivation to interpret a message they receive depends on the personal relevance of the message. Thus, if personal relevance and therefore motivation are lacking, it comes to a halo effect, leading stakeholders to make conclusions based on partial information (Allen, 2015).

Therefore, when it comes to stakeholders or companies as consumers, as a first step it should be identified which sustainability efforts are regarded as important by them (Kumar & Christodoulopoulou, 2014), to focus on their perceptions about sustainability and to understand where the focus and interests lie (Kapitan et al., 2019). According to Kapitan et al. (2019), five focal factors are important for business buyers especially: the credibility of the sustainability message, the impact caused by product and company, the consideration of stakeholders in the process, the resource and energy efficiency, as well as the adaptation of a holistic philosophy.

In the case of an environmentally conscious attitude, this attitude can be seen as a base for further efforts to shape consumer behaviour. In case of indifference, however, it is on the supplier "to transform this indifference of their clients into positive attitudes towards sustainability and promote socially responsible organizational buying" (Kumar & Christodoulopoulou, 2014, p. 9). To transform said indifference, Blythe (2013) presents four different strategies, targeting the consumer's salient beliefs. A salient belief refers to the belief that forms the base of an attitude. As such, it is not necessarily the strongest belief a person holds, but the most recent or most present one that therefore is referred to for forming attitude and behaviour (Blythe, 2013). First, one can try to add a new salient belief to the belief set of the consumer. Second, the strength of a salient belief might be changed, thus, its importance is either reduced or increased. Furthermore, the evaluation of an existing belief can change, so a certain attribute could be reassessed and reinterpreted. Lastly, an existing belief can become more salient if a certain attribute is now emphasised that has not been considered to be of main importance before. It needs to be emphasised that this is the theoretical way of proceeding, whereas the success of actually changing beliefs and, consequently, behaviour depends also on the strength and consistency of the existing attitude (Blythe, 2013).

The second prerequisite identified for behaviour change is sufficient and appropriate information. Information enables the consumer to make an informed choice (Leire & Thidell, 2005). For businesses specifically, a lack of information or clarity might lead to a lower consideration of sustainable products in their buying decisions (Kapitan et al., 2019). Thus, a

lack of adequate information can be seen as a major obstacle to facilitating environmental behaviour (Leire & Thidell, 2005). When providing information and trying to get across knowledge, one important factor to consider is that knowledge is not transferred by a high quantity of information alone, but rather the information needs to be of high quality, and targeted towards the receiver (BIO Intelligence Service, 2012). According to Leire and Thidell (2005), especially informative instruments that provide information in a neutral or positive way could stimulate environmental behaviour.

The question remains how these insights on attitude and information connect to communication and communication strategies. Generally speaking, the observed discrepancy between consumers' interest and their willingness to act environmentally conscious hints at communication and information flows being in need of improvement (Leire & Thidell, 2005). Especially a lack of information, or availability of unclear information only, can be tackled by improved communication and marketing (Kapitan et al., 2019). In the context of attitudes, communication proves to be of importance as well. In cases of matching attitudes, a buying decision towards a more environmentally friendly product can be influenced by focussing communication on factors that are important regarding the buyer's perception of sustainability. In case of unfavourable attitudes, shifting beliefs can be attempted through communication.

This chapter aimed at pointing out the importance of consumer attitudes and behaviour in the context of facilitating sustainable buying decisions through effective communication. Now, that the need for sustainability communication has been established, the research turns to the question of how to effectively use sustainability communication, especially for attitude change and the provision of adequate information.

4.1.3. Communication strategies

A more specific understanding of different concrete strategies on how to communicate sustainability is needed to, later on, form a strategy for communication regarding certifications. When it comes to adequate communication strategies, several authors emphasize that there might not be one ideal strategy, but that a combination of different approaches might be more successful (Allen, 2015; Reisch & Bietz, 2011; Schultz & Wehmeier, 2010). Schultz and Wehmeier (2010) point out that the main challenges for communication can result from conflicting demands of the receivers of the communication, so differentiated strategies have higher probabilities of success. Consequently, also different channels, such as information on the product, through the website, at the point of sale or through education packages can be seen as favourable (BIO Intelligence Service, 2012; BSR, 2008).

To still identify those strategies that are most promising for the present research, recent research by Fischer et al. (2021) has been taken as a first reference. The authors point out that communication about sustainable consumption, which, as emphasised in chapter 4.1.2., is central to the present research, is still insufficiently explored. By consolidating the yet existing

literature, they identify four types of sustainable consumption communication, namely, communication for consumer behaviour change, communication for consumer self-empowerment, communication for consumption systems change, and communication as constructing sustainable consumption. Communication for consumer behaviour change makes use of behaviour modification strategies, so consumers do not have to engage more deeply in sustainability, but rather the communication is supposed to appeal to the individual and their already existing beliefs and dispositions. Tools for this type of communication include social marketing, nudging and message framing. Communication for consumer self-empowerment, in contrast, is trying to change consumer behaviour. To do so, communication aims at engaging the consumer with sustainability topics by providing relevant information while focussing on the actual needs of consumers. This is done, for example, through boosting, information provision or education. When communicating for consumption systems change, communication focusses on systems behaviour instead of individual behaviour, mainly carried out by businesses through certifications and corporate social responsibility (CSR) or, when it concerns government communication, regulations, and sanctions. Lastly, communication as constructing sustainable consumption tries to analyse how consumption is shaped, enabling it to problematise and deconstruct sustainable consumption to put it into a broader societal view.

Resulting of this review and classification by Fischer et al. (2021), nudging and message framing have been identified as the first concrete strategies that should be examined in closer detail in the following chapters. This is further supported by the fact that those strategies are applied also by several authors that are not mentioned in Fischer et al.'s literature review. Nudging, for example, is seen as a useful tool to promote sustainable consumption by Lehner et al. (2016), and Ölander and Thøgersen (2014) find that choices that regard sustainability or sustainable consumption often combine multiple aspects of situations in which nudges are most appropriate. Research that investigates the effects nudging can have on sustainable consumption can further be found in a study by DellaValle and Sareen (2020) as well as by Mont et al. (2014) in a report for the Swedish Environmental Protection Agency. When it comes to the framing of messages, Pelletier and Sharp (2008) explore its role for pro-environmental behaviour, while Stoefs and Mathijs (2009) research the influence of reframing towards more sustainable consumption. Van de Velde et al. (2010) apply a different focus, which is still related to pro-environmental behaviour, by looking at the possible impacts of framing when it comes to the energy transition.

Furthermore, two overarching theories should be outlined in more detail, namely, sensemaking theory as well as persuasion theory. Persuasion theory is seen to be an important tool to influence beliefs and behaviours (Allen, 2015), in fact, Pelletier and Sharp (2008, p. 211) identify it to be "by far the primary method for motivating people to change their proenvironmental behaviours". Additionally, for example, Hardeman et al. (2017) and Kolandai-Matchett (2009) conducted further studies to explore the usefulness of this tool. Sensemaking theory, then, is also seen to be a good approach to increasing awareness of

environmental issues (Morsing & Schultz, 2006). Sensemaking theory is often times used for research on corporate sustainability (Angus-Leppan et al., 2010; Apostol et al., 2021; Hahn et al., 2014; Seidel et al., 2013), therefore, this research identified it to be particularly for the given B2B context.

It should be noted for all theories and strategies mentioned above there is not always a clear line of distinction. It might be, for example, that there is a tool that is considered to be a part of persuasion theory, while at the same time useful to frame a message.

However, before turning to those more concrete strategies, it should be acknowledged that there are several aspects which are seen to be generally important when communicating about sustainability, regardless of the underlying strategy or theory. The following chapter examines these overarching aspects more closely so that they do not have to be mentioned separately and in detail in the description of each strategy following after.

4.1.3.1. General aspects of communication strategies

Several general aspects should be considered when communicating about sustainability, regardless of the underlying theory. Both Blenkhorn and MacKenzie (2017) and Sharma et al. (2010) point out that, when promoting sustainable products, the sustainability message should be connected to the known, traditional attributes of the product, emphasising that the sustainable features are an addition, without lowering the overall experience or quality. Furthermore, it is considered advisable to communicate the personal or specific benefits the sustainable feature has to the stakeholders (Reisch & Bietz, 2011) and to focus on emotional rather than rational features (Blenkhorn & MacKenzie, 2017) so that stakeholders can better understand the relevant message and values (Kumar & Christodoulopoulou, 2014). In other words, communication should be target group specific, and highlight different attributes depending on the audience (Business for Social Responsibility (BSR), 2008; Reisch & Bietz, 2011).

Two aspects that are highlighted throughout literature are the importance of communicating consistently (Blenkhorn & MacKenzie, 2017; Kumar & Christodoulopoulou, 2014; Reisch & Bietz, 2011) and even more importantly, credibly. In order to be credible, it should be communicated transparently about meaningful impacts and changes made (BSR, 2008) while not only communicating goals but also concrete results (Blenkhorn & MacKenzie, 2017). To avoid issues with legitimacy, there should be cooperation with relevant stakeholders on what to communicate (Morsing & Schultz, 2006). Furthermore, the communication with the stakeholders should be direct, detailed and transparent, including specific information and examples about environmental performance (Allen, 2015). Communication is perceived to be more trustworthy and can thus be more successful when the message is transmitted through a third party instead of a producer or seller themselves (BIO Intelligence Service, 2012). Another strategy for credible communication lies in proactivity (Allen, 2015). Proactive action and communication entail communicating without significant external pressure but to assert

influence and become more sustainable while working together with stakeholders. By itself, it is a way of communicating that enhances transparency and directness (Allen, 2015). Lastly, while direct and transparent communication is favourable, companies that communicate too loudly about their sustainability efforts might also face suspicion (Morsing & Schultz, 2006). More subtle ways of communication are seen as more credible, while it also helps to avoid stakeholder disappointment and leaves room for interpretation (Schultz & Wehmeier, 2010).

