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UNIVERSITY OF TECHNOLOGY

Aligning a corporate sustainability performance measurement system with the Sustainable Development Goals

A case study at a global automotive supplier

Master's thesis in *Quality and Operations Management* and *Management and Economics of Innovation*

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Abstract

In September 2015, the UN countries vowed to achieve the Sustainable Development Goals (SDGs) by the year 2030. During the development of the SDGs, the critical role of business in sustainable development was highlighted. In response, companies have started efforts to explore what the SDGs mean for their business and how they can engage with the goals. In order to understand their impact on the SDGs, companies must adapt their sustainability performance measurement systems (SPMSs). This thesis aims to contribute towards understanding how companies, and more specifically the case company, can align their SPMS with the SDGs and what barriers should be overcome in the process.

An extensive review of literature has lead to the identification of six key requirements that an SPMS needs to fulfill in order to align with the SDGs. These six key requirements formed the foundation for an assessment of the current SPMS of the case company. A gap analysis was performed to identify gaps in the current SPMS in regards of the SDGs, and twelve semi-structured interviews were conducted with a wide range of employees, which provided the main input for the SPMS assessment. This has resulted in the identification of thirty barriers that obstruct the case company from aligning with the SDGs. The main outcomes of the research were verified through observations at a strategy workshop.

This study shows the complexity of integrating sustainability in the general operations of a business. Many areas of impact are not within control of the firm, and even if they are, the complexity of the different entities in the organisation and their synchronization makes the process of aligning with the SDGs difficult. The results of this study can be used by the case company as an aid in the process of focussing their efforts towards creating a more effective sustainability organisation. In the general context, the results can be used as a starting point for further investigation about how businesses can engage with the SDGs.
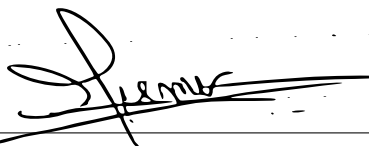
Keywords: Sustainability Performance Measurement System, SPMS, Sustainable Development Goals, SDGs, Performance Measurement System, PMS, Sustainable Development, Corporate Sustainability
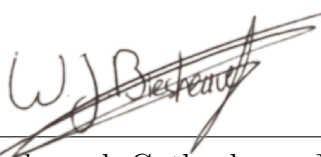
Acknowledgements

Contents

Contents

List of Figures

List of Tables

List of Abbreviations

CDP	Carbon Disclosure Project.
CO$_2$	Carbon dioxide.
CSR	Corporate Social Responsibility.
ESH	Environment, Safety and Health.
GRI	Global Reporting Initiative.
HR	Human Resources.
KPI	Key Performance Indicator.
LCA	Life Cycle Analysis.
MDG	Millennium Development Goal.
MNC	Multinational Corporation.
NGO	Non Governmental Organisation.
NO$_x$	Nitrogen oxides.
PDCA	Plan-Do-Check-Act.
PMS	Performance Measurement System.
Scope 1 emissions	Direct greenhouse gas emissions emissions from company activities.
Scope 2 emissions	Indirect greenhouse gas emissions emissions as a result of purchased energy.
Scope 3 emissions	Greenhouse gas emissions that are occurring within the value chain but outside of the company.
SDG	Sustainable Development Goal.
SO$_x$	Sulphur oxides.
SPMS	Sustainability Performance Measurement System.
TBL	Triple Bottom Line.
UN	United Nations.
UNFCCC	United Nations Framework Convention on Climate Change.
UNGC	United Nations Global Compact.
VOC	Volatile Organic Compound.
WBCSD	World Business Council for Sustainable Development.
WCED	World Commission on Environment and Development.

1
Introduction

1.1 Background

"Business is a vital partner in achieving the Sustainable Development Goals. Companies can contribute through their core activities, and we ask companies everywhere to assess their impact, set ambitious goals and communicate transparently about the results."
- Ban Ki-moon, Secretary-General of the United Nations (United Nations, 2015a)

In September 2015, the United Nations (UN) presented its Post-2015 Agenda for Sustainable Development: the Sustainable Development Goals (SDG). Succeeding the Millennium Development Goals (MDG), the SDGs represent the global priorities for sustainable development until 2030 adopted by 198 UN member-states. The SDGs consist of 17 interconnected goals and 169 sub-targets that form a framework of shared action for people, planet and prosperity (United Nations, 2015a). In contrast to the MDGs, the SDGs are comprehensive in scope and aim to provide a holistic framework for sustainable development, applicable to all countries and stakeholders (Corporate Citizenship, 2015).

One of the most important differences in both development and execution of the SDGs is the increased engagement of the private sector (Scheyvens et al., 2016). The MDGs have been commonly criticised for being too narrow, too focused on developing countries (Corporate Citizenship, 2015) and, most importantly, not actively engaging the private sector (Sachs, 2012). Acknowledging these shortcomings, the UN has made sure that the private sector has been closely involved and consulted in the development of the SDGs (Scheyvens et al., 2016) and it is seen as a critical partner in reaching the goals. Multinational corporations (MNCs) in particular are seen as key players in the process towards sustainable development, by leveraging their unique strengths such as global presence, state-of-the-art technology and large impact due to their size (Sachs, 2015).

The shift towards engaging the business world in sustainable development is reflected by a broader trend of increased involvement of the private sector in sustainable development. Where the private sector was previously mainly regarded as being part of the problem, it is now increasingly seen as a critical part of the solution. In addition, there is a growing consensus that sustainable business practices have a positive impact on both short-term and long-term business results (Porter and Kramer, 2011;

Accenture and Global Compact, 2016), which has lead to a growing engagement of businesses in sustainable development. This development is illustrated by the UN Global Compact (UNGC), the World Business Council for Sustainable Development (WBCSD) and the Global Reporting Initiative (GRI), who have advocated for the business community being engaged as a primary actor in the development of the Post-2015 agenda (UNGC, WBCSD & GRI, 2013).

As businesses are starting to explore how they can contribute to the SDGs, there is a clear need for directions on how they can align their activities. A global SDG engagement survey among CEOs performed by PwC (2015) has shown that while 71 percent of respondents say they plan to take action towards the SDGs, only 13 percent of respondent have identified the tools they need to start the engagement process. Several organisations have written directives that serve to provide guidance in this process, such as the 'SDG Compass' written by the Global Reporting Initiative (GRI) in cooperation with UNGC and WBCSD (2016). Similar guides have been written by the Sustainable Development Solutions Network (2015), Corporate Citizenship (2015) and PwC (2016). Surveys that have gathered perspectives on the SDGs among company executives and citizens (PwC, 2015) and millennials (Corporate Citizenship, 2016) provide additional insights and support. While differing slightly in wording, all above mentioned guides state that businesses should start their engagement with the SDGs by mapping and understanding their current impact on the SDGs and prioritise the goals accordingly. In other words, they must first establish a baseline of their impact on the SDGs and identify possible gaps in their strategies and policies. As described in the SDG Compass:

"To seize the most important business opportunities presented by the SDGs and reduce risks, companies are encouraged to define their priorities based on an assessment of their positive and negative, current and potential impact on the SDGs across their value chains." (GRI, UNGC, and WBCSD, 2016)

In order to perform a baseline impact assessment, companies must make sure their measurement systems are adequately equipped to measure impact towards the SDGs. This involves assessing their sustainability performance measurement systems (SPMS) against the SDGs, identifying possible gaps between their current measurement systems and what is required, and adjusting their measurement systems to align with the SDGs (Williams, 2015). Despite the importance given to measuring impact to the SDGs, neither the above mentioned guides nor other available literature provide any specific guidance or best-practice on how business should go about assessing and aligning their SPMS with the SDGs. Considering the urgent need for more guidance, it has become necessary to perform more research focused on how businesses can align their corporate SPMSs with the SDGs and what challenges they face in the process.

Several authors have written about designing, implementing and updating a corporate performance measurement system (PMS) or SPMS specifically. Research regarding SPMSs can be seen as a subset of that in the broader performance man-

agement field; therefore, this study builds on decades of academic work in this field. Examples of key articles are Neely et al. (1995), Bourne et al. (2000), Franco-Santos et al. (2007) and Folan and Browne (2005). Several authors have focused specifically on SPMS in their work. Ferreira and Otley (2009)) provide a clear framework for SPMS design, which describes important functions that need to be defined and how an SPMS interacts with its environment. Searcy (2012) underscores the need for an SPMS that evolves over time and adapts to a changing internal and external environment, to do this Searcy lays out several models and evaluation criteria. In his earlier work, Searcy (2011) proposes an elaborate framework for evaluating an SPMS designed to be used to evaluate and update a corporate SPMS. The listed academic contributions form a strong foundation for the theoretical framework of this study.

1.2 Problem Description and Research Questions

With the publication of the SDGs, the United Nations strives to provide global direction and a holistic approach towards sustainable development, and specifically calls upon the private sector to contribute. The case company, like many other companies, is currently exploring how it can align its sustainability strategies, targets, and policies with the SDGs as the company has identified the importance of the SDGs for corporate success. The case company is currently working on formulating their sustainability strategy until 2030 and has expressed their interest in contributing to the SDGs; however, the company has also identified that there is a lack of knowledge on how to contribute, in what areas to contribute, and what should be done to contribute enough towards the SDGs. In order to understand what needs to be done to work towards these ambitious global goals, the case company needs to understand their current situation and how their already existing efforts contribute to the execution of the SDGs; therefore, their corporate SPMS needs to be aligned with the SDGs. This alignment process is the focus on this study. Hence, the first research question:

1. How does the case company's current sustainability performance measurement system overlap with the Sustainable Development Goals and what are the gaps?

The identification of the areas where the SPMS incompletely or insufficiently measures the case company's impact towards the SDGs can be used to improve the current system; however, the improvement of an effective measurement system in a large global corporation is a complex endeavour. Building on the knowledge from previous research the researchers aim to gain an understanding of how the case company can redesign their SPMS to bridge the identified gaps and to ensure they are able to measure their contribution towards the SDGs and set targets accordingly. Identifying the the main pitfalls regarding the evaluation and adjustment

of an SPMS will enable the case company to better plan the development of their SPMS towards alignment with the SDGs, while keeping in mind the greater context of the corporation. Hence, the second research question:

2. How can the case company improve their sustainability performance measurement system in order to align with the SDGs, and what are the main barriers that should be overcome?

1.3 Purpose

This study aims to explore how the case company can align its SPMS with the UN SDGs and identify possible barriers that obstruct alignment and thus contribute to the understanding of SPMS in Multinational Corporations (MNCs).

1.3.1 Relevance for the case company

By aligning its sustainability strategy with the SDGs, the case company strives to build resilience against future changes in legislation and customer demand, as well as strengthen its brand towards customers, the public, investors and possible employees, identify new business opportunities and contribute to sustainable development in a broad sense. This study contributes to this process by assessing the case company's SPMS against the SDGs and identifying the gaps. Consequently, this study can provide the company direction on how to align their SPMS with the SDGs. This enables them to create a baseline for sustainability impact that can serve as a basis for a new sustainability strategy.

1.3.2 Relevance for Academia

This study aims to contributes to the field of environmental management, and specifically the area of sustainability performance measurement, by (1) developing knowledge on how commonly used sustainability performance measurement frameworks, such as GRI, relate to the SDGs; (2) providing insight in how theoretical knowledge on sustainability performance measurement is applied in a practical setting (e.g. the SPMS evaluation framework by Searcy (2011); and (3) identifying practical barriers to developing an adequate sustainability performance measurement system which may indicate gaps in literature and provide a basis for future research; furthermore, it gives insight in how theory on performance measurement, which is a well-developed research field, can be applied in the context of sustainability. Lastly, given the global importance of to the SDGs and the prominent role assigned to the private sector in achieving these goals, it becomes relevant for academia to perform research specifically on how business can contribute to the achievement of the SDGs, this study aims to contribute to this process.

1.4   Scope and Delimitation

This study is limited to a single case study at the one case company, which leads to more in-depth, but less generalisable results; however, the results of the study can be valuable for the internal use within the case company. Additionally, the focus of this study is on corporate sustainability performance measures, as part of the aim of the research is to aid the development and implementation of a corporate sustainability strategy. An SPMS assessment can focus on one or more of three distinguished system layers: the individual key performance indicators (KPIs), the SPMS as an entity and the SPMS in relation to its context. This thesis focuses on the last two layers, and thus defining specific KPIs and how they should be measured is not within the scope of this study. Although the researchers acknowledge that the SDGs are an holistic, interconnected framework, limitations in time and access have made it necessary to limit the focus of this study to the environmental organisation. A limited amount of data on social topics is collected to deal with this limitation, but the researchers do not aim to provide a holistic picture of this area. Furthermore, the focus on the alignment with specifically the SDGs and not with another framework stems from the corporate interest in this particular framework.

1.5   Thesis Outline

The thesis report is build up in the following manner:

Introduction - presents the problem statement, with a background where the problem originates from, and the context in which the research will take place. The research questions are presented, as well as the scope and delimitation of the study.

Theoretical Framework - provides the theoretical background of the thesis. The theory explores the areas of sustainability in a business context, performance measurement, and sustainability performance measurement. Based on the acquired insights, six key requirements to which an SPMS should adhere are identified. These requirements guide the research and support the answering of the research questions.

Methodology - describes the approach used in this study. The specific design and methodological choices are explained in detail. The research validity considerations and ethical concerns and their mitigation strategies are addressed.

Description of the Case study - elaborates upon the situation present in the case study and provides critical contextual information for the understanding of the reader. In addition to a general description of the case company, the environmental organisation, the reporting process and the environmental strategy are introduced.

Empirical Findings - presents the data and information acquired through the archival document review and the interviews and observations. Firstly, the archival

document review outlines the way the case company operates currently in respect to environmental sustainability, then the SDGs which are within scope are elaborated upon and lastly several SDG guides which explain how companies can contribute are explained. Thereafter the interview process and interviewees are introduced and the data and information is presented based on the six key requirements for aligning an SPMS with the SDGs identified in the theoretical framework.

Analysis and Discussion - answers the research questions by presenting the analysis made based on the theoretical framework and the empirical findings. The first research question is answered by addressing the relevant SDGs and the found gaps. The answer of the second research question is structured based on the six key requirements for aligning an SPMS with the SDGs identified in the theoretical framework; furthermore the contribution to research is phrased, a reflection on the research process is presented and areas for future research are identified.

Conclusion - concludes the study, outlines the most important results based on the research questions.

Managerial Implications - links findings to concrete business implications and describes areas of attention.

2

Theory

2.1 Sustainable development

Already in 1949, the American president Truman stressed that in his presidency one of the aims should be *"making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas"* (Truman, 1949). Interestingly, striving for the development of undeveloped countries (read: bringing them up to the developed countries standards) seems contradictory to sustaining our planet and ensuring a prosperous earth for all future generations. In order to achieve the Western rate of consumption for every person living on the planet, we would require two additional planets to provide us with the necessary resources (Wackernagel and Rees, 1998). In the past the efforts towards protecting our planet were considered to be a limiting factor to this worldwide (economic) development. Nevertheless consensus was reached regarding the notion that no inherent contradiction between sustainability and development existed (Engfeldt, 2002).