Keeping those overarching aspects, namely, target group specific, consistent, and credible communication, in mind, the following chapters turn towards the aforementioned theories and strategies, starting off with persuasion theory.

4.1.3.2. Persuasion theory

Persuasion theories are about "creating, reinforcing, or modifying beliefs, attitudes, or behaviors" (Seiter, 2009, p. 745). Already early persuasion research identified attitude change to be one prerequisite for changing behaviour. Said research states that attitude may be changed through credible information that is presented by a sender that is also credible, and additionally likeable and similar to the receiver (Seiter, 2009). It suggests presenting both sides of a story, with counter-arguments regarding the other side, having the strongest arguments first and last, and using moderately strong fear messages to successfully change attitudes (Seiter, 2009).

However, attitudes are only one prerequisite for behaviour change. Two others are motivation and the ability to change (Seiter, 2009). This is the underlying assumption of two influential and impactful theories of persuasion, that should be looked at in more detail.

The elaboration likelihood model of persuasion is trying to explain the relation between attitudes and behaviour, and why one and the same variable can have different effects on persuasion for different people. The model states that the extent of elaboration, meaning the extent to which a person reacts, reflects, and thinks about a message, influences the following processes and the possible extent of behaviour change (Petty & Cacioppo, 1986). This extent of elaboration is determined by motivational factors, such as relevance, accountability or need for cognition, as well as ability factors, such as distraction, time pressure or existing knowledge. In cases of high elaboration, the central route of persuasion is followed. Here, strong positive reactions to a message lead to higher persuasion, while strong negative reactions lead to lower persuasion. Important factors that determine the strength and direction of the reaction are the quality and perceived importance of information, the accessibility of possible thoughts and reactions, as well as the credibility of the sender (Petty & Cacioppo, 1986). The peripheral route of persuasion comes into play in cases of low elaboration. It requires little thought but relies on heuristics or cues that are activated with little awareness. While the peripheral route can be accessed faster and easier, attitudes that emerge from high elaboration are considered to be more stable, as they were formed under more awareness and consideration (Petty & Cacioppo, 1986).

The second influential model is the heuristic systematic model of persuasion, which considers two ways of changing attitudes. First, the systematic way requires considerate and careful processing of information, where attitudes are based on the evaluation of whether the information was perceived to be valid (Chen & Chaiken, 1999). The second way forms attitudes in a simplified way through the use of heuristics. These include, for example, consensus heuristics based on majority opinions, expert heuristics based on opinions of trusted expert sources, or message length heuristics inferring that longer messages have more arguments and are therefore more convincing (Chen & Chaiken, 1999). Next to heuristics, attitudes can also be influenced by other so-called biases. These include both defensive and impression motives. While defensive motives lead to higher agreement with favourable or self-benefitting perceptions, impression motives lead to attitude change to appeal to or impress others by confirming their attitude (Chen & Chaiken, 1999).

Those three main theories or ways of persuasion– attitude change, the elaboration likelihood model, and the heuristic-systematic model – are also those that are reflected in literature linking persuasion theories with sustainable behaviour.

When it comes to changing attitudes towards sustainability, Allen (2015) emphasises the importance of credibility and likeability well as the similarity of sender and receiver. Especially for the communication of sustainability-related messages, evoking fear could be an easy task due to the possible very negative consequences of non-sustainable behaviour, however, fear should be evoked only carefully, but all sides of an issue should be communicated (Allen, 2015). Furthermore, communication needs to be consistent and congruent with what it is about, thus, an emotional topic should be targeted with an emotional message (Hardeman et al., 2017). At the same time, the message needs to be tailored towards the audience. There should be a difference between communicating to those who already have knowledge and motivation, by providing high-quality information, and those who have little motivation towards acting sustainably. Here, making use of heuristics is seen to be the more promising strategy (Allen, 2015). Furthermore, it can prove to be successful to make use of already existing salient beliefs. Persuasion showed to increase when communication targets said salient beliefs, which therefore need to be evaluated carefully beforehand (Hardeman et al., 2017) to not choose the wrong target. In the context of communicating about sustainable behaviour, Hardeman et al. (2017) found that active appealing messages were most successful, thus, it is beneficial to emphasise the personal benefits of behaviour by making use of the receiver's injunctive and descriptive norms (Hardeman et al., 2017).

4.1.3.3. Sensemaking theory

The next main theory to be considered is sensemaking theory. The word sensemaking refers to being able to understand what is transmitted, mainly through the human senses. When talking about sensemaking as a theory, however, several wider definitions and aspects are included. Sensemaking can also have a social frame, which includes the ability to process information and social interaction. It can further be expanded to intrapersonal communication and one's perception of individual reflection, as well as communicative engagement and sensemaking as dialogue (Dervin & Naumer, 2009). As such, it includes questions such as why and how to make sense of an issue, or how to change the perception of it.

When it comes to making sense of environmental issues or sustainability, sensemaking "involves the sensing, weighing, and synthesizing of external stimuli in a way that lead to pro-environmental beliefs." (Degirmenci & Recker, 2018, p. 2). Degirmenci and Recker (2018) find that two ways to change a pro-environmental belief can be reflective disclosure as well as information democratisation, which includes the analysis and presentation of environmental indicators to increase awareness to impact behaviour, as well as enabling access and interaction to sustainability conversation.

On the organisational level, then, sensemaking includes cognitive, linguistic and conative processes, so processes that involve thinking about company or organisation worldviews and stakeholder relations, explaining and communicating the worldviews and company behaviour, so the commitment and consistency related to what the company says (K. Basu & Palazzo, 2008). Here, research on sustainability and sensemaking has focussed on companies' CSR activities. K. Basu and Palazzo (2008) are following the notion that corporate sensemaking influences a company's way of communicating with stakeholders, given the way they make sense of their environment, which can then shape or determine the company's CSR activities. Furthermore, outside stimuli or incentives can in turn also influence a company's sensemaking, especially when a company gets in contact with a relatively new concept such as sustainability. Therefore, incentives like public pressure, new regulations or stakeholder expectations could influence companies' perception of sustainability (Apostol et al., 2021). Morsing and Schultz (2006) find three ways of communicating about CSR to stakeholders, namely information, response, and involvement. An information strategy includes one-way communication and the goal of making sense and creating understanding amongst the company's stakeholders through information material with a coherent and appealing message (Morsing & Schultz, 2006). The response strategy includes two-way, but asymmetric communication. Here, a company tries to understand stakeholder concerns and wants to demonstrate how they are incorporated. Thus, the company tries to change stakeholder attitudes but does not change itself based on stakeholder opinions. Therefore, the communication sent by the stakeholders mainly gives feedback on whether the company strategies are accepted (Morsing & Schultz, 2006). In the involvement strategy, companies make use of two-way symmetric communication. This type of communication includes proactive dialogue with stakeholders, which are involved in the

CSR messages. Here, Morsing and Schultz (2006) introduce the additional approach of sensegiving, which tries to influence someone else's sensemaking, a process which, as the authors pose, is of increasing importance. In the involvement strategy, sensemaking and sensegiving interact, and both company and stakeholders might change their beliefs and approaches after the dialogue, as the idea is to identify the ideal CSR strategy together (Morsing & Schultz, 2006).

4.1.3.4. Nudging

After looking at two main theories, now more detailed concepts and strategies are outlined. The most prominent one is the concept of nudging. It is based on the cognition that humans do not always act rationally or based on their beliefs, especially in situations where the effort is perceived to be too high, and no cognitive effort is made. However, this is not necessarily seen to be a problem, as nudges can work to correct such faults by making decisions intuitive without required efforts, by directing people towards behaviour that matches their interests and preferences (Hertwig & Grüne-Yanoff, 2017; Lehner et al., 2016). Nudges are usually used to approach what Kahneman (2011) defines to be the first system of thought, thus, the processing system for fast and intuitive choices. According to Thaler and Sunstein (2008), the way nudges work is to change the environment or the way of presenting choice options and therefore influencing behaviour without changing a person's values or beliefs, but solely by trying to enable behaviour.

Typical situations in which nudges can be useful include those where choices have a delayed effect, are difficult to make or infrequent, where feedback is poor, learning is not possible or where the relation between choice and outcome is ambiguous (Thaler & Sunstein, 2008). Thus, they are mainly applicable if choices for behaviour are not actively made (Thaler & Sunstein, 2008) or in decisions of high involvement, that are characterised by high complexity or unfamiliarity (Lehner et al., 2016; Mont et al., 2014).

When implementing nudges, evidence suggests it to be most effective to integrate them with a supplement measure (Lehner et al., 2016; Mont et al., 2014). Such supplement measures could include information provision, the targeting of values, or changes in the available infrastructure (Mont et al., 2014; Ölander & Thøgersen, 2014).

Like most tools, nudging, too, has both benefits and weaknesses. On the positive side, it is a relatively easily implementable tool based on an empirical understanding of human behaviour and aims at guaranteeing a free choice while helping as a guide to decision making (Mont et al., 2014). On the other hand, its easiness does depend on the scale it is applied, on a large scale, it can be time-consuming. Furthermore, to be effective, a good understanding of the decision-making process is required (Mont et al., 2014). Points of critique mention that nudges could be seen as manipulative and could therefore lead to a decreased trust, especially as they might work best on less informed and thus vulnerable parts of society and could, in turn, enable

freeriding for better-informed people (Lehner et al., 2016; Mont et al., 2014). When making use of nudges, it is therefore important to consider and avoid these points of criticism.

When it comes to sustainable behaviour, Ölander and Thøgersen (2014) point out that decisions related to such sustainable behaviour often combine multiple of the aspects that Thaler and Sunstein (2008) define to be the situations in which nudging is most useful. Sustainability-related decisions can, for example, require high effort or have a delayed effect. Therefore, nudging could indeed be a useful tool to promote sustainable consumption (Lehner et al., 2016). DellaValle and Sareen (2020) studied the usefulness of nudges specifically for the topics of energy justice, energy poverty, and energy transition, where thy find nudging to be helpful to overcome the complexity of the underlying problem. However, especially in the context of sustainable consumer behaviour, nudging should not be the only tool in use as understanding and a change of values proved to be important in the long term, and some broad systems cannot easily be influenced by nudges (Mont et al., 2014).

The four main types of nudging tools that could also be applied to nudging sustainable consumption are simplification and framing, changes to the physical environment, changes to the default policy, and use of social norms (Lehner et al., 2016; Mont et al., 2014). *Simplification* relates to the fact that information needs to be understood easily, and therefore should be presented straightforwardly so that it can be processed and facilitates decision making. Through *framing*, the information can be presented in a format that appeals to a person and activates processes by approaching their values and attitudes. *Changing the physical environment* can be useful, especially for low-involvement decisions. It refers to changing a setting to facilitate decisions, for example, through a distinct placement of products or the specific design or layout of an environment. Oftentimes, people prefer to take the easiest way of behaviour by not acting without necessity, and instead relying on a standard way of behaviour. Thus, *changing this default policy* or standard, for example to a more sustainable one, can have a high impact. Lastly, making *use of social norms* can either influence behaviour through the use of an injunctive norm, so the assertion of what should be done, or of a descriptive norm, through pointing out what the standard behaviour is. However, to exert influence, either way, this norm needs to be visible. Here it should be considered that oftentimes, several norms could be applicable to a situation, and the one that is most prevalent or visible at the given time is the one that has the highest influence (Lehner et al., 2016; Mont et al., 2014).

4.1.3.5. Framing

The concept of framing in itself is something intuitive to most. People use frames to better understand the complex world, while at the same time using the frames to reconstruct the world themselves (Volkmer, 2009). Identifying those frames, therefore, means identifying how people see the world (Volkmer, 2009). Applying this to communication, for information to be transported effectively, it needs to be targeted towards the receiver and their world view – for example, through the understanding and use of the receiver's frames – in terms of content and way of presentation (van de Velde et al., 2010).

There are different ways in which a piece of information can be framed. Generally, information can be framed either positively or negatively, towards possible gains or losses of the behaviour. Furthermore, either extrinsic or intrinsic attributes can be appealed to (Pelletier & Sharp, 2008). Van de Velde et al. (2010) distinguish between risky choice, attribute, and goal framing. To promote a risky choice, the potential loss should be put into the centre of information transportation, whereas a gain frame is more likely to lead to risk avoidance (van de Velde et al., 2010). Another way of framing is to focus on certain attributes or specific parts of an issue which are communicated mainly, which usually are positive attributes (van de Velde et al., 2010). For a goal frame, a goal or desirable behaviour needs to be predefined (van de Velde et al., 2010). The framing should depend on the motivation leading to this goal, thus, a distinction between intrinsic or extrinsic goals should be made (Pelletier & Sharp, 2008). Then, a positive frame can either focus on possible gains won or losses avoided by the behaviour, while the negative frame points out the expected losses or lost gains (van de Velde et al., 2010). Intrinsic goal framing has shown to lead to deeper and more long-term effects regarding engagement, information processing, and persistency of behaviour (Pelletier & Sharp, 2008).

Pelletier and Sharp (2008) pose that at different stages of the sustainable behaviour change process, people are receptive to different kinds of messages, which is why the message should be tailored towards both the target group and the specific stage of behaviour change. First, in the detection phase, attention to a problem should be created, and personal relevance should be emphasised, for example by pointing out risks and creating fear. A negative frame that emphasises the costs more than the benefits, has shown to be a successful strategy to create attention. After awareness is already given, however, inducing fear bears the risk of a negative influence, leading to an avoidance reaction. To create motivation, a solution should be provided next to the fear induced (Pelletier & Sharp, 2008). Afterwards, in the decision phase, the focus should be on showing the feasibility, desirability and (personal) benefits of the behaviour change. While not yet proven for sustainable behaviour, in health research, gain-related messages have shown to be effective to create an intention to act, as the message can help identify behaviours that can serve as a solution to the problem (Pelletier & Sharp, 2008). Then, in the implementation phase, the intention to implement the behaviour needs to be created, so it needs to be clear what specific behaviour is needed in which context to achieve the predefined goal intended by the behaviour change (Pelletier & Sharp, 2008).

The framing and tailoring of messages according to the different phases of behaviour change might help to create a self-determined motivation to act, and lead to long-lasting effects on behaviour (Pelletier & Sharp, 2008). In order to achieve that, it is important to include information on how to behave, mitigate, or find solutions and what importance these solutions have, especially since if a person believes that their actions have an impact, they are more likely to act (van de Velde et al., 2010). To create this perception of an impact, a gain frame has shown to be effective (van de Velde et al., 2010).

4.2. Barriers and opportunities for certifications

In order to be able to purposefully apply the aforementioned communication strategies, it has to be identified where the content-related focal points of the communication should lie. In other words, what matters in the context of improving communication regarding certifications? To answer that question, the conducted interviews provide relevant insights. The interviews are used to identify the main barriers to using certifications, as well as positive aspects and opportunities that certifications have to offer. This shows promising points of entry for the communication strategies.

4.2.1. Barriers

In total, the results identify eight barriers that impede the use of certifications. These are shown below in Table 6 and Table 7. The tables provide an overview of the barriers, their definition, how far they match with insights from literature, and in what ways identification in interviews and literature differ. Table 6 entails those barriers that can be seen to be more systemic and impede the use of certifications in a more general manner whereas Table 7 shows barriers that are especially relevant at this moment in time.

Table 6: Barriers to the use of certifications (part 1)

Barrier	Lack of trust	High effort	High costs	Low understandability	Not suitable
Definition	Certifications are not always trusted as they can, e.g., be misused for greenwashing	In order to get a certification, high efforts need to be invested beforehand	Certifications might be rejected because of their inherent costs or because of the consequent higher costs for products	Certifications are unclear and too complicated for customers to understand	For some current aspects of sustainability, certifications are not suitable
Proof quote	"And that's exactly where it comes from. So that that's an issue I think that certification schemes are not necessarily trusted because there are these error […] certification schemes in between" (Certifier 1)	"So, you have to invest money, but you also have to invest time, and I think it's not a big topic still. It's changing, but it's not a big topic. And if it's not a big topic, you don't invest time." (Producer 1)	"Each certification, which brings a new technical specification, causes first of all costs. This is what could hinder the process." (Certifier 2)	"As an outsider, it's also difficult to check […] to what extent certification schemes are reliable because you're not gonna look in all requirements, it's just too much […] so, it's impossible to know what each certification scheme means" (Certifier 1)	"That's why it's good to take certification as a basic requirement. But in order for building projects to become truly more sustainable, the sustainability factor must be weighted in some way." (User 1)
Link to Literature	Trust reduces especially in cases of high numbers of certifications combined with a lack of transparency (Bratt et al., 2011)	The time of the verification process is a weak point for companies that can lead to restraining from the use of certifications (Rubik et al., 2007)	Companies see the fees for certifications as a hurdle to apply, as the money could be used differently instead, be it for marketing or other sustainability efforts (Rubik et al., 2007)	Not ensuring that the consumer can easily understand and access a certification is one major shortcoming of eco-labelling (Basu & Bidanda, 2014)	The applicability of certifications has been discussed in different contexts, e.g., its ability to promote wide ranges of sustainability (Walter et al., 2003) or its transferability to different contexts (Barrett et al., 2002)
Differentiation from literature	A lack of trust can also result from missing quantification. It can increase especially in industries that are not trusted in themselves, such as the plastic industry which already has a negative image.	Next to time, the process of certification and its requirements plays a role as well. It can either be underestimated or seen as too difficult to not start with it in the first place.	While the costs of the certifications themselves are one aspect, costs can also occur as a consequence: companies fear higher prices for themselves when buying certified products, or a competitive disadvantage through having to demand higher prices.	A lack of understandability can occur through highly complicated information, too many certifications with different requirements or unclear and misleading presentation of the certification	No discussion on the applicability of certifications for sustainable plastics to enhance plastics and construction sustainability has been found in literature, but the interviews suggest that such a debate might be of interest

Table 7: Barriers to the use of certifications (part 2)

Barrier	Lack of demand	Lack of standardisation	Low importance of sustainability
Definition	Certifications are currently neither required nor demanded	The high amount of non-standardised certifications makes it difficult to understand which certifications should be used	Especially in the building industry, sustainability awareness and therefore action in all regards, including certifications, is still relatively low
Proof quote	"But as long as there is no common thread on how these goals can, must, should be achieved, whatever, I believe that only a limited amount will happen. Because it's just not concretely demanded" (User 1)	"I think there is a lot of, still a lot of unclarity about which certifications are necessary and that's why people don't, or companies don't choose them because they don't know." (Marketing 1)	"But half of the people are not interested yet. So, how are you getting this knowledge across? You don't." (Buyer 2)
Link to Literature	In the context of tourism, a lack of demand is believed to stem from lacking belief in contributing to sustainability and increased profit and is found to be more prevalent in small companies (Margaryan & Stensland, 2017)	The large number of certifications makes it difficult to decide on which one to follow, especially as not all certifications are equally transparent and reliable (Basu & Bidanda, 2014)	The success of certifications is, inter alia, determined by a pragmatic dimension. Whether a certification is seen to be useful to achieve one's goals influences whether it is used or not (Dendler, 2014)
Differentiation from literature	While the interviews are suggesting a similar lack of demand as observed in tourism and both profit and company size have been mentioned as possible barriers, an evaluation regarding the specific reasons for the building industry is lacking	Not only the number but also the lack of (European) standardisation and harmonisation of certifications are seen as a problem	The literature suggests a strategic decision against certifications if sustainability is not a focus of a company. The interviews additionally suggest a general lack of awareness to be a reason for some actors.

While every barrier is relevant to improving certifications and their success, not all of them can be easily approached by the use of communication strategies. The lack of standardisation, for example, is more likely to be influenced by changes in legislation, whereas the fact that certifications are not suitable for some sustainability-related issues is most likely not going to change at all. Therefore, only those barriers that are seen to be approachable through communication are going to be outlined in detail.