Between 1980 and 1990 a transformation of the debate took place, by shifting from questioning whether or not development and environmental concerns contradict each other, towards the question on how to achieve sustainable development (Lele, 1991). This approach lead, in 1987, to the publication of the so-called *Brundtland Report* by the World Commission on Environment and Development (WCED) leading the discussion about sustainable development by formulating the most widely used definition of the term;

"Development that considers needs of current generations without compromising the ability of future generations to meet their needs and aspirations." (Brundtland, 1987)

This statement was made to align institutions throughout the world in order to reach the development that will *"guarantee the security, well-being and very survival of the planet"* (Brundtland, 1987). Additionally, the World Bank, stated that *"the achievement of sustained and equitable development remains the greatest challenge facing the human race"* (World Bank, 1992).

This challenge is often defined as to consist of development in the three intertwined sustainability dimensions; economic, social and ecological (Elkington, 1994). This definition outlines the challenges for individual actors, businesses and institutions to identify how they can have an impact on each of these dimensions, while also bal-

ancing the needs of both the current as the future generations, while most of these actors have been mainly focussing on the economical aspect in the past (Gimenez et al., 2012).

2.1.1   Critique on sustainable development

Sustainable development is not a notion that is accepted and supported unconditionally by everyone. Some people even argue that sustainable development is a driver from richer nations to create a world in their image (Estreva 1992; Escobar 1992. Others argue that the neo-liberal notion of economic growth has been the problem in the first place, and that sustainable development is nothing more than promoting the same agenda that caused the problems while giving it a green face (Doyle, 1998). Critics highlight the paradox that sustainable development seems to face; the call of development of underdeveloped countries does not seem to go hand in hand with increased ecological conservation (Lele, 1991). Furthermore, critics argue that countries that are striving for sustainable development are pushing the concept to (developing) countries that were not part of the problem in the first place (Pieterse, 2000).

Despite the critique on the intentions of sustainable development, the debate mainly revolved around the question if growth would be hampered by efforts aiming to mitigate the impact on the environment (Blowfield and Murray, 2014). The global reach of sustainable development means that it encompasses an incredible amount of people that all have their own gender, age, ethnic background, wealth, experiences and culture, which, as Hibbard and Lurie (2000) argue, would most likely lead to a wide, diverse range of opinions rather than consensus when deciding for a common, sustainable future since the important issues have to be selected and achieved by such a diverse population. In the debate and development of sustainability initiatives a mainly technocratic approach was taken which lead to neglecting the inclusion of all stakeholders at all phases of definition (Bell and Morse, 2008).

2.1.2   Bringing sustainable development further

Nonetheless, the importance to find a way forward and strive for a more sustainable reality has been a prominent agenda point for international governmental organisations. The United Nations have been working towards reaching this global consensus which Hibbard and Lurie (2000) believe is not to be expected. The UN published their first attempt towards establishing a common agenda with concrete areas to focus the global efforts in 2001 as the Millennium Development Goals (Appendix A). The eight ambitious goals were supported by all 189 member states, and were to be achieved by 2015 (Fehling et al., 2013).

The MDGs were supported by all members of the United Nations, but their development was driven by a limited set of mostly western countries (Amin, 2006). This is often argued to be an issue as the MDGs focused mainly on the developing countries, which had little involvement in the selection of said goals (Kabeer,

2005). According to Haines and Cassels (2004) this has lead to a lack of ownership of the goals. The goals itself were too focused on the issues that the developing countries face, while the developed countries' challenges were muffled away (Corporate Citizenship, 2015). As only countries have been involved in the process, the private sector has been ignored, as it was often seen as the problem, and not as the solution. Even though it are the MNCs which can bring unique strengths, like a global presence, the state-of-the-art technology and huge potential for impact due to their size (Sachs, 2015). Others' point out that the goals lack in holisticness, as important aspects as peace, security, human rights and democracy, just to name a few, were left behind (Waage et al., 2010). Lastly, the process has been limited due lack of focus on implementation (Fukuda-Parr, 2006). This wide range of aspects is believed to have limited the impact of the MDGs, and therefore more effort is required to support the world's transition towards a sustainable society.

2.1.3 The Sustainable Development Goals

In September 2015, the United Nations presented its Post-2015 Agenda for Sustainable Development: the Sustainable Development Goals. In contrast to the Millennium Development Goals, the SDGs are comprehensive in scope and aim to provide a holistic framework for sustainable development, applicable to all countries and stakeholders (Corporate Citizenship, 2015). Suchanek and Brook (2015), point at two main differences: coverage and scope. In contrast with the MDGs, the SDGs do entail both developing and developed countries, and they do provides a global development agenda which considers all three dimensions of sustainability. This difference in scope and coverage is evident in the setup of the goals. The SDGs consist of 17 goals and 169 targets (see Figure 2.1 for an overview, or Appendix B for the full goals) that form a framework of shared action for people, planet and prosperity that are envisioned to guide decisions for the next 15 years, until 2030 (United Nations 2015a).

In contrast with the MDGs, the SDGs have 9 more goals, which can be seen as the result of the iteration, where the SDGs are a more comprehensive, complete and holistic set of goals which are not only relevant for the developing countries but for developed countries alike. The process of forming these goals has been characterised by strong inclusion of the private sector, Non-Governmental Organisations (NGOs), other institutes and even civil society has been included by inviting them to participate in the consultation sessions. (Pingeot, 2014).

The resulting goals can be divided into five areas; People, Planet, Peace, Prosperity, and Partnership. Yet the goals should not be viewed at as independent goals as the clear links between the goals is essential, thus they rather should be viewed upon as a set of intertwined goals (United Nations, 2015a). With the SDGs these five areas have rebalanced; while the topics in focus of the MDGs are still represented, the nine extra goals now provide an extra focus on economic growth, and environmental protection.

Since countries are ultimately responsible for their internal economic and social de-

Figure 2.1: The Sustainable Development Goals as published by the United Nations (United Nations, 2015b)

velopment. The implementation of the goals are dependent on the the individual countries' positions; however, the UN emphasises on revitalising Global partnerships. This beholds that they request the countries to collaborate and deploy money, technology and knowledge in the most efficient way and thus ultimately lead to the achievement of the SGDs (United Nations, 2015a).

2.2 The role of business in sustainable development

Perhaps the most important, difference in both development and execution of the SDGs and the MDGs is the increased engagement of the private sector, which was one of the key critiques towards the MDGs (Scheyvens et al., 2016). The private sector has been closely involved and consulted in the development of the SDGs and is seen as a critical partner in reaching the goals (Scheyvens et al., 2016; Pingeot, 2014). There has been an increasing realisation among government officials and public policy makers that the private sector has an important role to play in solving global challenges. The private sector was previously regarded as being part of the problem, as they are perceived to be responsible for negative impact on the environment (Dunphy, 2003). However, these corporations are now increasingly seen as a critical part of the solution exemplified by the call upon the UN's call upon all businesses to apply their creativity and innovation to solving sustainable development challenges (United Nations, 2015a). The realisation that MNCs' unique strengths, like a global presence, the state-of-the-art technology and huge potential for impact

due to their size, combined with their current impact on sustainability issues has formed them into a key player in the strive for sustainable development (Sachs, 2012).

Simultaneously, there is a growing consensus that sustainable business practises have a positive impact on both short-term and long-term business results (Porter and Kramer, 2011; Accenture and Global Compact, 2016). This development has lead to a growing engagement of business in sustainable development. This is also illustrated by the United Nations Global Compact (UNGC) and the World Business Council for Sustainable Development (WBCSD), who have advocated for the business community being engaged as a primary partner in the development of the Post-2015 agenda (UNGC, WBCSD & GRI, 2013). Dyllick and Hockerts (2002) have tried to extrapolate the meaning of sustainable development for business:

"Meeting the needs of a firm's direct and indirect stakeholders without compromising its ability to meet the needs of future stakeholders as well."

The realisation that sustainable development is important for their success on both short term as in the long run. Corporate leaders and employees have begun to recognise the relations and inter-dependencies of the economic, environmental and social dimensions (Elkington, 1997; Commission of the European Communities, 2001). Merely focusing on the economic dimension is not sufficient to secure business profitability in the long run. This understanding has led to a shift in the Corporate Social Responsibility (CSR) debate; instead of questioning if businesses should work towards sustainable development the question rises on how to give a concrete form to these efforts (Smith, 2003).

2.2.1   The business case of sustainability

An increasing amount of corporations acknowledge the positive value for their business of engaging with sustainable development (Porter and Kramer, 2011; Accenture and Global Compact, 2016). But already in 1994 a shift was seen in consumer behaviour sees a shift in consumer behaviour where the advantages of incumbents are diminishing due to consumers preferring sustainable companies(Elkington, 1994). This change of mindset takes a different approach to the maximise shareholder value where not only the (short term) financial value is maximised but all three dimensions of sustainability are taken into consideration. Smith (2003) makes a case for two reasons why companies pursue different sustainability activities; a normative and a business case. The former aims at the ethical understanding from people in the corporation; it argues from the point of view that taking care of the planet and other people, both in the current generation, as in future generations is inherently the right thing to do and thus should be done. Whereas the latter aims at the possible improvement of company performance.

The business benefits of sustainability are diverse, and quite often hard to measure mainly due to the qualitative nature of the perceived benefits (Margolis and

Walsh, 2003; Lantos, 2001). It is commonly argued that sustainability efforts have a positive effect on the image a firm has in the perception of their stakeholders (including but not limited to, customers, investors suppliers and competitors) which is mainly achieved when reporting about these efforts in for example the sustainability report, or a special dedicated section in the annual report (Orlitzky et al., 2003). The positive image towards stakeholders to be is one of the most valuable intangible asset which can provide a source of competitive advantage (Fombrun and Shanley, 1990). For companies placed in the middle of a value chain, which do not directly sell to consumers, the positive effects of having a sustainable image might be larger on the investor relations side; where it could become easier to raise additional funds and get higher market valuation (Klassen and McLaughlin, 1996; Konar and Cohen, 2001); however, as sustainability requirements often work up the supply chain, where organisations require their suppliers to reach a certain standard, and thus a sustainable image might help organisations in the middle of the value chain as well. The licence to operate that businesses acquired in the local communities they operate in might be easier to maintain when proven to work towards sustainable development, deals made with governmental organisations are expected to be more favourable when a company has a positive image (Fombrun et al., 2000). These licences to operate can be both tangible as intangible in nature; where permits might be easier to obtain when organisations are able to prove they are responsible enough to take care of the environment and social communities.

Other than these aspects where reporting is necessary, some internal benefits are identified. First and foremost, sustainability does not only provide customers with a positive view on the brand, the demand for environmentally friendly products might enlarge the total market share of a company as certain customer segments specifically buy sustainable products for which the company could charge a premium (Branco and Rodrigues, 2006). Companies that aim to develop new sustainable products and processes have to possibility to foster better management as the search for improvement leads to the identification of inefficiencies and subsequently the fostering of the problem solving needed (Branco and Rodrigues, 2006). It is also linked to the development of innovative capabilities which has a positive influence on business performance and competitive advantage (Russo and Fouts, 1997; Kashmanian et al., 2011).

The positive effect of CSR friendly policies make companies a more attractive employer for employees, which increases the quality of people hired (Russo and Fouts, 1997). The effort of companies in regards to sustainability are expected to improve morale and productivity while reducing absenteeism and staff turnover which in turn decreases the costs associated with recruiting and training new employees (Branco and Rodrigues, 2006). In regards to the environmental sustainable side of CSR a company may be led to a more efficient and productive conduct of business (Goldstein, 2002). Mainly the prevention of waste and pollution are logical cost saving business choices as costs of disposal and cost not-used material are minimised (Hart, 1995). This progressive stance on sustainability might be valuable as it can be associated with lower costs of compliance, while providing the firm with new market

opportunities.

An important note to be made is that most of the benefits of sustainable conduct of business as described above long-term, while costs are short-term or even constant. Thus in order to understand and reap the benefits a view longer than most companies currently have is required (Branco and Rodrigues, 2006).

2.3 Sustainability in practice

According to Smith (2003)instead of questioning if businesses should work towards sustainable development they should work on how to give a concrete form to these efforts and see how businesses can contribute. However, due to the plurality that businesses face, it can be hard to understand what one specific organisation should do to contribute towards a sustainable future.

2.3.1 The triple bottom line

In 1997, Elkington coined what would become one of the most commonly used terms in corporate sustainability; the triple bottom line (TBL). This framework urges companies to assess their performance and thus success not just in the traditional monetary way, but as well by assessing their impact on the society and the environment. It is right that being aware of one's complete impact is the first step into improving ones sustainability impact. Yet the triple bottom line approach is not just about understanding the impact but accounting for it in a way similar to traditional financial accounting (Elkington, 1997). The TBL approach thus focuses on the full impact a company has and on the need to measure, calculate and report on a wider scope of issues than just the financial dimensions (Norman and MacDonald, 2004). This notion has been supported by plentiful Governmental Institutes, Non Governmental Organisations (NGOs) and MNCs in for example their yearly reports (Norman and MacDonald, 2004).

This notion, where the "normal" financial bottom line is combined with the social and environmental bottom line claims that these respective impacts are objectively measurable. And that companies that perform better on all three of these bottom lines perform better in the long run (Norman and MacDonald, 2004). Financial data is easily quantifiable, although it would be preferable to report the social or environmental performance of a company in a similarly objective and quantifiable way, this is not as straightforward.

2.3.2 Global Reporting Initiative

In efforts to overcome the difficulties associated with measuring and reporting sustainability performance several approaches and initiatives have focused on creating methods for measuring the impact on the social and environmental dimensions of sustainability. One of the most used sustainability indicator framework is the Global

Reporting Initiative (GRI) G4 Reporting Guidelines, which contains about 90 indicators in the categories economic, environmental, and labour practises and decent work, human rights, society and product responsibility (3BL Blogs, 2016). The GRI G4 Reporting Guidelines have recently been succeeded by the GRI Standards, a revised and restructured version of the G4 reporting guidelines. The GRI indicator framework is used by thousands of companies world-wide as a basis for their sustainability report. By having a standard in place, one for each respective industry, key critiques regarding difficulty of benchmarking the sustainability reports, and thus performances, have been addressed.

2.3.3   5 stages of sustainability in business strategy

As businesses move towards improving their impact towards sustainability they go through several stages of implementation. Willard (2005), based on earlier work, distinguishes five stages that show the differences in organisational sustainability maturity; the position of sustainability in the overall company strategy.
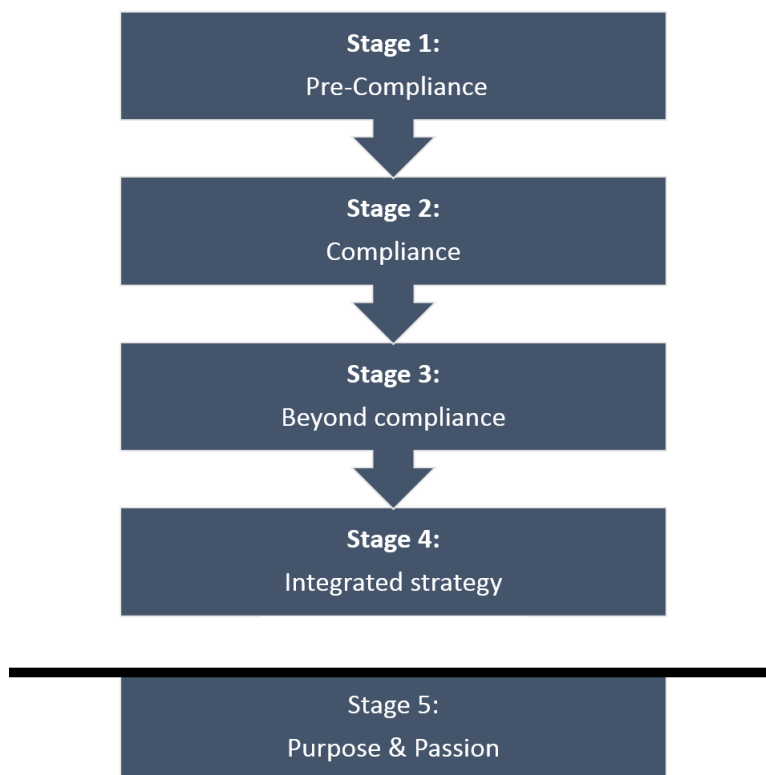
Figure 2.2: The five stages of sustainability (Willard, 2005)

These five stages, shown in Figure 2.2, are defined as:
1. **Pre-compliance** - The business focuses on not getting caught and save money by breaking the law.
2. **Compliance** - The business obeys the law but treats any CSR efforts purely as costs.

3. **Beyond Compliance** - The business realises it can save money by being proactive in regards to operational efficiencies, that it can create brand value to do so, and that it helps mitigating risk; however, the CSR efforts are still organised in separated departments, and thus are not integrated in the business processes.
4. **Integrated strategy** - The business encapsulates sustainability in their strategy and thus their value adding processes. It sees sustainability projects as opportunities no longer as risks. Sustainability is seen as a sustainable competitive advantage.
5. **Purpose and Passion** - The business focuses, based on internal personal values, on improving the society, environment and the company itself.

The transition between stages as (Willard, 2005) describes them are smooth between stage two and three; some people get the dedicated task to look for efficiencies and save costs by implementing eco-measures. The company has also realised that being regarded to be sustainable brings additional brand recognition and thus benefits associated with it. The change towards stage four is described as a transformation instead of a transition as it requires profound ways of internalising sustainability; which leads to significant changes in organisational culture and operations. Willard notes that in this stage the sustainability efforts move from the Environment, Safety and Health (ESH) department towards to board room. In Willard's fifth stage, the organisation does all things they do because it makes the world a better place. Earning money is less important. As a result, Wheeler and Elkington (2001) describe stage five companies as companies that are nice to watch but have too low impact from which Willard (2005) concludes that the world needs more companies in stage four. Senge et al. (2008) do not see much difference between stage four and stage five and therefore propose another model where stage five companies are companies that are born from a sustainability mindset from the start.

2.3.4   5 stages of sustainability implementation

Just as the place of sustainability in a company's strategy the actions to become fully sustainable can be described in five stages as done by Nidumolu et al. (2009). In their framework the focus lies on the implementation of sustainability. Contrary to the model proposed by Willard (2005), their model focuses more on the method used to become more sustainable, not as much on the place of sustainability in the organisation's strategy. Their five stages of sustainability are:

1. **Viewing Compliance as Opportunity** - The business uses legislation to spark the build of processes, products and services that lead to better performance.
2. **Making Value Chains Sustainable** - The business works together with suppliers to create eco-friendly material and reduce waste. Central are improved processes and process innovation.
3. **Designing Sustainable Products and Services** - The business realises the competitive benefits of offering eco-friendly alternatives as the first in market.

4. **Developing Business Models** - The business starts to investigate new business models, and re-think their value propositions with sustainability in mind.
5. **Creating Next Practice Platforms** - The business changes the existing paradigm by developing sustainability driven platforms.

2.4 Sustainability Performance Measurement Systems

Sustainability performance measurement is a relatively new research area and is regarded to be a niche within the field of performance measurement research. The performance measurement field is well-established, illustrated by the fact that a new publication on the topic is published on average every five hours (Barrows and Neely, 2011). The amount of papers published yearly has increased steadily since the early 1990s, which shows that the academic interest in performance measurement has grown and the discipline is evolving continuously (Neely, 2005). Performance measurement is a very diverse research area, due to the contribution from a broad range of academic fields such as accounting, operations management and psychology (Neely, 2002).

Many of the principles and concepts that originate in performance measurement research are also relevant to sustainability performance measurement. This chapter describes in short the development of the performance measurement field, presents a definition of PMS and includes a discussion on the most relevant concepts found in performance measurement literature.

2.4.1 Historical development of performance measurement field

Originating from the field of accounting, business performance measurement practises are a result of the desire to quantify performance, traditionally with a strong financial focus. The practice of quantifying financial business performance is far from novel; most of the basic principles of financial performance measurement that are used today were already applied more than a century ago (Neely, 1999).

The strong focus on financial performance has undoubtedly contributed to economic success of Western countries in the 20th century, but there has been critique on the narrow scope of this approach from early on. In 1954, Drucker (as cited in Neely, 1999) already pointed out that purely financial measures did not always result in the desired performance output, and argued in favour of a more balanced set of measures that would include a broader range of financial and non-financial aspects. In the following decades, the traditional cost-accounting focus was increasingly criticised for leading to wrong decisions, encouraging short-termism, lacking strategic focus, encouraging local optimisation, obstructing continuous improvement, being historically focused and failing to provide information on customer needs and competitors (Neely, 1999). In the 1980s, the success of Japanese manufacturing techniques and

the quality movement inspired companies in the Western world to start adopting additional performance measures such as quality, time and flexibility (Eccles, 1991; Nudurupati et al., 2011). These developments, combined with a changing business environment and increasing competition, led Eccles to predict that businesses would have to rethink the way they measured business performance within five years. Almost four decades after Drucker's argument, Eccles made a the following statement in his 'Performance Measurement Manifesto':

"At the heart of this [performance measurement] revolution lies a radical decision: to shift from treating financial figures as the foundation for performance measurement to treating them as one among a broader set of measures. [...] Many managers can honestly claim that they and their companies have tracked quality, market share, and other non-financial measures for years. Tracking these measures is one thing. But giving them equal (or even greater) status in determining strategy, promotions, bonuses, and other rewards is another. Until that happens, to quote Ray Stata, the CEO of Analog Devices, "When conflicts arise, financial considerations win out"."

Eccles' prediction turned out to be fairly exact. In the 1990s, there was a vast increase in academic interest in performance measurement, referred to by (Neely, 1999) as a 'performance measurement revolution'. Most of academic research was focused on developing more balanced performance measurement frameworks, which would include a broader set of financial and non-financial indicators (Neely, 2005). The most well-known framework developed in that period is the 'balanced scorecard' (Kaplan and Norton, 1992), which has since been adopted in firms all around the world and is the most widespread performance measurement framework today (Nudurupati et al., 2011). The balances scorecard combines financial and operational measures on customer satisfaction, internal processes and innovation and improvement. It was developed to give managers a fast and comprehensive overview of the business, by showing an overview of the most critical performance indicators in multiple areas simultaneously (Kaplan and Norton, 1992).

In the same period, following the 1987 Brundtland report on sustainable development, a growing public concern about environmental issues started to put pressure on companies to disclose more on their environmental impacts (Elkington, 1994). Elkington argued that companies should not only judge their performance based on economic measures, but should strive to contribute to sustainable development in a broader sense. Four years later, (Elkington, 1997) introduced the triple bottom line principle, also known as the 3Ps (People, Planet, Profit), which expands business performance measurement from the traditional financial focus (the 'bottom line') to social and environmental aspects. Following the triple bottom line principle, much research has focused on how to integrate social and environmental aspects in existing performance measurement tools, such as the balanced scorecard (Hubbard, 2009). A dominant approach does not seem to have emerged yet, which indicates that the field of sustainability performance measurement is still developing.

The historical development of business performance measurement shows that there

has been a trend towards a broader perspective on how to measure business performance. The common perception that companies exist to benefit their shareholders gave room to stakeholder theory and a focus on direct stakeholders such as employees and customers (exemplified by the balanced scorecard), which has later been evolving into a wider stakeholder perspective, including local communities, governments and society at large (Hubbard, 2009). Nowadays, the majority of large companies report on their performance in all three areas of sustainability; however, it is too early to speak of a truly 'balanced' approach to performance measurement, as sustainability reporting is often not fully integrated, biased and incomplete (Hubbard, 2009). Instead, there are indications that in many companies much of the traditional financial and operational focus still remains as the dominant factor (Hubbard, 2009).

2.4.2 Defining Performance Measurement Systems

Performance measurement is defined by Neely et al. (1995) as *"the process of quantifying the efficiency and effectiveness of action"*. The term measurement thus refers to a quantification process and performance is seen as the product of action (Neely et al., 1995). By referring to the efficiency and effectiveness of action, this definition identifies two fundamental dimensions of performance; an internal and an external dimension. The external dimension being effectiveness, or the extent to which customer satisfaction is created, and the internal dimension being efficiency, the level of resource utilisation needed to create a certain level customer satisfaction (Neely et al., 1995).

Based on the above definition of performance measurement, Neely et al. (1995) defined a PMS as *"the set of metrics used to quantify both the efficiency and effectiveness of actions"*. This definition describes the core of what a PMS is, but a PMS entails more than only a set of metrics (Franco-Santos et al., 2007). A wide range of alternative definitions have been proposed in literature, differing in scope and emphasising different aspects of PMS. Several research papers refer to a PMS as an information system ((Bititci et al., 1997; Forza and Salvador, 2000; Ittner et al., 2003) consisting of a structural and a procedural framework (Folan and Browne, 2005; Braz et al., 2011). Others emphasize the role of PMS in planning and control (Bourne et al., 2003; Maisel, 2001), monitoring of objectives and strategic alignment (Atkinson, 1998), reporting (McGee, 1992), reward systems (Otley, 1999) and internal and external communication (Forza and Salvador, 2000). Based on this wide variety of definitions in literature, Franco-Santos et al. (2007) conclude that a general consensus on a definition is missing. They argue that for the performance measurement field *"to develop and become more relevant to theory and practice, [...] researchers need to be more specific and explicit about the characteristics of the systems they are studying"* (Franco-Santos et al., 2007).

In an extensive literature review, Franco-Santos et al. (2007) analysed seventeen definitions of PMS with the aim of identifying and classifying the key characteristics of PMS. They found that all definitions, although varying widely, can be characterised as being based on one or more of three aspects:

- The 'features' of the PMS, i.e. the elements that constitute a PMS
- The 'processes' of the PMS, i.e. the actions and procedures that constitute a PMS
- The 'role(s)' of the PMS, i.e. the function the PMS fulfils in relation to its environment

Out of the nine features, twelve processes and seventeen roles identified from the different definitions,Franco-Santos et al. found that there is an agreement on two features ('performance measures' and 'supporting infrastructure'), three processes ('information provision', 'measure design and selection' and 'data capture') and one role ('measure performance'), which they argue should be part of any PMS definition. They suggest that researchers can choose to include other characteristics to fit their research, but should clearly describe the PMS definition used. All PMS characteristics identified by Franco-Santos et al. are shown in Table 2.1.

Features	Processes	Roles
Performance measures	Information provision	Measure performance & performance evaluation
Supporting infrastructure	Measures design & selection	Focus attention & provide alignment
Objectives & goals	Data capture	Internal communication
Targets	Target setting	Planning
Causal models	Rewards	Monitor progress
Hierarchy/cascade	Identify stakeholders needs and wants	Strategy implementation & execution
Performance contract	Strategic objectives specification	External communication
Rewards	Data analysis	Rewards
	Decision making	Performance improvement
	Performance evaluation	Managing relationships
	Interpretation	Feedback
	Review procedures	Double-loop learning
	Planning	Strategy formulation
		Benchmarking
		Compliance with regulations
		Control

Table 2.1: Performance measurement system characteristics

2.4.3   Scope and system boundaries of a PMS

The framework for performance measurement system design shown in Figure 2.3 helps to provide a better understanding of how the chosen PMS definition defines the scope and system boundaries of the studied system. This framework is based on the proposition that a PMS can be analysed on three levels: (1) The level of individual performance measures; (2) the level of the PMS as a whole; and (3) the relationship between the PMS and its external environment, i.e. related systems and tools (Neely et. al, 1995). The individual measures, generally referred to as 'key performance indicators' (KPIs), are the core of any PMS. The chosen set of KPIs from the PMS together with the defined features and processes. Hence, the features and processes that are regarded to be part of the PMS define the boundaries of the studied system. This is confirmed by Folan and Browne (2005), who state that a PMS is constituted of a structural and a procedural framework. The role(s) of the PMS define the relationship between the PMS and its environment; therefore, the system boundaries of a PMS and its relationship to its environment are set by the features, processes and roles that are regarded as part of the PMS definition. The chosen PMS definition and level(s) of analysis will influence the scope, level of detail and ultimately the outcomes of the study (Franco-Santos et al., 2007).
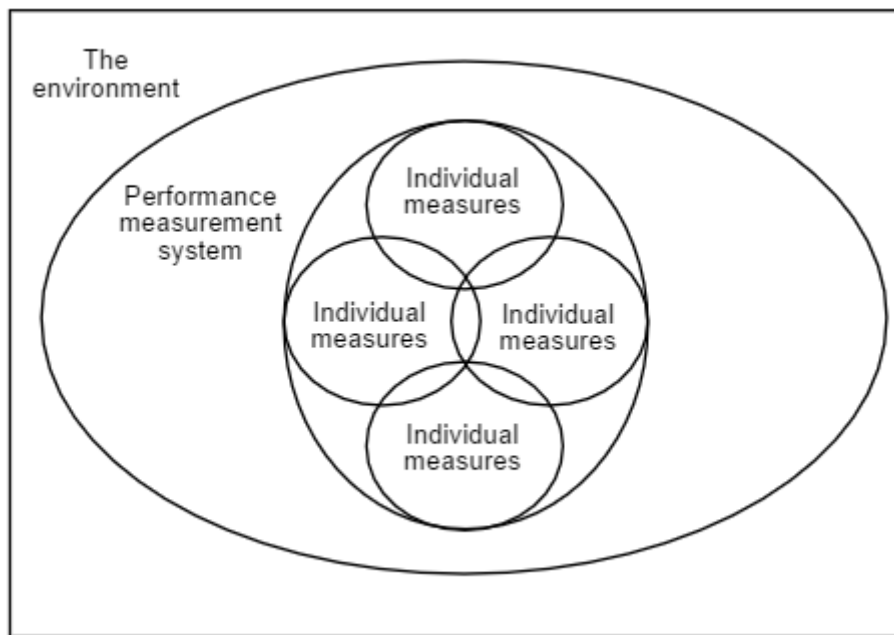
Figure 2.3: A framework for performance measurement system design (Neely et al., 1995)

2.4.4   Defining Sustainability Performance Measurement Systems

Within the context of sustainability management, a PMS is referred to as a 'sustainability performance management system' (SPMS). An SPMS can be distinguished

from other PMSs by *"their explicit focus on triple bottom line issues, their emphasis on the linkages between those issues, and their explicit focus on a long-term view of business performance"* (Searcy, 2011). An SPMS incorporates all three dimensions of sustainability: economic, social and environmental, i.e. the triple bottom line (Searcy, 2012). An SPMS is thus not limited to social and environmental issues, but incorporates economic performance measures as well. Many definitions of SPMS exist, but in this study the following definition, provided by Searcy (2016), is used:

"An enterprise sustainability performance measurement system is defined [...] as an integrated system of indicators and indices that provides information on progress towards defined goals to help manage the local, regional and global economic, environmental and social impacts of a focal firm and its forward and reverse supply chains over the short and long term."