Lack of trust

A lack of trust is an important hurdle that certifications are facing. Certifications aim to increase trust in a product, so if the certifications are not trusted themselves, this results in a major problem. The lack of trust can have different roots. For one, "you can always doing something in your own favour" (Buyer 2), thus, also use certifications in that way, for example, when certifications "are used as blenders or to dazzle or something like that." (Certifier 2). Connected to this is the issue that sometimes certifications do make unsupported claims or are at least seen to be doing that: "You see all the recycling sign, but it's, I think it doesn't say anything but it's a lot of recycling signs on products" (Producer 1). Lastly, when certifications are given out by companies themselves, they are perceived not to be trustworthy. The interviewees pointing out factors that reduce trustworthiness, usually also make clear that this is only the case for some certifications. It could, therefore, be overcome by emphasising which certifications can be trusted and why.

High effort

Another major reason named for not participating in certification programmes is the high effort connected to it. Here, different aspects seem to play a role. First of all, the effort connected to the time that needs to be invested is seen as a hurdle: "But it also means that it's quite some work. It takes a lot of time. You need to look at a lot of different aspects." (Certifier 1). Secondly, a lack of knowledge or capacity is a difficulty as well. Producer 2 remarks: "The challenge, of course, is that you first have to set up a corresponding certification system internally. I have to keep records, which means I have to design my processes accordingly, I have to make them comprehensible, and I may have to keep additional documentation. I also limit myself to some extent in terms of the degrees of freedom I have in production, so that's quite a challenge". Connected to that, the size of the company can play a role as well, as smaller companies might have even fewer capacities to invest the described efforts.

High costs

Closely related to the high effort, costs are another important factor not to obtain a certification: "the biggest challenge is the question, what are the costs." (Buyer 1). Here, companies first need to consider the money they need to spend for the certification. While one interviewee states that this might be especially challenging for small companies, another one points out that "most certifications work in a way, the bigger the company, the bigger the turnover, the higher

the price" (Buyer 2). For those companies that are not in the position to use certifications themselves, but to buy certified products, the barrier lies in the fact that the price of the obtained product might rise with the certification, which not every company is willing to pay. However, some interviewees also point out the fact that the cost of certifications should be seen relative to other investments or the total company spending: "But if you put the costs for such a certification in relation to, I don't know, 500,000 units that were produced or something like that. That's not going to be the big thing that's added on top either" (User 1). This, together with possible future costs, could be arguments to overcome the price hurdle.

Low understandability

Several interviewees reported that understanding a certification in detail is difficult due to the detailed requirements they entail and given the range of certifications available: "Maybe it is difficult to keep track of it in such a detailed way" (User 2). To increase understandability, the interviewees demand a more simplified way of presentation, that combines the inclusion of the important aspects and accessibility: "I think it's important for sure, like which norms do you need to have this certification, but also that it's explained in more like a normal language what it means." (Marketing 1).

Lack of demand

At the current time, different actors in the building industry have only limited demand for the use of certifications. This leads to a situation in which "theoretically it's supposed to be a decision criterion, but then it's always individual talking" (User 1). Several interviewees emphasise that their clients do not ask for certifications, which is why in consequence they do not focus on having them. According to Buyer 3, this leads to the following situation: "For plastics, at the moment, are only the legal requirements in the focus". Those legal requirements, however, are not in favour of certifications either. Currently, it is not necessary to use certifications, leading to a situation in which, according to User 1, some actors might say "then I'll put it off for the time being if I'm not obliged to." Overcoming this barrier would thus require either the implementation of legal requirements or increased consumer demand for certifications.

Low importance of sustainability

There seems to be agreement among the interviewees that, while sustainability might be gaining more importance recently, the current state of sustainability within the plastics and building industries is still relatively low, or, as Buyer 2 puts it: "the building materials world is a little bit behind. It's a little bit slow." The main problem for certifications resulting from this is the limited willingness to invest time or money in sustainability and sustainability labels. Currently, the experience is that money still rules over sustainability: "Means, we can, or we must always deliver or submit the cheapest offer to get the contract. Means, if we offer any super

environmentally friendly machines, construction methods or the like, we are no longer competitive […] and then get thrown out." (User 1).

The presented barriers are different in nature. While some of them might be suitable to be overcome or reduced through communication, others might impede successful communication. Before this is outlined in more detail, the next chapter turns to the positive sides and opportunities identified by the interviewees.

4.2.2. Opportunities

Luckily, not only barriers but also opportunities for improved use of certifications have been identified. Over the course of the interviews, a total of seven opportunities have been extracted. Table 8 presents them in an overview. All opportunities are applicable to communication, thus all of them will be explained in detail below the table.

Table 8: Opportunities for the use of certifications

Opportunities	Distinction	Standard setting	Increase trust	Sales argument	Increase sustainability	Growing demand
Definition	Certifications are seen as a tool to distinguish oneself from competitors	Certifications can set a standard regarding sustainability that can be relied on	Certifications can provide proof as well as transparent and trustworthy information that adds to the sustainability message	Certifications are expected to increase in demand and are or can become an argument to choose one company over the other	The use of certifications can lead to enhanced sustainability efforts within companies	Sustainability is growing, thus, the demand for certifications is increasing too
Proof quote	"So for us it's important to stand out from the competition. Because the certifications have not, or not yet, established themselves as an industry standard." (Producer 1)	"But I do think that it sets a certain standard and that if you look at ISO certificates, for example, I do think that it really helps and it gives companies sort of hand out and they keep it up to date because of these certification schemes" (Certifier 1)	"People are saying, no but this is really sustainable because of X. But if you have a certificate that is, with the multiple layers, you can actually prove it. And I think we really, umm, need to go into that way more." (Buyer 2)	"And because you can now just create a, yeah, because you can simply create selling points by being able to build in a climate-friendly or more climate-friendly way, which others may not be able to do because they don't even know how to do it." (User 2)	"You started looking at the way they are producing differently, so I have a couple of other companies that actually, they started the Cradle to Cradle project because they wanted to have a commercial certification label, but in the end, they actually hired somebody to set up this whole approach within the company and they're gonna be applying it to each and every product that they have." (Certifier 2)	"And I perceive that the awareness of using recycled plastic has grown very strongly in the last five years in various industries, that the manufacturers of plastic products are currently looking for plastic recycling, for plastic recyclate, to a high degree." (Certifier 2)
Link to Literature	Certifications can help to identify environmentally superior products from others (Gazulla Santos 2014)	“An ecolabel identifies a product that meets a wide range of environmental performance criteria or standards.” (Golden et al., 2010, p.4)	Certifications can provide environmental legitimation (Martín-de Castro et al., 2017)	Certifications are aiming to enable decision-making based on environment-related information (Basu & Bidanda, 2014)	Especially multi-attribute certifications can lead to sustainability improvements of a certified product (Cobut et al., 2013)	The success of certifications is, inter alia, determined by a pragmatic dimension. Whether a certification is seen to be useful to achieve one's goals influences whether it is used or not (Dendler, 2014)
Differentiation from literature	A distinction can be both, in terms of the environmental attributes from one product to the other, but also in terms of engagement for sustainability from one company to the other	Through setting the standard, certifications also enforce compliance with it to a certain degree without having to check it in too much detail	The legitimation is achieved through the perception of certifications being a fact-based, reliable proof and checked regularly	This could lead to the point where having certifications is a necessary requirement in a tender	The focus of literature has been on improvements needed to comply with labels, and less so on the effects of certifications on the awareness and perceived importance sustainability has within a company	

Distinction

A first opportunity the interviewees see in using certifications is that the certifications can serve as a means of distinction from competitors who do not use certifications. As such, a certification can also be "a proof that you are doing the right things." (Producer 1). The possibility of distinction can go in different ways. Producers can distinguish themselves by placing certifications on their own products: "Of course, we also try to convince our clients that in this way we're saying our products with certifications offer added value, added value in terms of sustainability" (Producer 1). For stakeholders further down the chain, such as users of plastic products, buying products with certifications can be a distinction or a message towards their partners: "The added value is actually that we have the opportunity to prove that we are working with partners who have looked at this issue and are trying to optimize themselves." (User 1).

Standard setting

Closely related to both standard-setting and increased trust is the fact that certifications are perceived to set a reliable standard that companies and clients can count on. Certifications are seen as a relatively easy way to prove the value added in terms of sustainability, and for companies to prepare themselves for possible future legislative requirements. An advantage is seen in the fact that "what is certified then and through that also proofed, to then guarantee the fulfilment of the use of recyclate" (Certifier 2).

Increase trust

Trust is reported to be a central theme for sustainability and certifications. The interviewees appreciate that certifications are fact-based and point out that, to have a trust-increasing effect, the certifications need to be sufficiently strict and transparent. When this is given, certifications can have a positive impact on trust in the sustainability of a product: "And these days the question comes, okay, if you say environmentally friendly, prove it. Therefore, the certifications, as Blaue Engel, TÜV, LEED, are getting more and more important to prove the claim that you make in your advertisement." (Buyer 1). However, certifications can increase trust not only in a product but also in a company: "Yeah; I think when they have the certification, it gives them a certain professionality" (Marketing 1).

Sales argument

In the interviews, it has been pointed out that certifications are increasingly seen as an argument that can influence the decision for or against buying a specific product. Especially in tenders certifications either already are required or are expected to be required in the near future: "In our view, the market will simply change in such a way that a sustainability certification will simply become a mandatory criterion." (Buyer 3).

Increase sustainability

Certifications are seen as a tool that can be used to not only display, but also enhance sustainability efforts within a company. This can be the case when companies start to become more aware of sustainability through certifications: “And when you get a insight in the numbers, you get, I think you create some awareness.” (Buyer 2). Another mechanism can start through new requirements that force companies to change their business practices: “I think this will have a much greater impact in the future because only those companies that position themselves correctly will continue to offer the products that are in demand on the market.” (Buyer 3).