An SPMS thus aims to incorporate a broad range of perspectives on sustainability performance, including the full product life-cycle and geographical and time dimensions (Searcy, 2016). For the purpose of this study, the definition above is complemented with the set of selected features, processes and roles shown in Table 2.2. Together they constitute the SPMS definition used for this study. The features, processes and roles are further elaborated upon below.

Features	Processes	Roles
Performance measures	Measures design & selection	Measure performance & performance evaluation
Objectives, goals & targets	Data capture & analysis	Internal & external communication
Supporting infrastructure	Information provision	Performance improvement
	Target setting	Monitor progress

Table 2.2: Characteristics that are part of the PMS definition for this study

2.4.5 Features and processes of an SPMS

2.4.5.1 Performance measures and measure design and selection

A performance measure is a qualitative or quantitative representation of the status of a system or an aspect of it (Veleva et al., 2001) and serves to simplify and condense the complex and complicated reality of a dynamic system to meaningful and useful information (Singh et al., 2009). In the context of sustainability the term 'sustainability indicator' is often used to describe performance measures (Singh et al., 2009). In this study we will refer to 'key performance indicators' (KPIs) or simply 'performance measures'. KPIs are a useful tool for organisations to track and communicating progress towards or away from defined goals. They are especially useful in the area of sustainability, because they aid *"transforming the abstract concept of*

sustainability into an actionable objective" (Milman and Short, 2008). The individual sustainability KPIs combined form the core of an SPMS and should cover all important environmental, social and economic impacts of the organisation (Searcy, 2016).

KPIs can have a profound impact on the development of an organisation, as *"what gets measured, gets attention"* (Eccles, 1991). The process of designing, selecting and evaluating KPIs is therefore of critical importance. Many publications have focused on the process of KPI design and selection, proposing procedural frameworks (see, for example, Searcy et al., 2008) and design requirements for individual KPIs (see, for example, Veleva et al., 2001) and sets of KPIs (see, for example, Searcy et al., 2005).

2.4.5.2 Supporting infrastructure, data capture and analysis and information provision

KPIs are variables, i.e. representations of primary system data. This primary data are the actual measurements and observations of the system (Veleva et al., 2001), which have to be captured, analysed and presented in a way that it provides useful information. The supporting infrastructure of a measurement system includes all necessary resources used for capturing, collecting, sorting, condensing, analysing, verifying and presenting measurement data (Neely et al., 1998). Resources that are considered as parts of the supporting infrastructure of an SPMS are measurement instruments and procedures, calculation and estimation tools, IT infrastructure and systems, the skills and human resources needed to feed, maintain and use the system, etc. (Franco-Santos et al., 2007). An efficient and effective supporting infrastructure is needed to ensure a high quality of data and is therefore critical for a well-functioning SPMS.

2.4.5.3 Targets and target setting

As was pointed out by Lancker and Nijkamp (2000) *"a given indicator does not say anything about sustainability, unless a reference value such as thresholds is given to it"*. In other words, KPIs have little meaning by themselves and only provide useful information about performance when they can be linked to a reference baseline or target. When linked to clearly defined targets, KPIs are also more effective (Searcy et al., 2016). Sustainability targets and target setting are therefore regarded to be an integral part of an SPMS in this study.

Most corporate targets are constructed based on historical achievement and competitors' performance, and are refined according to economic and technical feasibility and stakeholder values (Rauch and Newman, 2009); however, such targets provide little information on what performance level is needed to actually be sustainable. New initiatives such as the science-based target initiative for Carbon-dioxide (CO_2) emissions (Science Based Targets Initiative, 2016) are an attempt to base corporate targets on a company's fair share to achieving global sustainability. So far, only few companies have made references to planetary limits in public statements related

to their corporate targets (Trexler and Schendler, 2015). Similar to the ecological limits of our planet, the SDGs could be regarded as global reference targets for sustainability on which corporate targets can be based. In a report to the UN Secretary General in 2013 by UN Global Compact, a reference was made to the potential of using the SDGs for setting corporate sustainability targets:

"The establishment of a post-2015 agenda with a set of sustainable development goals would provide a unique opportunity to significantly grow the global population of companies setting their own specific, quantitative and time-bound targets aligned with one or more such goals." (UNGC, WBCSD & GRI, 2013)

In the SDG Compass (GRI et al., 2016) companies are also advised to base their corporate targets on the SDGs, which is referred to as the 'outside in approach' as opposed to the conventional 'inside out approach'; however, there have been no references to the SDGs being used in this manner in available academic literature to date.

2.4.6 SPMS in its context

A PMS is seen as a critical component of the management system of a company (Neely, 2005). Performance management can be described as the application of information and knowledge provided by performance measurement (Nudurupati et al., 2011). Performance management and measurement are inseparable, as they feed each other in a continuous cycle (Lebas, 1995). Besides, performance management provides the context for performance measurement (Lebas, 1995). This is schematically visualised in Figure 2.4.
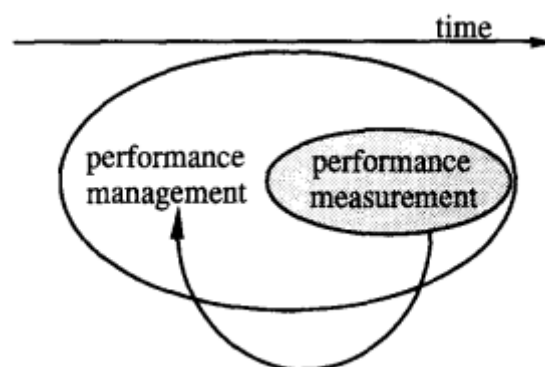
Figure 2.4: Performance management and performance measurement are closely intertwined (Lebas, 1995)

A more detailed framework of performance measurement in the context of performance management systems is presented by (Ferreira and Otley, 2009) as shown in Figure 2.5. The framework pictures performance management as a chronological process, starting out from a vision and mission, which through the organisational structure and strategies feed the development of KPIs and targets, which form the

basis for performance evaluation and feed reward systems. In reality, the development of a PMS is a dynamic and iterative process, with performance measures often directly and indirectly influencing strategy and vice versa (Folan and Browne, 2005). Ferreira and Otley identify four core enabling mechanisms for performance management systems, those being information flows and infrastructure (IT systems, feedback and feedforward information flows), the use of available information and control mechanisms, how a performance management system is evaluated and changed and the strength of the connections between the different components of a performance management system. Additionally, they identify the company culture and other contextual factors as important influences on performance management systems. Folan and Browne emphasise that for a performance management system to be effective the different components, enabling mechanisms and external influences should be aligned and form a coherent whole.
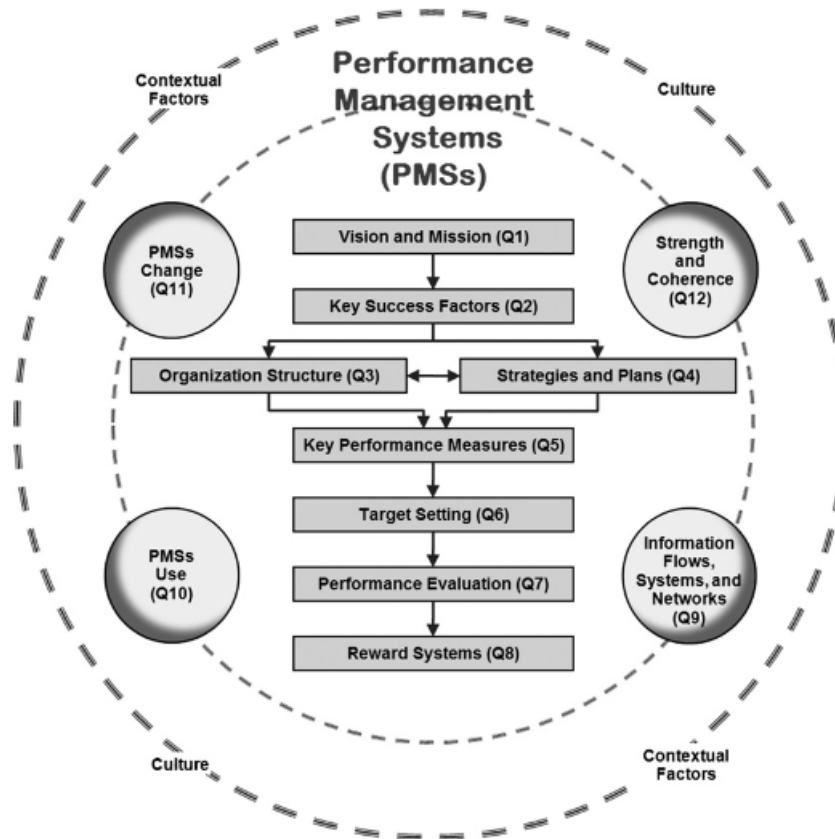
Figure 2.5: The performance managmnet systems (PMSs) framework (Ferreira and Otley, 2009)

2.4.7   Roles of an SPMS

An SPMS can fulfil a variety of functions that depend on the situation and might change over time (Franco-Santos et al., 2007, see Table 2.1). For the purpose of this study, four roles were selected (see Table 2.2), based on their relevance for alignment with the SDGs, as described in the Synthesis section. The role 'measure

performance and performance evaluation' is a function of an SPMS by definition and does not require further introduction. 'Monitoring progress' refers to keeping track of progress towards set goals and targets, and providing timely information to feed decision making and strategic planning. 'Performance improvement' refers to providing feedback and learning, as well as directing improvement efforts and identifying potential for future improvement. 'Internal and external communication' refers to internal knowledge sharing, employee motivation, internal and external reporting and internal and external benchmarking (Franco-Santos et al., 2007).

2.4.8 Life-cycle of an SPMS

According to Bourne et al. (2000), the life-cycle of an SPMS can be divided into three distinctive stages: design, implementation and use, each of which require different key organisational competencies. In addition to these three stages, four 'updating processes' are identified which are required to review an SPMS. The framework developed by Bourne et al. describing these stages is shown in Figure 2.6. Several researchers have made adaptations to this framework (Nudurupati et al., 2011; Searcy, 2012; Braz et al., 2011), with the main difference being the classification of updating the SPMS as a separate stage. In this study, we distinguishes the following three life-cycle stages of an SPMS: design, implementation and use, and reviewing and updating of an SPMS. It is important to emphasise that these are conceptual stages. In reality they may overlap and may not be directly distinguishable; however, all SPMS will progress through each of these stages in one way or another (Bourne et al., 2000).

Most of the available literature on SPMS is focused on the design phase (Searcy, 2012). The design phase of an SPMS consists of two main processes (see Figure 2.6), those being identifying key objectives and designing measures to track progress towards these objectives (Bourne et al., 2000). There is a strong consensus in literature that measures should be derived from strategy, hence the processes of designing strategic business objectives and designing measures should be strongly connected and intertwined (Bourne et al., 2000). The aim is to design a framework of adequate measures that encourages behaviour in line with strategy (Neely et al., 1996) and addresses customer and stakeholders' needs (Braz et al., 2011).

Several researchers present procedural and structural conceptual frameworks for SPMS design focussed on different aspects and levels of SPMS. Several procedural frameworks for individual indicator design and selection (Searcy et al., 2005; Chee Tahir and Darton, 2010; Keeble et al., 2003; Searcy, 2009) and measurement frameworks (Searcy, 2009) have been proposed and many structural SPMS framework have been presented, mostly focussed on designing an indicator framework in a specific context (Keeble et al. 2003; Searcy et al. 2007; Krajnc and Glavič 2003, 2005; Veleva et al. 2001; Azapagic and Perdan 2000; among others). The exact content of the design frameworks in the above listed publications are not within the scope of this study; however, several of these publications discuss the development of indicator selection criteria, which have been used in this study to construct eval-
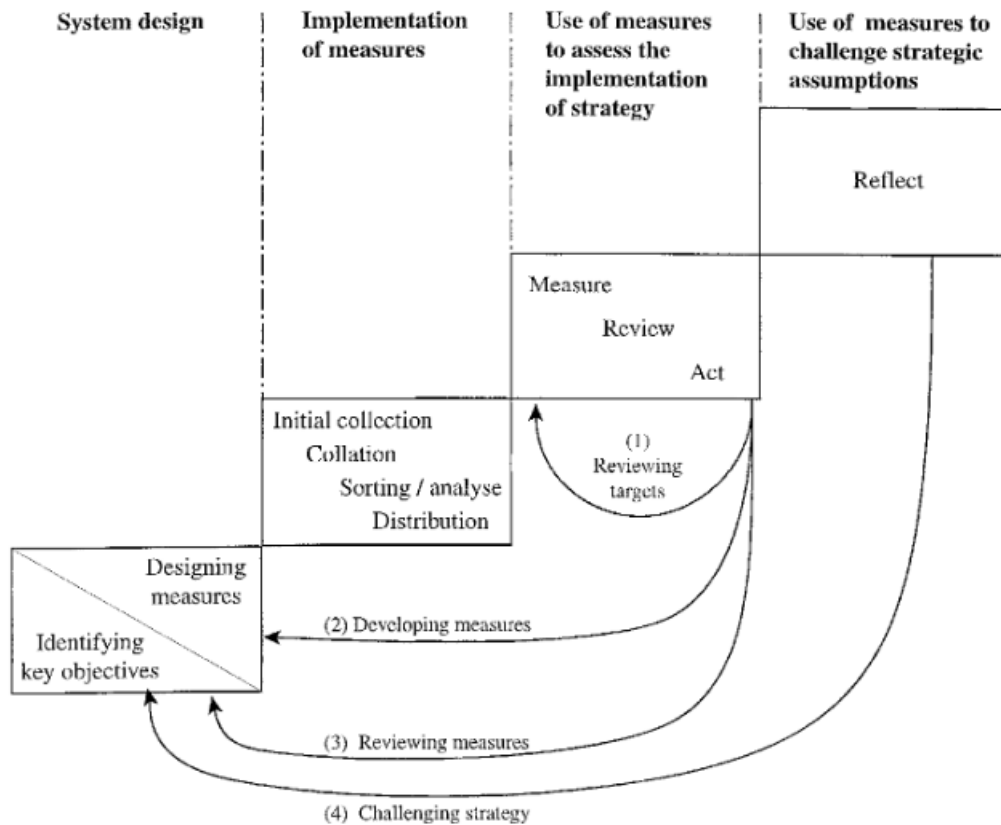
Figure 2.6: Phases in developing a performance measurement system (Bourne et al., 2000)

uation criteria for SPMS (see Chapter 2.5.2).