Growing demand

Several interviewees report that with slow but steady growth of sustainability in their industries, the demand for certifications is expected to increase as well. It is observed that currently, sustainability awareness is not yet fully there, but that more and more, companies “want not only to have good quality products and also the best price, but they also want the products to be produced in a sustainable way” (Marketing 1). This is also increasingly true for plastic products, as Certifier 2 reports: “Yes, this change in awareness is something that I perceive very, very positively, that not only recycled paper is good, but also recycled plastic is regarded as a techno-cultural achievement, let’s say”. This growth in awareness and positive attitude towards sustainability and recycling also reflects in the possible development for demand in certifications, as they are seen as one means to attend the growing importance of sustainability: “Sustainability is also playing an important role for more and more companies, and these certificates help us to provide better independent proof of this.” (Producer 2).

Emphasising these already existent opportunities in their broad range in communication could prove to be a useful tool to overcome the barriers identified earlier. How this can be done according to literature insights is outlined in the following chapter.

4.3. A communication strategy

In the next step, a connection needs to be made between the insights the research gathered so far. To do so, this chapter investigates how far the presented aspects of importance for successful sustainability communication as well as the concrete strategies can help overcome the presented barriers, by making use of the identified opportunities, and the role the analysis framework can play in this process. In the first step, Table 9 and Table 10 present these results in an overview. Here, the tables display the main aspects of the different strategies, the related barriers and opportunities as well as how those connect and can be used in brief. The introduction to the theoretical background in chapter 4.1. identified different levels of importance. These levels were the prerequisites for sustainable behaviour as a goal of communication, general, overarching concepts that were identified to be relevant for sustainability communication despite the underlying theory, and lastly, concrete theories and

strategies. Accordingly, the first focus is on the more general aspects of behaviour change and overarching concepts, which are presented in Table 9. Only after that, the research turns to the more concrete strategies identified in Table 10. Following the table presentation, a more detailed description of said connection is given for each strategy, with the goal of forming the barriers and opportunities into a communication strategy that is based on a theoretical foundation. Lastly, the relevance for the case study is pointed out.

Table 9: Overview of connections between communication strategies, barriers, opportunities (pt. 1)

Strategy	Information provision	Consumer attitude	Target group specific communication	Credible communication
Definition	Consumers need sufficient and appropriate information to make an informed choice which is a prerequisite for sustainable behaviour	A sustainable consumer attitude is one necessary precondition for according consumer behaviour, even though attitude is not a definite predictor	Successful communication should be adjusted to the target group, focussing on their specific needs, wants and perceptions, as well as on known attributes of the product valued by this group	In order to transport a message successfully, communication needs to be credible and consistent in its content and form
Main aspects from literature	The quantity of information communicated is less important than its quality and its targeting (BIO Intelligence Service, 2012)	To reach compliance between attitude and behaviour, communication should focus on the main factors of importance for business buyers, being credibility, impact, stakeholder consideration, efficiency and a holistic philosophy (Kapitan et al., 2019). In cases where a sustainable attitude is not given, salient beliefs need to be targeted (Blythe, 2013).	Sustainable features should be communicated as an addition to the known attributes of the product (Blenkhorn & MacKenzie, 2017; Sharma et al, 2010). The focus of communication should be on the personal benefits of the sustainable features (Reisch & Bietz, 2011)	Communicate about changes made and goals reached (BSR, 2008), be detailed and direct (Allen, 2015) and communicate proactively (Allen, 2015) while remaining subtle (Schultz & Wehmeier, 2010)
Related barriers	Lack of demand, lack of trust, high effort, low understandability	Lack of demand, lack of trust, low importance of sustainability	Lack of demand, high effort, high costs, low importance of sustainability	Lack of trust, low understandability
Related opportunities	Increase trust, growing demand	Distinction, increase trust, sales argument, increase sustainability, growing demand	Distinction, sales argument, growing demand	Standard setting, increase trust, increase sustainability
Connection	Using clear high-quality information can help overcome mentioned barriers for certifications. Additionally, the analysis framework could be used as a neutral information instrument to increase trust.	Changing unfavourable consumer attitudes can be attempted by trying to change salient beliefs by rephrasing barriers or emphasising opportunities. In case of favourable attitudes, communication should focus on credibility and stakeholder relevance, whereas the opportunities identified should be used to emphasise the personal benefits of certifications	Attempt to overcome barriers of high effort and price by emphasising low costs and efforts compared to other efforts, as well as long-term savings and benefits. For certified products, focus communication on value added to a product by the certification through distinction and possible sales argument.	The lack of trust in and low understandability of certifications are the main barriers that need to be overcome by making use of the identified opportunities, especially by pointing out sustainability enhancements and by using the framework as a transparent and impartial tool

Table 10: Overview of connections between communication strategies, barriers, opportunities (pt. 2)

Strategy	Persuasion theory	Sensemaking theory	Nudging	Framing
Definition	Main persuasion theories find that in order to create or change behaviours, attitude, motivation and ability to change are crucial, leading to decisions being made either consciously or based on automatic heuristics	Involves the why and how to make sense of an issue, or how to change that sense. Thus, for sustainable behaviour, it refers to making sense of external information so that this leads to sustainable attitudes	Nudging can make decisions intuitive by leading towards a behaviour that is in line with someone's interests and preferences	Framing a message includes targeting its content and way of presentation to the receiver and their worldview
Main aspects from literature	Communication should be consistent, match the receivers' norms and values and therefore be tailored towards them and target their salient beliefs (Hardeman et al., 2017). Both sender and content should be credible and likeable, whereas the use of fear should be considered carefully, rather, personal benefits should be pointed out (Allen, 2015)	Outside pressure or stakeholder expectations can influence sustainability perception (Apostol et al., 2021) and should therefore be communicated. Getting into proactive dialogue with stakeholders to exchange beliefs and approaches leads to the most successful results for incorporating sustainability (Morsing & Schultz, 2006)	Main nudging strategies are simplification, framing, changing the physical environment, changing the default policy, and making use of social norms (Lehner et al., 2016; Mont et al., 2014)	Relevant frames for sustainable behaviour include a negative frame that at the same time provides a solution (Pelletier & Sharp, 2008), as focus on solutions facilitates people to act (van der Velde et al., 2010), framing that shows the feasibility, desirability and benefits of behaviour change, and a frame aiming at an intention to implement behaviour (Pelletier & Sharp, 2008).
Related barrier	Lack of demand, low understandability, low importance of sustainability	Lack of demand, low understandability, low importance of sustainability	Lack of demand, low understandability, high effort, high costs, low importance of sustainability	Lack of demand, high effort, high costs, low importance of sustainability
Related opportunity	Distinction, sales argument, standard setting, increase trust	Distinction, standard setting, increase trust, sales argument	Increase sustainability, growing demand	Distinction, standard setting, sales argument, increase sustainability, growing demand
Connection	Sending a consistent and credible message by emphasising standard setting and trust and focussing on personal benefits can help overcome low motivation and attitude for sustainable behaviour. Understandability needs to be increased to enable the ability to change.	In stakeholder dialogue, external pressure can be created, and own demands can be formulated by pointing out the opportunities, while listening to stakeholder concerns, to be able to overcome barriers to certifications.	Especially the strategies of simplification and making use of injunctive norms to overcome or reduce barriers and promote sustainability and certifications could prove to be useful.	Distinction and sales argument can either be framed as a loss or a gain frame, depending on the phase of behaviour change. Further opportunities can be used to point out the desirability and benefits of change.

4.3.1. General insights

Information provision

By making use of tailored and high-quality information, it might be possible to overcome some of the barriers that have been identified to impede the use of certifications. First, if the information provision regarding why certifications are of importance, especially for the relevant stakeholders, would be improved, this could help overcome the lack of demand that is observed at the moment. Similarly, low understandability, which is seen to be a major barrier not to use certifications, could be improved if information about certifications were to be presented more clearly and easily accessible. Providing clear and qualitative information could also help overcome the lack of trust in certifications, as transparency might increase said trust. Here, the somewhat contrary opportunity pointing out that certifications can increase trust in the message could be used, especially by pointing out that certifications are scientifically, and fact-based. The analysis framework developed in this research could be seen as a useful information provision tool in this context. It can be used as a neutral information instrument that has not been created by a certifier or certification holder and thus, could increase trust in the message delivered.

Consumer attitude

Both the perceived low importance of sustainability throughout the industry, as well as the lack of demand for sustainability certifications hint at currently unfavourable consumer attitudes. Shifting such attitudes is a challenging task. To do so, existing salient beliefs underlying the behaviour need to be identified and then targeted. While a full identification of all existent salient beliefs amongst the interviewed stakeholders is beyond the scope of this research, the interview insights allow for some assumptions as to reshaping or reinforcing the valuation of certain attributes to influence said salient beliefs. This includes, as the following paragraphs will describe in more detail, trying to decrease the importance of price and effort as currently main decision factors, as well as emphasising reasons to engage in certifications that are currently not dominant, such as the factor for distinction. However, the interviewees also reported a growing importance of sustainability, and connected demand for certifications, suggesting that attitudes towards sustainability are already shifting, or for some stakeholders, are already in favour of sustainability. In these cases, communication should focus on the main factors of importance in terms of sustainability for business buyers, as reported by Kapitan et al. (2019). One of them, the credibility of the sustainability message, faces the challenge that certifications experience a lack of trust. Thus, communication needs to focus on credibility, which is further outlined later on. However, said main factors for business buyers can also be used to target some of the identified opportunities. For example, the impact the behaviour of a company can have, can be communicated by pointing out the fact that certifications have the possibility to increase sustainability within the company. Stakeholder consideration can be targeted by communicating the rising demand for certifications. Furthermore, when being able

to point out the factors through which a certification can add to the trustworthiness of the message, for example, if they are based on factual criteria, this can emphasise the credibility. Lastly, as Allen (2015) points out, the motivation to change attitudes and behaviours also depends on the personal relevance of the behaviour and its consequences. As such, communication should point out said personal relevance. Here, one focus could be on emphasising the fact that certifications can be an instrument of distinction from one's competitors, that additionally is increasingly demanded by clients and in some parts already is a decisive factor for purchases, and in others, it has the potential to become one. Thus, the personal benefit of acting early can be emphasised.

Target group specific communication

Another takeaway from literature is the insight that communication should be geared towards its target group in order to be successful. At the current moment, key decisive factors for the industry still seem to be price, effort, and sales, with sustainability-related motivational factors being on the rise. As sustainability is not in the focus yet, it seems recommendable to follow Blenkhorn and MacKenzie (2017) and Sharma et al. (2010) that recommend focussing on the fact that a certified, more sustainable product remains to have the same attributes and qualities as a similar non-sustainable product, whereas the factor of sustainability is only seen as an addition. The benefits of this sustainability addition can be emphasised as being distinct from competition and potentially favoured in sales, as pointed out above. Following the mentioned decisive factors in the industry, high costs and high effort can be identified as two major barriers for the specific target group when it comes to using certifications or making use of certified products. A possible strategy to try and overcome them is to focus on comparability, so the relatively low costs and efforts compared to other departments or efforts within the company, as well as the long-term cost savings or increased benefits that can arise from acting now.

Credible communication

While credible communication is identified to be one main factor for successful communication about sustainability, efforts to credibility might be hindered by both the lack of trust adhered to certifications, as well as the certifications' low understandability. Even more so, it is important to follow the recommendations identified in literature and to make use of the opportunities for certifications, in order to overcome this possible problem of credibility: Certifications are seen as a tool that helps set a reliable standard in terms of sustainability. A recommendable strategy for a company could be to proactively point out how they are using certifications for standard setting, what changes they made in the process and how certifications helped to increase sustainability within the company. Furthermore, the analysis framework could be used as a tool that supports detailed, consistent, and clear communication that is being started proactively to show own motivation and consideration.

Persuasion theory

As mentioned before, the lack of demand as well as the low importance of sustainability show a currently low motivation and unfavourable attitude for sustainable behaviour. Therefore, these are the main barriers to be targeted by strategies drawn from persuasion theories, as persuasion strategies are focussing on, inter alia, attitude and motivation change. By pointing out how certifications can be used to set a reliable standard, and in which ways they can increase trust in the sustainability message, a consistent and credible message, which is crucial for persuasive efforts, can be achieved. Again, pointing out personal benefits is of importance, for example by making use of the opportunities identified in using certifications as a distinction as well as a sales argument. A barrier that could hinder persuasive strategies is the perceived low understandability of certifications, as it might impede the ability to change behaviour. Therefore, communication should aim at making certifications clearer and more understandable by those who could either get certified or choose certified products in order to enable the general success of persuasion strategies.

Sensemaking theory

Also for sensemaking theory, lack of demand and low sustainability represent those barriers that communication strategies from that theoretical background could aim to overcome, while low understandability forms the main barrier to success. Here, a company that is already using or demanding certifications could use sensemaking strategies to influence their stakeholders, by exerting pressure, formulating the company's expectations, and engaging in proactive dialogue, while making use of the relevant opportunities. As such, the possibility of distinction and the future sales argument could be tools to create pressure, whereas pointing out the relevance of certifications when it comes to creating trust and being able to rely on a certain standard can help to get across expectations. These points could then best be communicated in a direct, dialogic way, in which concerns of the communication partners are heard and considered.

Nudging

Different nudging strategies could be used in order to overcome barriers and make use of opportunities. Simplification, for example, could help to tackle the low understandability of certifications, by making the message easy and clear to understand. Theoretically speaking, changing the default policy could be a powerful tool to overcome issues such as high effort or low trust. However, in the given context, it is uncertain how far the strategy of a single firm to change their default policy would be successful, or if it would rather put this firm at risk. Changing the default policy might be more applicable if it is used as a policy instrument at the higher level. Making use of social norms, however, could prove to be a useful tool. By pointing out the injunctive norm, the increase in sustainability and the growing demand could be fostered further. At the same time, the currently low demand and sustainability could be helped to be

overcome, while the importance of other barriers, such as high costs and effort, could possibly be reduced. The role of framing will be evaluated further in the next paragraph.

Framing

Framing could have the potential to overcome perceived barriers stemming from a lack of demand and sustainability, as well as high costs and efforts. In the detection phase of behaviour change, where attention needs to be created, this could be done by emphasising the costs of not engaging in sustainability and certifications, by pointing out the losses of not being able to distinguish oneself from competition and use certifications as a sales argument, that can turn out higher than current costs or efforts that would need to be invested. Here, the use of certifications offers an easy solution. For stakeholders in the decision phase, the distinction and sales arguments can be used in a different frame, to point out their effects on the desirability and benefits of a behaviour change. In combination with that, the increasing demand for certifications, the use of certifications to set a standard as well as the fact that certifications can lead to an increase in sustainability can be pointed out to the same ends.

After presenting the generic insights that can be drawn from literature and interviews, these insights should be narrowed down to be applicable for the present research. The next chapter outlines how far Berdal can apply the insights in their communication.

4.3.2. Target points for Berdal

Berdal, who serves as a case study for this research, is a plastic producer. In this role, their possibilities for communication might be somewhat limited. They have a fixed place in the supply chain from where they can reach some stakeholders better than others. Furthermore, the fact that they are not independent and without their own interest might limit what they can communicate credibly. Therefore, the results presented above have been analysed regarding their specific applicability for Berdal, which will be presented in this chapter.

It should be noted that changing attitudes is most likely going to be a more than challenging task for one actor alone. Of course, the communication taken by Berdal can try to support the attitude change, however, it seems to be more fruitful to target more concrete actions and stakeholders that already have a somewhat positive attitude towards sustainability and certifications. That does not mean that all targeted stakeholders need to be fully engaged in sustainability already, but that those stakeholders that are clearly opposed to sustainability might not be the ideal target group, to begin with.

The first target point identified is the possibility to engage in more dialogue with the relevant stakeholders, probably mostly the direct buyers rather than the end user, which are difficult to reach for a plastic producer. A common approach, that could also be seen as beneficial for Berdal, would be to set up a stakeholder dialogue with several stakeholders at the same time, for example in the form of a “Sustainability Day” that could take place regularly, perhaps yearly

or bi-yearly. Such a dialogue should be set up to be reciprocal. On the one hand, it would give Berdal the possibility to explain their own efforts and reasonings behind using certifications to their stakeholders in-depth and to point out the opportunities they see for both themselves and for their stakeholders transparently, an attribute of communication which is regarded highly. On the other hand, such dialogues are usually set up in a way that direct and concrete questions about a specific topic, for example, certifications, are asked to the participants. This allows the stakeholders to give their concrete inputs, concerns and demands to Berdal, which can make them feel heard. Especially as these inputs should afterwards be considered in Berdal's own strategy and the communication about it as far as feasible, this could lead to closer connection and trust from the stakeholders to Berdal. If dialogue with several stakeholders simultaneously should not be feasible, it could still be beneficial to engage in direct dialogues with single stakeholders by themselves instead, as similar results regarding communicating directly and receiving inputs can be expected.

When communicating about their sustainability efforts and use of certifications, be it in a direct dialogue, on the website, in leaflets or in mailings, several recommendations apply. All information that is provided should be checked to be clear, consistent with prior communication, and at the same time detailed enough but not overly complex. These are also prerequisites for the communication to be regarded as credible, which should always be ensured. When it comes to certifications, the credibility of the message that is sent through the certifications can be pointed out by emphasising the reliability and standard setting certifications can provide, and the fact that this is – in the case of the certifications used by Berdal – done by an independent third party. Especially after finishing the application process for the C2C certification, this might be promising information to communicate to stakeholders, as Berdal would be the first company to get a plastic bucket or tub C2C certified. Coming across as credible when it comes to the sustainability efforts of the company can help to convince customers to choose said company as a business partner, especially when the customer is already in search of a sustainable partner.

Not only, but especially in cases where sustainability might not be the focal or decisive point for a business partner yet, it is recommendable to point out that the certified product is of the same quality as a non-certified one, and to then turn to the additional benefits provided. Here, the focus should lie on personal benefits for the concrete stakeholder rather than possible general benefits. Based on the insights from the interviews, it seems that for Berdal's stakeholders, such personal benefits could derive from sales-related arguments. Thus, Berdal could point out that a stakeholder, for example, a DIY market, that is actively offering certified products in its stores can distinguish itself from competitors. Furthermore, especially with large buyers, having a certified product on offer could become a sales argument soon, and being a first mover and preparing for this near-future scenario already now will be advantageous then. These personal benefits could be adapted for each stakeholder individually, based on additional insights and experiences Berdal might have, for example, specified for the size or location of

the DIY market in question. Connected to that, the price barrier seems to be of high relevance for Berdal's stakeholders. A possibility to approach this would be to point out the long-term benefits, for example, the possibly higher sales, certifications can bring.

Lastly, the analysis framework, or rather its results can be used as a communication tool by Berdal as well. For now, this research applied the framework to the Blue Angel, which Berdal is certified with. The analysis concluded that it is an applicable label for sustainable plastics, that can be seen as highly transparent and trustworthy. These results could for example be used as a tool for both information and explanation on why Berdal chose this label. If desired by the stakeholder, Berdal can provide detailed information that has been gathered by an outside researcher and based on insights from scientific literature, that therefore should be perceived to be relatively credible. At the same time, information can be comprised in a clear overview. In a next step, the framework could be applied to the C2C certificate in a similar manner, or to a certification not held by Berdal, such as the Nordic Swan. Here, Berdal could make a comparison in order to show why they decided on one or another label in a convincing and clear manner. Additionally, Berdal could use the results from a comparison between labels to point out the value a specific certification can add to the already existing ones, both for Berdal themselves, as well as for a company deciding to buy a certified product.

4.4. Discussion

Following the presentation of the interview data as well as their connection to literature, these results and implications are discussed. Again, this entails the contribution to the discussion in literature, the aim at closing the knowledge gap as well as the applicability of the results on different scales.