The most widely used indicator framework is the set of roughly 90 indicators included in the GRI G4 Reporting Guidelines. The GRI indicator framework is used by thousands of companies world-wide as a basis for their SPMS, but it has been widely criticised for being too generic and containing too many indicators, and many researcher have attempted to create frameworks that go beyond the GRI (Searcy, 2012). Many researchers have concluded that creating a "one size fits all" framework is not feasible, and that any indicator framework should be adapted to the specific needs and context of an organisation (Searcy, 2012) and the interests of relevant stakeholders (Azapagic, 2004). Another important observation to consider, especially for companies that have adopted the GRI guidelines, is that most corporate SPMS focus too much on external reporting and fail to satisfy internal information needs, as stated by Staniškis and Arbačiauskas (2009):

"The biggest shortcoming of many existing sustainability performance evaluation systems is their focus on external reporting and underestimation of internal information needs for decision-making, increased management effectiveness and actual performance improvement."

26

After measures are designed, they are implemented through data creation, data collection, data sorting and analysis, and information distribution (Bourne et al., 2000; Nudurupati et al., 2011; see also Figure 2.6). These tasks require new systems and procedures to be put in place in order to collect and process the measurement data regularly. This often requires the implementation of a new IT system to standardise and automate the analysis and present the data in a meaningful way (Bourne et al., 2000). It may also require the initiation of new procedures and initiatives in order to acquire new data that were not recorded previously (Bourne et al., 2000). Based on three longitudinal case studies, Bourne et al. conclude that *"the task of implementing and using a performance measurement system is far from complete at the end of the design phase and there are obstacles to further progress"*. While there seems to be a broad consensus among academics about the importance of the implementation stage, surprisingly little empirical evidence is available on how an SPMS should be implemented (Searcy, 2012; Nudurupati et al., 2011). As observed by Searcy:

"Virtually all of the papers focused on the development of a corporate SPMS acknowledge the importance of implementing the system, but few provide specific details on how this may be done."

Bourne et al. observed three main barriers to the implementation and use of an SPMS, those being (1) resistance to measurement, (2) IT system issues and (3) distraction of top management commitment. They note that resistance to measurement is rarely commented upon in available literature, most likely because it is very difficult to observe. Still, based on change management principles, they conclude that some form of resistance is likely to occur:

"[...] the implementation of a new performance measurement system can be seen as 'changing the rules of the game' or redistributing power in the organisation. Individuals and groups may see this as not being in their best interest and actively or passively resist the implementation." (Bourne et al., 2000)

IT system issues hindering the implementation of an SPMS are often related to a lack of knowledge about the new IT system, wrong use of the system, the inappropriate presentation of data, and the incompatibility of multiple systems (Bourne et al., 2000). In some cases, IT problems even force companies to switch to manual calculations. The third barrier, top management commitment being distraction, is also a common phenomena. Management is often involved in the design phase, but as management priorities shift, it gets distracted, resulting in poor overall implementation of the system (Bourne et al., 2000).

The implementation of an SPMS does not automatically result in appropriate use of performance data. As stated by Nudurupati et al.: *"Providing performance information is not sufficient to improve business performance results. The real success lies in people's behaviour in using this performance information"*. Bourne et al. suggest that the data is put to use in regular performance review meetings attended

by managers with responsibility and decision making power. SPMS can be used in many ways, as shown in Table 2.1, but based on previous studies one can conclude that there is still relatively little knowledge about how SPMS are used in practice (Searcy, 2012).

The framework shown in Figure 2.6 makes a distinction between two ways of using an SPMS. One the one hand, the use of an SPMS to assess the implementation of the strategy and on the other hand the use of an SPMS to challenge strategic assumptions (Bourne et al., 2000). Both processes require adequate review procedures to be in place, which will be further elaborated upon below.

Bourne et al. (2000) describe four updating processes that are required for reviewing an SPMS at different levels. The first process is related to the reviewing of targets and standards. The second process refers to reviewing and updating individual measures as circumstances change. The third process is about reviewing and updating the complete set of measures as changes occur in strategic direction and competitive environment. The fourth process addresses the ability of the SPMS to challenge and review strategic assumptions. The four processes are pictured in Figure 2.6. These review processes should be performed regularly in order for the SPMS to remain aligned with strategy (Nudurupati et al., 2011). As concluded by Bourne et al.: *"Targets and measures can evolve naturally during the use of the measures but, if unchecked, this evolution may lead to the performance measures diverging from strategy"*. Divergence may also occur when strategy is reviewed without updating the measures (Bourne et al., 2000). Several publications have been devoted to reviewing and updating SPMS, these will be discussed more in-depth in the next chapter.

2.5 SPMS Evaluation

2.5.1 Procedural framework for assessing an SPMS

It is of critical importance that an SPMS is evaluated and updated on a regular basis (Bourne et al., 2000; Kennerley and Neely, 2002; Searcy, 2011, 2012). Managing corporate sustainability is a dynamic process with continuously changing priorities and requirements, which underscores the need for an SPMS that evolves over time and adapts to a changing internal and external environment (Searcy, 2012). Without appropriate reviewing procedures in place, the value of an SPMS will diminish over time and will fail to provide managers and stakeholders with reliable information on how the company is progressing towards its sustainability goals. Hence, regularly reviewing and improving an SPMS is needed in order to *"review the ongoing usefulness of the system, identify changing corporate requirements, monitor data availability, and to determine success and failures in implementing the SPMS"* (Searcy, 2011).

Considering that many researchers have acknowledged the importance of SPMS review processes, surprisingly little research has been performed on how to keep an SPMS relevant and useful over time (Searcy, 2011). In an effort to address this

gap in literature, Searcy developed a conceptual procedural framework for SPMS assessment (shown in Figure 2.7). The framework describes a structured approach, divided in three main phases which are subdivided into a set of key issues that should be addressed. The purpose of the framework is to provide a systematic approach to the evolution of corporate SPMS. As described by Searcy:

"The framework will help the corporation to identify the strengths and weaknesses of its SPMS and provide a starting point for implementing improvements. In doing so, the framework will help focus the corporation's attention on the SPMS and will, ultimately, help yield a better understanding and improved usage of the SPMS."

The framework was designed to be broadly applicable, stakeholder- and practice-oriented and to serve as a supporting tool in addition to existing sustainability performance measurement frameworks, such as the GRI indicator frameworks (Searcy, 2011). It is important to note that this conceptual framework is not designed to serve as a step-by-step prescriptive procedure, but rather as a rough guideline for SPMS assessment (Searcy, 2011). The framework can be adapted to the specific needs and context of an organisation and is meant to be improved over time based on further empirical testing (Searcy, 2011). Besides, the framework is designed as an iterative process, meaning that *"the three phases are dynamic and that moving back and forth is often necessary"* (Searcy, 2011). The three phases are now briefly described in more detail.

Figure 2.7: Framework for structuring the assessment of a corporate SPMS (Searcy, 2011)

A detailed planning for the assessment is important to make sure that the assessment is done in a structured and systematic way (Searcy, 2011). The key issues

that are to be addressed in the planning phase are (1) conducting an environmental scan; (2) defining the purpose and scope of the assessment and; (3) developing an action plan (adapted from Searcy, 2011).

The environmental scan entails an examination of the internal and external factors that may influence the evolution of the SPMS and provide a ground for updating the system. Possible internal factors are changes in strategic priorities, corporate objectives, organisational structure and data collection, processing and reporting systems (Searcy, 2011). External factors can be changes in governmental policy and regulations, customer needs, competition, stakeholder pressure and other external incentives (Searcy, 2011). In the case of this study, the introduction of the SDGs can be identified as one of the main external factors that triggered the SPMS assessment.

Based on the outcomes of the environmental scan, the purpose and scope should be defined, which define the goal and the boundaries of the assessment (Searcy, 2011). The scope of the assessment can for example focus on one or more levels of the SPMS (see also Chapter 2.4.3): the individual performance measures, the SPMS as a whole, or the relationship between the SPMS and its external environment (Searcy, 2011). The assessment team can also decide to focus on one or more of the life-cycle stages of an SPMS (Searcy, 2011; see also Chapter 2.4.8). Deciding whether or not to include industry benchmarking as part of the assessment is also part of this scoping process (Searcy, 2011).

The final stage of the planning phase is the development of an action plan for conducting the actual assessment. The action plan should include a description of key stakeholders and documents and how these will be engaged in the assessment (Searcy, 2011). The assessment team should also decide to what extent external stakeholders will be consulted (Searcy, 2011). The planning phase is completed by the creation of a time schedule and sending out invitations for participation to the identified stakeholders (Searcy, 2011).

The assessment phase includes the following key issues: Preparing for the assessment; assessing the SPMS at specified levels; and assessing the SPMS at specified life-cycle stages (adapted from Searcy, 2011). The preparation step involves reviewing previous assessments, setting specific goals and plans for stakeholder engagement and planning meetings with key stakeholders (Searcy, 2011). Also, a review of the current SPMS should be performed, including the individual KPIs as well as supporting systems and processes such as IT systems.

After careful preparation, the assessment can be performed according to the defined purpose, scope and action plan. Based on the ISO 19011 standard for management auditing and the Plan-Do-Check-Act (PDCA) cycle, Searcy identified a set of key questions that address all levels and life-cycle stages of an SPMS. The questions are shown in Figure 2.8. This is not claimed to be an exhaustive and complete list of questions, but rather a general framework that can be adapted to any situation by adding, changing or deleting questions (Searcy, 2011).

| | Key life cycle stages of a corporate SPMS | | |
Questions	Design	Implementation	Usage
Questions on individual measures	Are any new measures required? Are any of the measures obsolete? Do any of the goals or targets for any of the measures need to be updated? Do any of the definitions of the measures need to be updated? Have new data become available for any of the measures?	Have all of the measures been implemented? Have there been any difficulties in implementing any of the measures? Have all of the data collection and analysis requirements been met for each measure? Have responsibilities for managing the measures been established and communicated? Do the responsibilities for any of the measures need to be reassigned?	How have the measures been used? Have any of the measures not been used? If so, why not? Have the measures changed the way the corporation is managed? Have any of the measures encouraged dysfunctional behaviour? Have issues highlighted by the measures been addressed as necessary?
Questions on SPMS as a whole	Does the SPMS address the corporation's current priorities? Does the purpose of the SPMS need to be updated? Does the scope of the SPMS need to be updated? Are the measures in the SPMS linked through a cohesive framework? Are any new sub-systems required in the SPMS?	Have any key obstacles impeded the implementation of the SPMS? Are there any major gaps in the implementation of the SPMS? Have responsibilities for managing the whole SPMS been established and communicated? Have expectations regarding the implementation and use of the SPMS been clearly communicated? Has the training needed to implement and operate the SPMS been provided?	Has the SPMS been meeting its desired outcomes? How has the corporation addressed conflicts between individual measures? How does the use of the SPMS differ by department, division, and business unit? How does the use of the SPMS differ at the strategic, operational, and project levels of the corporation? Has the corporation established incentives for using the SPMS?
Questions on SPMS and its relation to its operating environment	Have any new internal policies been developed which impact the SPMS? Have any new regulatory requirements been implemented that need to be considered in the SPMS? Have any new external voluntary initiatives been developed that need to be considered in the SPMS? Have the priorities of internal and external stakeholders changed? How have the SPMSs of competitors in the same industry changed?	How has top management demonstrated its commitment to the SPMS? Has the SPMS been integrated with the relevant existing business infrastructure? Does the SPMS require any additional supporting infrastructure/resources? How have external stakeholders supported or impeded the implementation of the SPMS? How is the SPMS monitored between formal assessments?	How does the corporation manage communication with internal and external stakeholders regarding the SPMS? How is the SPMS perceived by internal and external stakeholders? How have internal and external enquiries regarding the SPMS been addressed? How has the SPMS contributed to meeting corporate goals? How has the SPMS facilitated external benchmarking?

Figure 2.8: Representative questions to guide assessment of a corporate SPMS (Searcy, 2011)

In the follow-up stage, the assessment team reviews the purpose and scope of the research to determine that the assessment has been successful. In this phase, the key issues are defined as 'developing recommendations', 'implementing recommendations' and 'concluding the SPMS review' (Searcy, 2011). Based on the results of the assessment, recommendations for changes to the SPMS are made by the assessment team. Recommendations can involve, among others, adding, changing or deleting measures and targets, changes to processes and procedures and changes to

supporting infrastructure (Searcy, 2011). The senior management should judge the feasibility of the recommendations and decide which recommendations will be implemented. The information regarding the recommendations and their implementation should be communicated with all relevant stakeholders (Searcy, 2011). For the recommendations that will be implemented, a detailed implementation plan should be developed. It is important that the implementation plan addresses how stakeholders will be affected, managed, and involved in the implementation process as well as takes common barriers to implementation into account. Barriers to implementation will be further explored in Chapter 2.5.3. Finally, the implementation process should be closely monitored and adequate support should be given to stakeholders involved (Searcy, 2011). The assessment team can formally end the assessment by reflecting on the process and identifying improvements for future assessments (Searcy, 2011).

2.5.2   Assessment criteria for SPMS

A limited amount of research has specifically addressed individual assessment criteria or criteria frameworks for SPMS (Searcy, 2012); however, a significant amount of publications address design requirements for PMS and SPMS specifically, which can be translated into assessment criteria.

Focused specifically on SPMSs, Searcy (2016) has constructed a framework of seven key requirements and 36 sub-requirements for measuring 'enterprise sustainability', which focus on measuring sustainability and address stakeholder needs along the entire value chain of a company. Searcy et al. (2004) present a set a basic design criteria for individual sustainability indicators and several guiding principles to accompany these criteria, which were supplemented by Searcy et al. (2005) with a six-step model for the design and selection of sustainability KPIs. In a consecutive paper, Searcy et al. (2008) presents the key lessons learned from a case study in which the indicator design model was applied to create a balanced system of sustainability indicators. Focusing specifically on sustainability indicators for production companies, Veleva et al. (2001) have contributed by providing a guiding procedural framework for indicator design and selection, as well as a set of desirable qualities that sustainable production indicators should have. Together, the listed papers possess a wide variety of design requirements for SPMS, which can be used in the assessment process.

A variety of papers have addressed design criteria for general PMS, many of which are also relevant in a sustainability context. Globerson (1985) and Maskell (1991) have provided early contributions to PMS design, both presenting a set of indicator selection guidelines. Neely et al. (1995) builds on this work and provides an overview of PMS design principles based on a literature review. Further literature review by Folan and Browne (2005) resulted in a coherent framework of 32 recommendations for PMS design and development. Braz et al. (2011) describe learnings from longitudinal study on the evaluation and updating of a PMS at an energy company. Kennerley and Neely (2002; 2003) provide further insights and learnings on design criteria for PMS based on case studies in companies from a wide range of industries.

In addition, several other publications have provided information on PMS design criteria (see, for example, Keeble et al., 2003; Bourne et al., 2000; Nudurupati et al., 2011; Bititci et al., 2005; Tung et al., 2011).