In the first step, the interview data allowed to identify several relevant barriers and opportunities. The barriers identified are placed on different levels, one more structural and one based on current problems and perceptions. Thus, not all barriers were found to be relevant for communication, such as the lack of standardisation or the fact that certifications are not always suitable, others could be overcome through communication. And some could additionally be barriers to successful communication by themselves, such as the lack of trust. In the case of the opportunities, all have been found to be on a similar conceptual level and to be approachable by communication.

In the second step, the research achieved to connect all the theoretical foundations that were assumed to be relevant to the interview data. Applying the different strategies to the barriers and opportunities made it more evident why literature suggests not to see the different strategies all by themselves, but to consider them to be overlapping and to be combined: several insights drawn from the strategies do overlap or complement each other. Therefore, some overarching insights can be drawn from the application of the communication strategies. First of all,

changing sometimes still unfavourable attitudes will be of main importance. There are signs that such a change is already on the way, however, it might further be supported through communication targeting attitude and motivation change. A possible way to do so is, for example, to point out the possibilities provided by certifications through the ability to set a reliable standard. Adding to this, it can be pointed out how certifications can increase trust in the sustainability message, and already existing social norms can be made use of. Furthermore, low understandability can be identified as one of the barriers that is most difficult to be targeted by communication, as the interviewees currently do not see positive development in terms of understandability, and the problem of low understandability oftentimes lies in the labels themselves. However, communicators may attempt to increase understandability by making information more clear, accessible, and simple. Then, some general insights can be drawn regarding the preferred mode of communication. Communication in the form of dialogue and the inclusion of stakeholder concerns and demands are seen as important prerequisites. To be perceived as credible, communication should be proactive, and certifications can be used to emphasise the trustworthiness of the message sent. Content-wise, the communication should be geared towards the target group, thus, it should point out how the main barriers of price and effort can be overcome, and the main goal of high sales can be achieved through certifications. One way to do so is by pointing out the personal relevance that certifications can have for said target group. Lastly, the analysis framework developed in this research can be used as a tool to present information in a clear and detailed way, to reason why certified products are preferred, or why a certain certification might be preferred over another.

The more general insights, be it per strategy or overarchingly as presented here, are still on a relatively high level and need to be connected to a specific situation to be concretely applicable. This has been done through the example of the case study, showing how the general results can be used by one specific actor. The case study shows that the main points of importance identified in this section do also apply to the specific case, while at the same time specific points of relevance can be identified for this distinct case with its unique role and position as, for example, their communication needs to additionally make sure that certifications are not simply used for marketing purposes, in order to stay trustworthy.

The approach of first developing general insights and then narrowing them down to a case study shows a certain generalisability in the sense that a similar procedure should also be possible for other actors based on the same interview insights, or that a similar proceeding would be possible for a different dataset. Of course, the theoretical base has been tailored to this specific case, however, the overall procedure can remain the same, and the strategies presented are in themselves relatively broadly applicable.

Chapter 5: Conclusion

This final chapter draws general conclusions from the present research. Before doing so, however, some limitations that the research is facing need to be addressed. At the very end, recommendations for further research as well as for practical use are presented.

5.1. Limitations

Some limitations of the present research need to be taken into account before presenting the final conclusions.

First of all, these limitations concern data collection. While the number of interviews conducted was within the set range, and clusters and repetitive information, thus some degree of saturation, has been observed, a limitation remains in the fact that the research did not include all stakeholder groups of interest. Foremost, this is the case for policy makers, with whom no interview has been conducted. It can be assumed that they could have added a new perspective to the research. Similarly, the inclusion of end users of different sizes as well as private users would have been preferable.

Also related to data collection, it should be mentioned that conducting the interviews through (video) calls can have downsides compared to face-to-face interviews. For example, it is more likely to miss some of the interviewee's emotions or small reactions. Furthermore, interviewees could be more distracted, by their private or office environment. Of course, at the same time, video calls can also create a more relaxed setting for interviewees in which they give less socially desired responses, which is why the mode of conduction can still be seen as suitable.

As already mentioned when introducing the method, a single case study always faces the limitation of limited generalisability. In the present research, the interviewees have given relatively broad answers regarding their perceptions of certifications, sustainability and/ or sustainable plastics, and some general insights that are not only applicable to the case study have been found. Still, it needs to be kept in mind that the interviewees did come from a specific sector and were stakeholders of the case study company Berdal, thus, general conclusions should at least be made carefully.

A limitation regarding the analysis framework concerns the fact that it has only been applied to one certification. While said application was fitting, it can be assumed that applying the framework to more certifications might show some unclarities or means of improvement of the criteria identified. Furthermore, the proposed use of the framework for comparing different certifications has not been demonstrated yet.

Lastly, the research only applied a limited amount of communication theories and strategies to the barriers and opportunities identified in primary data. These have been chosen based on

research as well as assumptions regarding their importance and fit for communication about certifications. There is a broad range of further theories that might also be of interest for communicating on certifications, that can possibly add insights to this research topic. In this research, for example, it was initially considered to include theories of (green) marketing. These were ultimately excluded, as the literature research suggested that green marketing strategies often times target a different level than certifications, thus, more the whole company than one single measure. However, it should not be ruled out that green marketing strategies could still provide new insights that are now not part of this research.

5.2. Conclusion

The present research aimed at finding solutions for a problem present both on the practical and theoretical level. It did so in form of a case study with results generalisable enough to find possibilities to promote certifications in a way that avoids greenwashing and points out the scientific soundness of those certifications. To reach this aim, the research made use of communication theories. Thus, the research wanted to find an answer to the question of how such scientific soundness of certifications specifically for plastics in the building and DIY industry can be assessed, and how the importance of using those certifications can successfully be communicated.

First of all, the developed framework shows to be a useful tool to assess the soundness of certifications. It has been found that both literature and primary data find trust and transparency-related criteria to be especially important. Thus, these criteria are also seen to be especially relevant for communication, which reflects in the fact that for communication, credibility is one of the key factors, and the framework can be a tool for clear, detailed, and trustworthy information provision on certifications with the same attributes.

Some general insights can be drawn on how to communicate on certifications preferably, that can be applied later on to the present case study, but also to different contexts. These include a preference for proactivity and dialogue with stakeholders, while tailoring the content towards the target group and emphasising personal benefits. Furthermore, the barriers most difficult to overcome by communication and especially by one actor alone have been identified to be a still relatively unfavourable attitude towards sustainability as well as the sometimes low understandability of certifications.

Consequently, those barriers that are generally difficult to overcome are also the main problems for the case study that need to be considered. Therefore, for Berdal's position as one single plastic producer, it might be recommendable to focus on those customers that already have a relatively positive attitude or to focus on the additions a product can provide and not the differences it has to a conventional product. When communicating, the points that have been identified to be of main importance apply to the case study as well. This includes reciprocal

dialogue with the stakeholders and a clear and consistent message. Furthermore, when communicating about certifications, the focus should be on the benefits those certifications can have for the target group of the communication, such as their reliability or standard setting. Lastly, the framework and the results it provides can be used to emphasise soundness, credibility and personal benefits of their use, in the case of Berdal, but also in a more general manner to promote the use of certifications.

5.3. Recommendations

The very first chapter of this research established that the problem under investigation is one that is of relevance both on the theoretical and practical levels. Therefore, recommendations shall be given for further research as well as for practical application.

5.3.1. Recommendations for further research

The recommendations drawn for further research are mainly based on the limitations that were identified earlier on. Further points relate to interesting aspects identified in primary data that were not addressed in this research as they were not of relevance here. Figure 9 provides an overview of these.

1. Conduct more interviews
2. Apply the framework to different certifications
3. Use different communication theories and strategies to identify different or additional results
4. Explore how those barriers that are not suitable to be targeted through communication could be overcome
5. Investigate on improvements for certifications identified in primary data

Figure 9: Recommendations for further research

First of all, it would be recommendable to conduct additional interviews in the future, especially with policy makers and private buyers to include their perspectives to add to the findings of this research. Another recommendation to validate and improve the results of this research would be to apply the framework to different certifications for sustainable plastics, such as the Nordic Swan or the C2C certification, in order to check how far the developed criteria are applicable and hold, and how they could be further improved. It would also be recommended to use

different communication theories and strategies to see whether different or additional results regarding successful communication on certifications can be obtained. A first recommendation would be to do so by using green marketing strategies. However, also other communication strategies might be of interest.

Two barriers, namely, the lack of standardisation as well as the observation that certifications are not suitable for all matters related to sustainability, were identified to not be targetable by communication. In further research, it might be of interest to investigate different means to overcome especially these two, but also to support communication in overcoming the other barriers identified, as well as new means to make use of the opportunities.

When coding and analysing the interviews, a recurring theme was also possible means to improve certifications. These insights were not used in full detail due to the different focus of this research, however, it could be of interest for further research to explore the topic of improving certifications.

5.3.2. Practice-related recommendations

On the practice side, recommendations can be made for companies that want to improve their sustainability performance (through certifications) as well as for policy makers and the bodies that issue the certifications. Figure 10 gives an overview of these.

1. Accustom yourself to sustainability communication
2. Focus communication on stakeholder inclusion and dialogue
3. As policy makers and certifiers, explore means of improvement for certifications
4. As a company wanting to be certified, consider benefits of obtaining certifications early
5. Focus sustainability efforts not only on certifications

Figure 10: Practice-related recommendations

For all stakeholders, it is recommendable to accustom themselves to sustainability communication as a general concept, as sustainability and consequently successfully communicating about sustainability efforts, is expected to grow in importance. When communicating, especially stakeholder inclusion and dialogue are of importance and it can be recommended to introduce regular dialogues with one's stakeholders about sustainability, in order to reassure that the efforts are perceived well and go in the right direction for all parties involved.

A main barrier in this research has been identified to be the low understandability of certifications. Combined with insights from the interviews on how to possibly improve certifications, this gives a good base for both policy makers as well as those issuing certifications to explore means to improve the existing certifications to make them more applicable and successful in promoting sustainability.