Several researchers have also presented procedural frameworks and guiding questions for PMS and SPMS assessment. These help to provide an understanding of how design requirements can be used as criteria in an assessment. Based on experiences from a case study, Searcy et al. (2006) present a sustainability indicator assessment model which consists of nine steps to guide indicator assessment. Searcy (2011) present an assessment model specifically for SPMS, including 62 key considerations divided over three assessment phases, as well as a framework of guiding questions divided over the levels and life-cycle phases of an SPMS (see Figure 2.8). Ramos and Caeiro (2010) present a framework for sustainability indicator assessment based on meta-performance evaluation, which contains 21 best practice factors and recommendations to increase the effectiveness of sustainability indicators. Searcy (2009) proposes a diagnostics framework, which aims to provide guidance specifically in the earlier design phases of an SPMS. The framework is divided into 'situational diagnostics', 'goal diagnostics' and 'implementation diagnostics' and contains over one hundred representative questions that can be used to clarify the status of an SPMS. The papers listed here further support the construction and selection of SPMS assessment criteria.

Table 2.3, 2.4 and 2.5 show the collection of criteria found in the listed literature, categorised by the three levels of an SPMS. Many criteria are applicable to several levels. In those cases, the criteria have been assigned to the level it most logically belongs to in order to avoid overlap. A minimal amount of criteria that were judged to be irrelevant or similar to other criteria have been filtered out from the lists.

Assessment Criteria	Publications
KPIs must address the issues identified by key internal and external stakeholders	Searcy et al., 2005, 2006, 2008; Folan and Browne, 2005; Kennerley and Neely, 2002; Searcy, 2016; Veleva et al., 2001; Keeble et al., 2003
KPIs should be under control of the evaluated organizational unit	Globerson, 1985; Kennerley and Neely, 2002, 2003; Bourne et al., 2000; Keeble et al., 2003; Folan and Browne, 2005
KPIs should be relevant	Searcy et al., 2004; Folan and Browne, 2005; Kennerley and Neely, 2003; Veleva et al., 2001; Braz et al., 2011

Table 2.3: Assessment criteria for individual KPIs (Continues on the next page)

(Table 2.3 continued)

KPIs should be understandable	Searcy et al., 2004; Bourne et al., 2000; Maskell, 1991; Kennerley and Neely, 2003; Braz et al., 2011
KPIs should be practical	Searcy et al., 2005; Veleva et al., 2001; Braz et al., 2011; Maskell, 1991; Keeble et al., 2003
KPIs should be chosen from and linked to clear business goals and targets	Globerson, 1985; Maskell, 1991; Searcy et al., 2006, 2008; Kennerley and Neely, 2003
KPIs should be able to measure progress over time	Keeble et al., 2003; Kennerley and Neely, 2003; Braz et al., 2011
KPIs should be objective - not based on opinion	Globerson, 1985; Kennerley and Neely, 2003; Braz et al., 2011
KPIs should be acceptable to senior management, to those who will use it, and to those who will collect the data	Searcy et al., 2004, 2005
KPIs should be clearly defined	Kennerley and Neely, 2003; Keeble et al., 2003
KPIs should provide useful information	Kennerley and Neely, 2003; Keeble et al., 2003
KPIs should be measureable	Veleva et al., 2001; Searcy et al., 2005
KPIs should be verifiable	Veleva et al., 2001; Keeble et al., 2003
KPIs should be quantitative	Braz et al., 2011; Folan and Browne, 2005

Table 2.3: Assessment criteria for individual KPIs

Assessment Criteria	Publications
Measurement system should include appropriate, effective and flexible supporting systems	Kennerley and Neely, 2002, 2003; Tung et al., 2011; Bourne et al., 2000, 2002; Bititci et al., 2005
Measurement system should evolve over time to address the changing needs of internal and external stakeholders	Searcy et al., 2008; Searcy, 2016; Bourne et al., 2000; Folan and Browne, 2005; Maskell, 1991

Table 2.4: Assessment criteria for SPMS as a whole (Continues on the next page)

(Table 2.4 continued)

Measurement system should include an effective mechanisms for periodically reviewing measures and targets	Bourne et al., 2000; Nudurupati et al., 2011; Kennerley and Neely, 2002; Searcy et al., 2006; Folan and Browne, 2005
Measurement system include all appropriate elements (internal, external, financial, non-financial, short-term and long-term measures and targets)	Neely et al., 1995; Searcy, 2016; Maskell, 1991; Folan and Browne, 2005
Measurement system should be balanced (between social, environmental and economic, internal and external, financial and non-financial, and short-term and long-term measures and targets)	Bititci et al., 2005; Bourne et al., 2000; Neely et al., 1995; Searcy, 2016
Measurement system should convey information through as few and as simple a set of measures as possible	Bourne et al., 2000; Searcy et al., 2006; Veleva et al., 2001; Folan and Browne, 2005
Measurement system should incorporate data from the entire supply chain	Searcy, 2016; Veleva et al., 2001; Folan and Browne, 2005
Measurement system should be specific to business units and locations	Bititci et al., 2005; Folan and Browne, 2005; Maskell, 1991
Employees should be trained to work with measurement system	Bititci et al., 2005; Tung et al., 2011; Nudurupati et al., 2011
Measurement system should address all three areas of the triple bottom line	Searcy, 2016; Veleva et al., 2001
Measurement system should provide timely and accurate feedback	Kennerley and Neely, 2003; Maskell, 1991
Measurement system should use data which are automatically collected as part of a process whenever possible	Searcy et al., 2006; Kennerley and Neely, 2003
Measurement system should include leading, as well as lagging, indicators	Searcy, 2016
Measurement system should consider cumulative economic, environmental and social impacts	Searcy, 2016
Measurement system should not include overlapping performance measures	Searcy, 2016
The scope of the measurement system should be clearly defined	Searcy, 2016

Table 2.4: Assessment criteria for SPMS as a whole (Continues on the next page)

(Table 2.4 continued)

Measurement system should consider the local, regional and global social and environmental boundaries that the focal firm and its supply chains operate within	Searcy, 2016
Measurement system should include measures which relate to the rate of improvement	Neely et al., 1995
Measurement system should not contain conflicting measures	Neely et al., 1995
Measurement system should be adapted to fit the unique business situation	Searcy et al., 2008
Measurement system must focus on a few critical key issues that the organisation can actually address	Searcy et al., 2008
Measurement system should be comprised of core and supplemental indicators	Veleva et al., 2001
Measurement system should be address key global issues	Veleva et al., 2001
Measurement data should be available for constant review	Folan and Browne, 2005
Measurement data should be presented in a simple and consistent format	Kennerley and Neely, 2003

Table 2.4: Assessment criteria for SPMS as a whole

Assessment Criteria	Publications
Measurement system should have top management support	Folan and Browne, 2005; Searcy et al., 2005, 2006; Neely et al., 1995; Tung et al., 2011; Kennerley and Neely, 2002
Measurement system should deploy strategy	Searcy et al., 2008; Searcy, 2016; Bourne et al., 2000; Bititci et al., 2005; Folan and Browne, 2005; Neely et al., 1995
Measurement system should be linked to reward system	Tung et al., 2011; Folan and Browne, 2005; Kennerley and Neely, 2002; Neely et al., 1995; Searcy et al., 2006

Table 2.5: Assessment criteria for SPMS in relation to its environment (Continues on the next page)

(Table 2.5 continued)

Measurement system should make possible the comparison with other business units and organisations (internal and external benchmarking)	Globerson, 1985; Searcy et al., 2005, 2006; Veleva et al., 2001; Keeble et al., 2003; Neely et al., 1995
Measurement system should be linked to decision-making across all managerial levels	Searcy et al., 2008; Searcy, 2016; Braz et al., 2011; Nudurupati et al., 2011
Measurement system should be integrated with existing management systems	Bititci et al., 2005; Neely et al., 1995; Searcy et al., 2005; Searcy, 2016
Measurement system should intend to foster improvement rather than just monitoring	Folan and Browne, 2005; Maskell, 1991; Kennerley and Neely, 2003
Measurement system should inform strategy	Bititci et al., 2005; Bourne et al., 2000
Measurement system should link business strategy with sustainability performance measurement and management	Schaltegger et al., 2006
Measurement system should be designed, so that at plant and divisional level, the evaluation of PM standards is consistent with the manufacturing objectives and environment	Folan and Browne, 2005
Measurement system should be designed, so that information on the strategic objectives of the firm are shared at plant and divisional level to provide organisational focus between them	Folan and Browne, 2005
Measurement system should not induce fear, politics and subversion	Folan and Browne, 2005
Measurement system should be linked to partner selection (e.g. supplier selection)	Searcy, 2016
Measurement system should monitor whether the indicators are meeting established goals or not	Searcy et al., 2006
Measurement system should match the organisation's culture	Neely et al., 1995
Measurement system should consider customer satisfaction	Neely et al., 1995
Measurement system should be consistent with national and community sustainability indicators	Veleva et al., 2001

Table 2.5: Assessment criteria for SPMS in relation to its environment

2.5.3 Barriers to updating an SPMS

Despite significant efforts, many companies still fail to implement effective SPMSs and successfully update them over time (Searcy, 2012). This is partly due the fact that companies fail to overcome the obstacles that will likely occur during the design, implementation, evaluation and updating processes (Neely, 1999). Several publications, including many of the publication listed in the previous chapter, address such obstacles. An especially valuable contribution regarding the identification of barriers was made by (Bourne et al., 2002), who investigated success and failure factors in SPMS initiatives in ten companies. An overview of relevant barriers distilled from literature is given in Table 2.6.

Besides barriers, several researchers have also made an effort to identify success factors and enablers of SPMS evaluation. For example, (Bourne et al., 2002) identify top management commitment, culture, purpose and organisational structure as enablers for successful SPMS implementation. A focused review of literature would enable compiling a more comprehensive list of enablers for updating an SPMS, but this is not within the scope of this study. Still, it is important to emphasise that for corporate SPMS initiatives to be successful, companies must be aware of commonly occurring barriers and how these can possibly be overcome, which may require further knowledge on enablers and common success factors.

Barriers	Publications
The measures that are relevant to the corporation change over time	Neely et al., 1995
Trade-offs occur, because it is not possible to measure everything	Searcy et al., 2005
It is not always obvious which indicators to use, especially in geographically and functionally diverse organisations	Neely, 1999; Hubbard, 2009
Data needed to measure performance is not always readily available	Hubbard, 2009; Braz et al., 2011
Is it not always obvious how lower-level measures should be weighted, scaled and aggregated for higher-level use	Hubbard, 2009
Relevant stakeholders vary throughout the process	Bourne et al., 2000
Resistance to measurement - a lack of motivation and support for change	Bourne et al., 2002; Kennerley and Neely, 2002
Certain performance measures are hard to quantify, due to their intangible or qualitative nature	Bourne et al., 2002

Table 2.6: List of barriers to updating SPMS (Continues on the next page)

(Table 2.6 continued)

Data access and IT system issues	Bourne et al., 2002
Lack of top management support	Bourne et al., 2002
Too much time and effort required for implementation	Bourne et al., 2002
The corporate sustainability strategy is not linked to department, team and individual goals	Bourne et al., 2002
A large number of measures dilutes the overall impact	Bourne et al., 2002
Vision and strategy are not actionable	Bourne et al., 2002
Political problems	Bourne et al., 2002
Lack of necessary skills and human resources	Kennerley and Neely, 2002
Culture that is inappropriate to the use of PMS	Kennerley and Neely, 2002
Time wasted producing reports	Kennerley and Neely, 2002
A lack of knowledge regarding the IT infrastructure	Nudurupati et al., 2011
A lack of flexibility in the IT infrastructure	Kennerley and Neely, 2002; Nudurupati et al., 2011
The complexity of sustainability	Searcy, 2012
A lack of knowledge, skills and training regarding sustainability	Searcy, 2012
The inability to tailor sustainability frameworks to local circumstances	Searcy, 2012
Lack of use of existing indicators in decision making processes	Searcy et al., 2005

Table 2.6: List of barriers to updating SPMS

2.6 Synthesis

From the historic path of sustainable development it has become evident that the private sector has an essential role to play in the transition towards a sustainable society. The SDGs signify important milestones in this transition, as they describe the global goals to be reached by 2030, agreed upon by all UN countries. The private sector was extensively consulted in the development of the SDGs and is explicitly called upon to contribute to their execution. This should not come as a surprise, especially considering the fact that the MDGs were widely criticised for not sufficiently engaging the private sector. This increase in involvement also means the private sector bears a large responsibility in progressing towards the SDGs, which presents several new challenges for private corporations. One of these challenges is that, in order for them to show their contribution, private corporations should be able to measure how much they contribute to the SDGs. In other words, corporations must align their SPMS with the SDGs.

As was emphasised by Franco-Santos et al. (2007), any research regarding performance measurement should clearly state what features, processes and roles constitute the used definition. The chosen definition for this study was presented in Table 2.2. This definition includes all features and processes that Franco-Santos et al. as 'necessary characteristics' for any PMS, plus 'targets' and 'target setting'. These two components were chosen as part of the definition, as they form the critical link between the SDGs and the SPMS of the company. The roles that were selected to be part of the definition (measure performance and performance evaluation, monitor progress, performance improvement and internal and external communication) were also chosen based on their relevance for the SDGs. In order for companies to contribute to the SDGs, they should be able to measure their contribution, monitor their progress towards set goals, actually improve their performance towards these goals and ultimately report on their contribution to the SDGs.

The SPMS assessment framework by Searcy (2011) is used as a guideline to design this study. As was described by Neely et al. (1995), an analysis can focus on one or more of three levels of a PMS. This study is mainly focused on two levels: (1) the SPMS as a whole; and (2) the SPMS in relations to its environment. The researchers argue that the individual KPIs that are part of the SPMS are not directly relevant to alignment with the SDGS, as long as (1) the SPMS as a whole covers all aspects of the SDGs that are relevant to the company and (2) the SPMS fulfils the four important roles that are described above. Based on these two criteria, the researchers have identified six key requirements that an SPMS must fulfil in order to align with the SDGs. The first two of these key requirements are related to the SPMS as a whole, referring to the coverage of all SDGs as described in the first criteria above. The next three are related to its relationship with its environment, following from the four key roles that the SPMS must fulfil. The last criteria was added to take critical factors outside the definition of the SPMS into account. In line with the performance management framework by Ferreira and Otley (2009) shown in Figure 2.5, these external factors include the corporate strategy, organi-

sational structure, performance evaluation, rewards systems and culture. The six key requirements, shown in Table 2.7, are used as a primary basis for structuring the collection of data for this study. The SPMS assessment criteria and barriers to updating SPMS, that are presented in Chapter 2.5.2 and Chapter 2.5.3 respectively, provide additional information for more in-depth data acquisitions and analysis.

Key requirements for SPMS as a whole	
1	The SPMS must cover all aspects of the SDGs that are relevant.
2	The SPMS must include targets connected to the SDGs that are relevant.
Key requirements for SPMS in relation to its environment	
3	The SPMS must enable timely monitoring of the company's progress towards set goals.
4	The SPMS must enable improvement of the company's performance towards set goals.
5	The SPMS must enable complete and accurate reporting on the contribution of the company to reaching the SDGs.
6	The SPMS must be aligned and integrated with other performance management tools and vice versa.

Table 2.7: Key requirements for SPMS alignment with the SDGs

3

Methods

3.1 Research Design

The SDGs were established in 2015 and can thus be considered relatively new. As a consequence, there is little to no research available on how companies can align their businesses with the SDGs and how this will affect their SPMSs. Brown (2006) argues that when a study aims "to tackle new problems on which little or no previous research has been done", it is appropriate to use an exploratory research design. Exploratory research does not aim to provide fixed conclusions, but aims to extend the knowledge base and identify directions for further investigation. The aim of this study is to explore how businesses can align their SPMSs with the SDGs and what pitfalls could potentially prohibit a business from achieving alignment. As there is little to no pre-existing knowledge available on what pitfalls businesses can encounter when engaging with the SDGs, an exploratory research approach is deemed to be suitable for this study. This approach allows researchers to freely choose the scope of the research (Brown, 2006), which in this case enabled the researchers to obtain data from a wide range of sources and thus identify a wide range of barriers to alignment.

Exploratory research naturally fits well with a qualitative research design, because a pre-existing knowledge base is lacking and a qualitative design provides more flexibility to direct the research according to knowledge that is gained in the process. In addition, most of the concepts and theories relevant for this study are dependent on complex business situations which are subject to interpretation and discussion and are therefore hard to quantify. In such cases, a qualitative research design is most appropriate (Easterby-Smith et al., 2015); hence, a qualitative research design is chosen.

This study is based on a single, in-depth case study at the case company. A single case study enables thorough analysis of one case with its complexity and its interaction with its context (Bryman and Bell, 2011; Dubois and Gadde, 2002), which enables the exploration and investigation of contemporary real-life phenomena (Yin, 2003). This is in line with the purpose of this study, as it enables the researchers to gain an in-depth understanding of how the SDGs can be used in a specific business environment. The knowledge gained in this specific case can then be used in future studies to develop general principles (Stake, 2006). Hence, a case study approach enables the researchers to identify barriers to alignment with the SDGs based on a

specific business situation, which can possibly be used in further research to create general barriers to alignment with the SDGs that are applicable to a broader business context.

This research design enables the thorough comprehension and unravelling of the situation at hand in the specific case study; however, the focus on a specific context also means that the study's results might be hard to extrapolate and use in other situations. Furthermore it requires skilled interviewers which are thorough in their questioning and have a well-designed study protocol (Voss et al., 2002). By using triangulation to verify findings, these validity concerns are mitigated (Bryman and Bell, 2011).

3.2 Theoretical framework

A literature review was conducted in order to gain in-depth understanding of SPMS and their design, implementation and evaluation. The literature review process was divided in two phases. In the first phase, an initial exploration of available literature was performed to identify relevant research areas and define the scope and boundaries of the relevant research areas. Literature was initially mainly acquired using the Chalmers Library's database (`http://lib.chalmers.se/en/`), complemented by Google Scholar searches (`http://google.scholar.com`). Literature was scanned for relevance, notes were taken and compiled, keywords were generated and useful references were listed. Examples of used keywords are "performance measurement system", 'performance measurement system design', 'sustainability performance measurement system', 'SPMS', 'updating SPMS' and 'SPMS evaluation'. Based on this initial exploration, the scope and design of the study were adjusted.

In the second phase, the defined research area was reviewed in-depth. Relevant articles were reviewed in detail, relevant sections and phrases were highlighted, new keywords were listed and articles were scanned for potentially relevant references. The databases used in the initial search were complemented with searches in the Web of Science database (`http://webofknowledge.com`), using its more sophisticated filters, as well as a review of specialised journals, such as Elsevier's Journal of Cleaner Production (`http://journals.elsevier.com/journal-of-cleaner-production`). A specialised reference management tool was used to collect and sort all articles and notes. Based on the in-depth literature review, a comprehensive theoretical framework was constructed. This theoretical framework formed the foundation for the collection of empirical data.

3.3 Research Process

In Chapter 2.5.1 a framework for SPMS evaluation is presented based on the work of (Searcy, 2011). This framework was used a guideline to develop the research process for this study. Hence, the research process is following the three phases that are distinguished in Searcy's framework: (1) Planning for SPMS assessment; (2)

Conducting the SPMS assessment; and (3) Following up on the SPMS assessment.

The planning phase started with conducting an environmental scan in order to understand the context of the SPMS and identify changes in internal and external circumstances. This contextual study followed an iterative process where the findings from internal documents, annual reports, sustainability reports and specific SDG publications were discussed with the company supervisor, which lead to new contextual aspects to consider and which were looked into and discussed again. These contextual aspects mainly considered what the SDGs are, how they are relevant for the business, what the case company already does in regard to the SDGs, and how other actors (governmental, business and NGOs) view upon the SDGs. Based on the environmental scan, it was decided that the SDGs represent an important external development that justifies a detailed assessment of the SPMS.

Searcy (2011) describes that based on this contextual understanding a clear purpose and boundaries should be defined. Based on the performed contextual study, the purpose was found to be finding the gaps between the current measurement framework and the SDGs, and identifying barriers to aligning the SPMS with the SDGs. The boundaries of the assessment were defined by adopting a focus on the environmental section of the SPMS. The levels of the SPMS in focus are mainly the relationship between the SPMS and its external environment, and the SMPS as a whole. The third level defined by (Neely et al., 1995), the level of individual performance measures, is not prioritised.

Taking into consideration time limitations, availability of identified stakeholders for interviews, and access to stakeholders, a detailed planning was created for the assessment of the SPMS.

The assessment phase was conducted using a three step process. First, a gap analysis was performed by matching the current framework of KPIs and targets to what the SDGs require based on their goals and targets. The gap analysis was verified with the head of the Corporate Sustainability department. This gap analysis provides insights into the areas where the SPMS is not aligned with the SDGs. Second, the findings from the gap analysis were used as input for a set of in-depth semi-structured interviews. These interviews were conducted according to the assessment plan that was constructed before. The interviews were structured according to the six key requirements that were developed in the theoretical framework. The interview questions were based on the list of questions as presented by Searcy (2011), the four updating processes identified by Bourne et al. (2000), the roles of an SPMS, requirements for SPMS design and common barriers to updating an SPMS, as described in the theoretical framework. Finally, the discussions and outcomes from a strategy meeting were used to verify the findings from the gap analysis and the interviews.

This final outcome of this study is a set of barriers to SPMS alignment with the SDGs and recommendations for management and future investigation. In regards of

Searcy's framework this means that this study follows the assessment process until the first step of the third phase: the development of recommendations. The barriers and recommendations were developed based on the theoretical framework and the analysis of the acquired data. The subsequent steps that are considered to be part of the follow-up phase ('Implementation of recommendations' and 'concluding the review') are not within the scope of this study.

3.4 Data Collection

3.4.1 Archival Documents Review

A review of archival documents was performed using three different types of documents: the case company's internal documents (e.g. data collection sheets), publicly available documents published by the case company (e.g. the Sustainability Report) and relevant publications from third parties (e.g. the SDG Compass). The internal documents were acquired from the internal file server, which the researchers had full access to. Publicly available documents were acquired from the internet. An analysis of these documents formed the foundation for the gap analysis performed in this study, as well as provided useful background information that helped picking suitable interview participants, compiling the interview guide and conducting the interviews. More details about which documents were used in the study is provided in Chapter 5.1.3.

3.4.2 Interviews

Over the course of eight weeks 12 semi-structured interviews were conducted at different locations of the case company. Semi-structured interviews allow for follow up questions (Bryman and Bell, 2011), which in the case of an exploratory research is beneficial. The interviews were all conducted with case company employees who were employed in a range of different central functions as well as in a set of different functions on plant level. A wide range of interviewees was selected in order to gain a thorough understanding of the system and it is users and identify a broad range of challenges in regards to the SPMS. Nine interviewees held a corporate, divisional or regional function, while three interviewees worked on plant level. Nine interviewees held positions within the environmental organisation, while three people were interviewed to broaden the scope of the research. Two people were selected for their knowledge on Human Resources (HR) related topics, in order to acquire data on the challenges that are faced in regards to the social aspects of the SPMS. One person from a geographical region different then Germany was interviewed to understand if the issues described in the study are faced throughout the whole organisation. The selection of interviewees has been based on recommendations by our supervisor, the interviewees interaction with the reporting system (and thus the SMPS), their position within the case company, their availability and their proximity. An overview of interviewees and their roles within the case company can be found in Table 5.2.1 in the Empirical Findings section.

Prior to the interviews, the interviewees were sent an invitation explaining the aim of the study, and the information aimed to retrieve from the interview. This ensured that the participants were informed sufficiently beforehand, which according to Yin (2014) is important to ensure understanding and improve the quality of the interview.

An interview guide was created and used throughout all interviews, which was improved after each interview. The interview guide was needed to ensure that all topics or issues were covered in the interviews (Easterby-Smith et al., 2015). The guide existed of a set of wide, open questions enquiring about the overall performance of the system, followed by a set of more specific questions structured according to the six key requirements that were identified. This approach allowed interviewees to elaborate on aspects they believe to be important before their thoughts were guided more towards the pre-identified key requirements. The questions were based upon the identified roles of an SPMS (see Table 2.2), around the four processes needed to update an SPMS as proposed by Bourne et al. (2000) and around the list of questions which can be used to evaluate an SPMS as proposed by Searcy (2011). The guide included a checklist of important aspects to mention to the interviewee before the interview started, and when the interview had come to an end. The interview guide was adjusted fit the specific expertise and position within the corporation of each interviewee. An example of the interview guide can be found in Appendix C.

All interviews were conducted in English, were conducted face-to-face with both researchers present for all interviews and on the location which the interviewee indicated. The interviews took roughly between 45 and 75 minutes. As soon as the interview ended, a key take-away list was made in order to ensure the important, stressed aspects were taken into account immediately. The recordings were transcribed later. Each interviewee was asked if in case of any follow-up questions they were open to answering them via telephone or e-mail.

3.4.3 Observations in meetings and conversations

The researchers were located full-time at one of the case company's locations where the Corporate Environment department is situated. Over the course of 20 weeks, the interviewees had countless informal conversations, observed and participated in (undocumented) meetings and had the opportunity to observe the daily work in the environmental department. These experiences have enabled the researchers to make better judgements on what topics to emphasise in the interviews and the relevance of empirical data, which also supported the research in analysing the data and drawing up conclusions and recommendations.

The researchers have also participated in a two-day strategy workshop, where the complete core team of the central environmental organisation was present. At this strategy workshop the development of a new environmental strategy was addressed, including discussions about gaps in the KPI framework and new target setting methods. As part of this workshop, the researchers facilitated a session about the SDGs.

In this session, the participants of the workshop were asked to rate the SDGs based on their relevance for the environmental strategy, after which the SDGs were prioritised according to their rating. The five top SDGs were selected for further discussion in groups. The participants specifically discussed if the prioritised SDGs and their respective sub-targets were covered by the current environmental strategy and, if not, how they could be covered. The outcomes of these sessions were presented in a plenary setting and were documented by the researchers. During the remainder of the two-day workshop the researchers had a passive, observing role. All presentations, discussions and decisions made during the workshop were documented by the researchers and were used as input for this study.

3.5   Data Analysis

A gap analysis was performed to uncover gaps between the current framework of environmental KPIs and targets and what the SDGs require to be measured. The gap analysis was based on data acquired from internal and publicly available Continental documents and the official publication of the 2030 Agenda for Sustainable Development by the UN. GRI has published a document showing the connections between the GRI disclosure framework and the SDGs, which has been used to support the gap analysis. The results of the gap analysis have been verified through a discussion with the head of the Corporate Environment department, several interviews and discussions during the strategy workshop.

The collected interview data was processed by marking interesting passages and compiling and clustering these passages in a separate document, structured according to the six key requirements identified in the theoretical framework. This document was used as a starting point for a discussion between both researchers and a comparison with information from the theoretical framework and data from the archival document review. The empirical findings were structured according to the relevant topics that were discussed during the interviews. The results of the data analysis were presented in the form of 30 barriers that were identified based on the empirical data. These barriers were linked to the relevant SPMS design requirements and barriers to updating an SPMS in the theoretical framework when applicable. The identified barriers were combined when possible in order to limit the total amount. The researchers judge that the final amount of 30 barriers could not be reduced any further without losing their specific meaning in the context of this study.

The strategy workshop took place towards the end of the thesis writing process; therefore, the data acquired from this two-day workshop was predominantly used to verify the findings from the gap analysis and the analysis of the interview data. Based on this verification process some findings were adjusted and missing information was added.

3.6 Trustworthiness

According to Easterby-Smith et al. (2015) one of the key justifications for doing research is that the results are more accurate and believable than normal observations. Therefore understanding and assuring the trustworthiness of studies is of high importance. According to Bryman and Bell (2011), we should look at four sub-criteria: credibility, transferability, dependability, and confirmability when assessing the quality of business research.

The credibility criterion indicates the extent to which the study is believable. Bryman and Bell (2011) state that a study is increasingly believable the more it is conducted by scientific good practice as well as ensuring the proper understanding of empirical results by confirming them with the subject of analysis (Trochim and Donnelly, 2001). A common method of increasing believability is the use of triangulation of different data sources and methods; however, this makes analysis more complicated (Miles and Huberman, 2013). This practice has been applied as much as possible to increase credibility, by using multiple interviews, as well as archival research all around the same topic.

The transferability criterion reflects on the applicability of finding outside of the studied context. Due to the qualitative, case study based design of the research, generalising results will be hard; however it might be a good starting point for further research and results possibly can be applied in similar contexts and the results could be related to other research projects (Bassey, 1981). The dependability criterion assesses the dependency of the results of the study to the specific time and context in which the study took place. Ensuring compliance to this criterion requires the thorough description of context in which the study will be conducted as this is ever changing (Bryman and Bell, 2011; Marshall and Rossman, 2014). In order to ensure the possibility to understand in which context the research was conducted a case study description is presented in Chapter 4. Furthermore the description of methods and research design is available in this report as required by Shenton (2004).

The last criterion, confirmability, points out the influence of the researchers´ value upon the scientific work. Due to the nature of qualitative research, intrusion of the researchers' biases is inevitable, as all tools will be designed by people at some point by a person with certain values (Patton, 1990). In order to mitigate the possibility, again, triangulation and possibility to allow for audits are useful tools. Triangulation ensures that multiple sources would need to confirm a certain fact, which would lower possible biases (Shenton, 2004). Audits, would allow others´ to peek at the raw data and assess to which extend the researcher's biases and values have impeded proper scientific work (Shenton, 2004). Miles and Huberman (1994), mention that confirmability is dependent on the researchers' ability to admit possible predispositions. The researchers note that during the study no conflicts of interests have been known and due to the use of semi-structured interviews the standpoints of the interviewees was followed, not the opinion of the researchers.