When it comes to companies that think about getting their products certified, it is recommended to consider the possible first mover advantage that this could bring, as buyers that see sustainability as more important have a reason to choose the long-time certified and invested company over another one. This might be relevant even more so when legal action comes into play. In Germany, for example, the Act on Corporate Due Diligence Obligations in Supply Chains is in effect since July 2021 (Federal Ministry of Labour and Social Affairs, n.d.), with a similar attempt being under way on the European Union level (European Commission, 2022a). These legislations will require companies to prove the due diligence also of their suppliers along the chain, leading to a possible rise in demand for certifications as a means for proof.

Nevertheless, it should also be pointed out that sustainability efforts should not be limited to certifications. Certifications can certainly be a very useful instrument, but sustainability is a broad field that requires actions in a broader manner as well. This holds true from a point of view that focusses on how to best improve sustainability in itself, as well as from a company perspective, as stakeholders also show demand for other actions.

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Appendix

Appendix I: Interview guides

Interview guide for companies – English

Introduction/ attitude towardss sustainability

(1) Please tell me about your work and your position at your company.
(2) What does sustainability mean to you and to you at your company?
(3) What do you think makes a plastic product, and more specifically a plastic bucket, sustainable?

Certifications at the company

(4) Could you tell me about the certifications that are being used for plastic products in the building and DIY industry?
(5) Does your company participate in any certification programmes currently?
    a. If yes: I'd like to know what motivated your company to participate.
    b. If no: I wonder which are the particular reasons why not?
(6) Does your company consider certifications in their buying decision?
(7) What do you think are possible impacts of including certifications in your company?
    a. Which particular benefits would you anticipate from the use of certifications?
    b. What do you think are the biggest challenges related to certifications in the company?

Perceptions on & important aspects of certifications

(8) Can you tell me how the **importance of certifications** has developed in your industry in recent years?
(9) What **barriers** that limit participation in certifications could you think of?
(10) In your opinion, what can **incentivize** the industry to use more certifications?
(11) How do you believe that certifications influence **company performance**, positively or negatively?
(12) What aspects of a certification would you consider to be most important?
(13) Please tell me about attributes of a certification that make you trust it.

Conclusion

(14) How do you envision the progress of sustainability and certifications in your industry in the future?
(15) Are there any aspects that you feel were missing so far and that you would like to comment on?
(16) Do you have any questions for me?

Interview guide for companies – German

Einführung/ Einstellung zu Nachhaltigkeit

(1) Bitte erzählen Sie mir etwas über Ihre Arbeit und Ihre Position in der Firma
(2) Was bedeutet Nachhaltigkeit für Sie und Ihre Firma?
(3) Was macht ein Plastikprodukt, insbesondere einen Plastikeimer, Ihrer Meinung nach nachhaltig?

Zertifizierungen auf Firmenebene

(4) Könnten Sie mir berichten, welche Nachhaltigkeitszertifizierungen für Plastikprodukte in der Bau- und DIY-Branche derzeit eine Rolle spielen?
(5) Nimmt Ihre Firma derzeit an Zertifizierungsprogrammen teil?
    a. Falls ja, würde ich gerne wissen was Ihre Firma zur Teilnahme bewegt hat
    b. Falls nein, würde ich gerne wissen, aus welchen Gründen Sie dies nicht tun
(6) Achtet Ihre Firma beim Einkauf auf Zertifizierung der Produkte?
(7) Was sind aus Ihrer Sicht mögliche Auswirkungen, die die Nutzung von Zertifizierungen auf Ihre Firma haben kann
    a. Welche Vorteile würden Sie durch die Nutzung von Zertifizierungen erwarten?
    b. Was sind die größten Herausforderungen in Bezug auf Zertifizierungen in Ihrer Firma?

Wahrnehmung und wichtige Aspekte von Zertifizierungen

(8) Können Sie mir berichten, wie sich die **Bedeutung** von Zertifizierungen in Ihrer Branche in den letzten Jahren **entwickelt** hat?
(9) Was könnten **Barrieren** sein, die die Teilnahme an Zertifizierungen behindern?
(10) Was könnte Ihrer Meinung nach die Branche dazu bewegen, **mehr Zertifizierungen** zu verwenden?
(11) Wie, glauben Sie, beeinflussen Zertifizierungen die **Unternehmensleistung**, positiv oder negativ?
(12) Welche **Aspekte** einer Zertifizierung sehen Sie als **am wichtigsten** an?
(13) Bitte erläutern Sie mir, welche Eigenschaften eine Zertifizierung haben muss, damit sie dieser **vertrauen**

Abschluss

(14) Wie stellen Sie sich die Entwicklung von Nachhaltigkeit und Zertifizierungen in Ihrer Branche in der Zukunft vor?
(15) Gibt es Aspekte, die für Ihr Gefühl noch fehlen und die sie gerne noch erwähnen würden?
(16) Haben Sie noch Fragen an mich?

Interview guide for certifiers – English

Introduction/ attitude towardss sustainability

(1) Please tell me about your work and your position.
(2) What is the most significant environmental issue facing plastic in the building and DIY industry and why?
(3) How would you describe the general level of sustainability awareness among companies in the plastic industry?
(4) How do you think has that changed over time?

(Existing) certifications in the industry

(5) What do you think are possible impacts of including certifications for companies?
    a. Which particular benefits would you anticipate from certifications?
    b. What do you think are the biggest challenges related to certifications for companies?

(6) In your view, in how far have the existing certifications been successful in achieving their intended goals?
(7) When talking to your stakeholders, what feedback do they give you about why they chose to participate or not participate in a certification?

Perceptions on & important aspects of certifications

(8) Please tell me, how has the **importance of certifications** developed for plastic products, especially in the building and DIY industry, in recent years?
(9) Which **barriers** can you think of that limit participation in certifications?
(10) In your opinion, what can **incentivize** the industry to use more certifications?
(11) Do you believe that certifications can influence **company performance**, positively and negatively?
(12) What aspects of a certification would lead you to see one certification as better than another?
(13) Please tell me about attributes of a certification that would make you and your stakeholders **trust** it.
(14) What aspects can you think of that would need to be **improved** to make certifications better?

Conclusion

(15) How do you envision the progress of sustainability and certifications in the industry in the future?
(16) Are there any aspects that you feel were missing so far and that you would like to comment on?
(17) Do you have any questions for me?

Interview guide for certifiers – German

Einführung/ Einstellung zu Nachhaltigkeit

(1) Bitte erzählen Sie mir etwas über Ihre Arbeit und Ihre Position in der Firma.
(2) Was ist derzeit das größte Umweltproblem das Plastik in der Bau- DIY-Branche verursacht und warum?
(3) Wie würden Sie sagen, ist der Stand des Bewusstseins zu Nachhaltigkeit bei Unternehmen in der Plastikindustrie?
(4) Wie hat sich das Ihrer Meinung nach über die Zeit entwickelt?

(Bestehende) Zertifizierungen in den relevanten Branchen

(5) Was sind aus Ihrer Sicht mögliche Auswirkungen, die die Nutzung von Zertifizierungen auf Firmen haben kann
    a. Welche Vorteile würden Sie durch die Nutzung von Zertifizierungen erwarten?
    b. Was sind die größten Herausforderungen in Bezug auf Zertifizierungen in diesen Firmen?
(6) Inwieweit sind die bestehenden Zertifizierungen aus Ihrer Sicht erfolgreich darin, ihre angestrebten Ziele zu erreichen?
(7) Wenn Sie mit Ihren Stakeholdern sprechen, welche Rückmeldung erhalten Sie dazu, warum diese sich entscheiden an einer Zertifizierung teilzunehmen oder nicht?

Wahrnehmung und wichtige Aspekte von Zertifizierungen

(8) Können Sie mir berichten, wie sich die Bedeutung von Zertifizierungen für Plastikprodukte, speziell in der Bau- und DIY-Branche in den letzten Jahren entwickelt hat?
(9) Was könnten **Barrieren** sein, die die Teilnahme an Zertifizierungen behindern?
(10) Was könnte Ihrer Meinung nach die Branche dazu bewegen, **mehr Zertifizierungen** zu verwenden?
(11) Wie, glauben Sie, beeinflussen Zertifizierungen die **Unternehmensleistung**, positiv oder negativ?
(12) Welche **Aspekte** einer Zertifizierung würden dazu führen, diese als **besser** als andere zu bewerten?
(13) Bitte erläutern Sie mir, welche Eigenschaften eine Zertifizierung haben muss, damit sie und Ihre Stakeholder dieser **vertrauen**
(14) Welche Aspekte fallen Ihnen ein, die angepasst werden müssten, um Zertifizierungen zu **verbessern**?

Abschluss

(15) Wie stellen Sie sich die Entwicklung von Nachhaltigkeit und Zertifizierungen in Ihrer Branche in der Zukunft vor?
(16) Gibt es Aspekte, die für Ihr Gefühl noch fehlen und die sie gerne noch erwähnen würden?
(17) Haben Sie noch Fragen an mich?

Appendix II: Coding system

Code groups	**Categories**	**Core categories**
Awarding format End user focus Operation scope Sector scope	Organisational framework criteria	Framework criteria
Clarity Credibility of awarding entity Credibility of criteria Longevity and reassessment Transparency Verification by third party Verification through measurements and monitoring	Trust and transparency related framework criteria	
Environmental excellence Life cycle perspective Plastic specific sustainability aspects Sustainability consideration	Content related framework categories	
Certifications are not asked for Certifications are not required Lack of standardisation Too many certifications existent	Reasons not to use certifications at the moment	Barriers
Not suitable Lack of trust Low understandability High effort High costs	Reasons not to use certifications in general	
Low importance of sustainability Growing demand of sustainability	Sustainability in the plastics and building industries	
Distinction Increase sustainability Increase trust Sales argument Standard setting	Reasons to use certifications	Opportunities
Need for standardisation Need to make certifications more known Need to make certifications more understandable	Improvements for certifications	Improvements