3.7   Ethical Considerations

With conducting research some ethical considerations need to be considered. Bell and Bryman (2007) identified ten principles of ethical practice which should be paid attention to:

1. Ensuring that no harm comes to participants.
2. Respecting the dignity of research participants.
3. Ensuring a fully informed consent of research participants.
4. Protecting the privacy of research participants.
5. Ensuring the confidentiality of research data
6. Protecting the anonymity of individuals or organisations.
7. Avoiding deception about the nature or aims of the research.
8. Declaration of affiliations, funding sources and conflicts of interest
9. Honesty and transparency in communicating about research.
10. Avoidance of any misleading or false reporting of research findings.

To ensure ethical conduct of this study, a few measures have been put into place. First of all the researchers clearly state that no conflicts of interests and other forms of affiliation that might be relevant to the research and its findings have been present. The participants haven been informed fully, before the interview with an elaborate e-mail, and before and after the interview by repeating the privacy considerations. Furthermore, the participants have all been anonymised, including other information that could be used to identify an interviewee, in order to ensure their privacy. Wherever interviewees are quoted their names have been deleted and replaced by aliases. The interviewees were always asked if consent is given to record interviews. In one case consent was not given, hence the researchers have used pen and paper to record findings from this interview. Furthermore, the purpose and scope of the research, the form in which it will be published and where it will be published were clearly communicated both in the invitational e-mail as in the interview itself. Data collected in any form have been used with the appropriate amount of confidentiality and data that contains copyright has been referred to in appropriate manners to credit the rightful author and/or owner of the information.

4

Description of the Case Study

4.1 The Case Company

The case company is a global tier one automotive supplier. More detailed information about the company has been removed from this publication for confidentality reasons.

4.2 The Environmental Organisation

The subject in the case study is the environmental organisation of the case company. The environmental organisation is headed by the Corporate Environment department, which is a part of the Corporate Quality and Environment function. The environment organisational, as can be seen in Figure 4.1 is divided into several product types and regions. This division is made because of differences in environmental requirements and regulations between industries and regions.

Figure 4.1: The environmental organisational structure of the case company. *(This figure has been removed from this publication for confidentiality reasons)*

The corporate environment department is responsible for the environmental strategy, target setting, external reporting and governance, as well as representing the Corporation on several platforms, initiatives and boards, such as Econsense, UN Global Compact and the WBCSD. The divisions are responsible for the control and monitoring of environmental performance including legal compliance, as well as providing support to all locations worldwide. This is among other things achieved by the implementation of management systems such as ISO14001 and ISO50001, stimulating knowledge exchange between plants, supporting product development in developing environmentally friendly products, creating supportive structures and awareness campaigns (e.g. the "Be Energy Efficient" (BEE) campaign), the environmentally friendly design of new plants (Greenfield 2.0 design) and stimulating plants to improve their performance by a green plant label programme. The divisional environmental departments are rather small, with only a handful of people working in each department. These divisional departments are in direct contact with the plants, for example for revising the environmental management system, their energy monitoring systems, the aforementioned green plant label, and for the

collection and validation of environmental data. The environmental organisation is characterised by its flat structure, which facilitates direct communication between different functions in the organisation. The small divisional departments do not hold responsibility or formal power regarding the plants' sustainability performance; the plants are responsible for their performance, and their performance improvements, themselves.

4.3 The Reporting Process

An important aspect in regards of environmental performance is the reporting of the corporate performance. Sustainability reporting is legally required, but is also increasingly important for investor relations, as well as for rating agencies, which in turn are important for customers. The case company reports its performances based on the GRI G4 reporting guidelines. Some rating agencies require special reports; however, these reporting systems are not leading (e.g. Carbon Disclosure Project (CDP) reporting). The data is gathered and communicated across all levels of the organisation following the reporting process depicted in Figure 4.2.
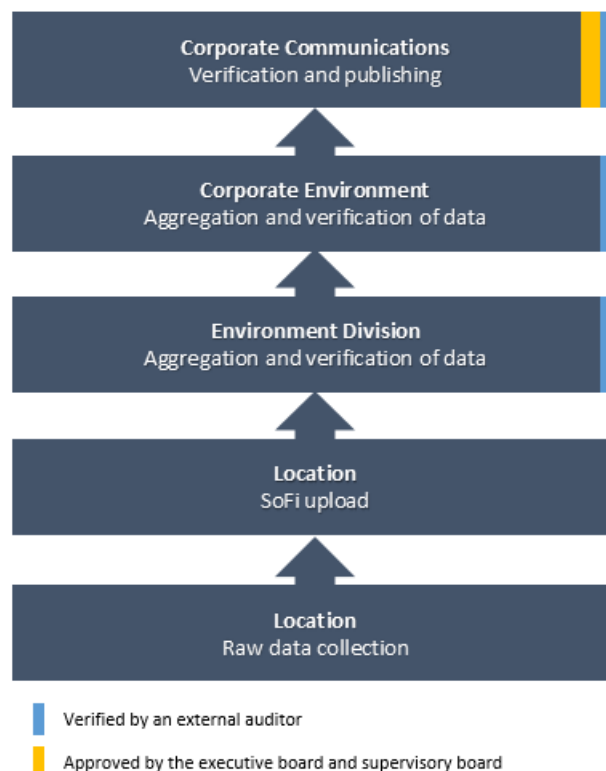
Figure 4.2: The environmental reporting process within the case company.

On location level, the local ESH and/or energy manager are responsible for the data collection. They use this data to fill in different questionnaires in a system called SoFI. The results are aggregated by the divisional environmental department, which verifies the information and communicates this to the corporate environmental department. Here the data is again checked, combined with the other divisional data

sets. This data is then used as input for the sustainability as well as to fill in questionnaires for rating agencies and customers. The data for the sustainability report is gathered in designated excel sheets, which as send to the Corporate Communication department. The department combines the input from the environmental organisation with data from HR and finance and use this to compile the GRI report, which is published on the corporate website. This whole process is gone through once per year and is audited by an external auditing firm. Due to stricter governmental regulations, the reporting frequency is planned to increase to quarterly reporting with the last month of the year having a monthly reporting frequency. Some of the divisions have taken this opportunity to increase the overall reporting frequency and aim to make the plants report on a monthly basis. Interesting to note is that the business units are not part of the reporting infrastructure, plants report directly to the divisions.

4.4 The CSR Council

The leading executive body for sustainability-related topics within the case company is the CSR council. This council, which meets every three months, consists of twelve high-ranking members from different disciplines, such as Finance, Investor Relations, Environment, Health & Safety, Human Resources and Communication. The council is lead by a member of the executive board responsible for HR.

4.5 The Environmental Strategy: Roadmap 2020

In 2013 the first environmental strategy of the case company was rolled out. The vision is that this strategy should lead to the company to be "recognized as a sustainable company". Four main areas were identified as crucial to ensure improved environmental performance of the corporation which, as described in the strategy, are:

1. **People and Organization:** The environmental performance of the case company is the results of training, collaboration, and contribution of every individual.
2. **Processes, products and customers:** The environmental performance of the case company's products and processes is defined by the systematic and sustainable management of resources, emissions, energy and substances of concern.
3. **Suppliers:** the case company's suppliers need to support the case company's environmental strategy in a sustainable way and have to fulfil the case company's requirements.
4. **Stakeholders (shareholders and society):** The value of the company is determined by sustainable growth, value creation and an excellent environmental image based on legal compliance, an open dialogue, a trustful relationship and our contribution to a healthy environment.

These key areas show that the organisation is aware of its impact and understands its position in relation to the environment. In line with these key areas, five strategic KPIs and targets have been identified:

1. **Complete roll-out the communication concept in all plants:** Following the strategy a communication package including slogan ("creating sustainable solutions"), icon and posters was created. The aim is to raise awareness of sustainability topics throughout the organisation.The communication concept should be rolled-out in all plants by 2020.
2. **Reduce the use of water, the waste quota, the use of energy and the CO_2 emissions by 20% in 2020, based on sales:** By introducing these four environmental reduction targets the case company committed themselves to work towards a more environmentally sound conduct of business (baseline: 2013).
3. **Have 100% ISO 14001 certified Strategic Suppliers.** This target is the first step into assessing the case company's supply chain impact and highlight the awareness that the focus should not only be on on internal efficiency measures but that the scope is broader and includes the upstream supply chain.
4. **Maintain "Excellence" Rating in sustainability rankings**. Maintaining the rating level "excellence" is required by customers, and thus of vital importance for the organisation.
5. **Zero complaints and legal non-conformities as defined in the GRI standard.**

4.6 Environmental Strategy 2030

The targets in the current corporate environmental strategy are set until 2020. Recently, the process the creation of a new strategy for 2030 was started. This includes investigating internal and external trends, and discussing what the strategy should be based on and which dimensions should be included. One of the external trends that is considered essential to take into account for the new strategy is the SDGs. The case company is evaluating the SDGs and investigate if the organisation is ready to align their strategy with these global goals.

To kick-off the strategy formulation process a strategy workshop took place in May 2017 with people involved from the different divisions and regions in the environmental organisation. During the two-day meeting, a workshop was held to create a better understanding of what the SGDs mean for the case company and what place it should have in the new strategy.

Simultaneous to the creation of a new environmental strategy, a CSR project is running. The aim of the CSR project is to create a more holistic approach to CSR topics at the case company. Exactly how this CSR project relates to the environmental strategy creation is not entirely clear yet, but it is clear that environmental protection will be a critical issue within this new CSR approach.

5

Emperical Findings

5.1 Archival document review

The collection of data from archival document is done to enable a gap analysis and to provide a basis for further data acquisition through interviews. First, a thorough review of internal documents, annual reports and sustainability reports is performed, from which an overview of all the case company's corporate sustainability KPIs and targets is acquired. This also includes a review of the GRI G4 Reporting Guidelines GRI (2013), which is the framework that the case company's SPMS is based on, and several additional publications that describe how these reporting frameworks relate to the SDGs. The second part involves a detailed review of all the SDGs. The SDGs are filtered according to their relevance for the case company and the environmental area. Furthermore, information is acquired from publicly available SDG guides on how the private sector should engage with the SDGs, which helps to translate the SDGs to implications for businesses.

5.1.1 The case company's current measurement framework

The KPI framework used in the case company's SPMS is largely based on the disclosure framework of the GRI G4 Sustainability Reporting Guidelines.(GRI, 2013) The analysis performed in this study is therefore largely based on the case company's publicly available Sustainability Report 2015 *(Reference deleted to ensure confidentiality)* and Annual Report 2015 *(Reference deleted to ensure confidentiality)* plus internal data collection documents which are internally used to collect all the content for the GRI reporting. A full list of environmental GRI disclosures that are included in the case company's measurement framework with their corresponding KPIs is shown in Appendix E. Several GRI G4 disclosures are not part of the case company's measurement framework, because the necessary data is not available or because the case company has decided not to report on this disclosure based on their materiality analysis. Disclosures that are not included are for example related to water recycling, biodiversity, certain air emissions and actions taken in the supply chain.

The case company has a range of corporate environmental targets, which form an important part of their environmental strategy. A full list of environmental targets, as published in the Sustainability Report 2015, is shown in Appendix F.

5.1.2 The Sustainable Development Goals

The SDGs are comprised of 17 goals and 169 targets, covering the three areas of sustainable development. All the SDGs and targets, including their exact formulations as officially published by the UN, are shown in Appendix A. An initial review of the SDGs showed that 12 out of 17 the goals are either by themselves relevant or include targets that are related to environmental issues. A more detailed review of the goals and targets resulted in a set of six goals that cover all relevant aspects directly related to environmental issues (Shown in Figure 5.1). This selection was possible due to the overlapping nature of the different goals and targets. As the goals aim to engage the public sector as well as the private sector, not all targets are directly relevant to private companies, which allows for several targets to be filtered out. A final filter based on the specific industry and context of the case company has led to the selection of six goals and 16 targets (shown in Table 5.1) that are specifically relevant for the case company and are related to environmental issues.

Figure 5.1: The six selected sustainable development goals (Adjusted from United Nations, 2015b)

The main environmental issues of relevance can be summarised as sustainable water use and water efficiency (Goal 6), renewable energy and energy efficiency (Goal 7), sustainable use of natural resources, resource efficiency, sustainable (hazardous) waste handling and education (Goal 12), climate change mitigation (Goal 13), pro-

tection of marine ecosystems (Goal 14) and protection of terrestrial ecosystems (Goal 15).

Goal 6. Ensure availability and sustainable management of water and sanitation for all

6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated waste-water and substantially increasing recycling and safe reuse globally.
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.
7.3	By 2030, double the global rate of improvement in energy efficiency.

Goal 12. Ensure sustainable consumption and production patterns

12.2	By 2030, achieve the sustainable management and efficient use of natural resources.
12.4	By 2020, achieve environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on the human health and the environment.
12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.
12.6	Encourage companies, especially large and transnational companies, to adopt sustainable practises and to integrate sustainability information in their reporting cycle.
12.7	Promote public procurement practises that are sustainable, in accordance with national policies and priorities.
12.8	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

Table 5.1: The selected Sustainable Development Goals and their targets (Continues on the next page)

(Table 5.1 continued)

Goal 13. Take urgent action to combat climate change and its impacts[1]

13.2	Integrate climate change measures into national policies, strategies and planning.
13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

15.1	By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry-lands, in line with obligations under international agreements.
15.2	By 2020, promote the implementation of sustainable management of all types of forest, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.
15.5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

Table 5.1: The selected Sustainable Development Goals and their targets

It is important to note that the 13th SDG, which is about climate change mitigation, does not contain specific targets because international climate change negotiations take place in a separate UN convention called the United Nations Framework Convention on Climate Change (UNFCCC). In 2015, the Paris Agreement was signed within this convention with the main aim of limiting the global temperature rise as a result of human activities below 2 degree Celsius. SDG 13 specifically refers to the UNFCCC and thus indirectly refers to the Paris Agreement; therefore, in this study SDG target 13.2 is interpreted as integrating climate change measures that put the

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[1]Acknowledging that the United Nations Framework Convention on Climate Change (UNFCCC) is the primary international, intergovernmental forum for negotiating the global response to climate change.

world on the path towards reaching the goals as stated in the Paris Agreement.

5.1.3 SDG guides and directives

As the private sector has started to explore how it can engage with the SDGs, several partnership organisations and consultancy firms have published guides to support businesses in their efforts. The most commonly proposed recommendations found in the guides are discussed below. A full list of guides that were consulted in this study is given in Table 5.2 for further reference.

Guide	Published by	Year
SDG Compass: The guide for business action on the SDGs	GRI, UNGC, and WBCSD	2016
Development Co-operation Report 2016: The Sustainable Development Goals as business opportunities	OECD	2016
Measuring Impact: How Business Accelerates the Sustainable Development Goals	GRI and Business Call to Action	2016
Navigating the SDGs: A business guide to engaging with the UN Global Goals	PwC	2016
Making it your business: Engaging with the Sustainable Development Goals	PwC	2015
Advancing the Sustainable Development Goals: Business action and Millennials' views	Corporate Citizenship	2016
From My World to Our World: What the Sustainable Development Goals Mean for Business	Corporate Citizenship	2015
Getting Started with the Sustainable Development Goals: A Guide for Stakeholders	Sustainable Development Solutions Network	2015
Sustainable Development Goals: What you need to know about the Sustainable Development Goals and how EY can help	EY	2016

Table 5.2: The used directives on the SDGs

5.1.3.1 How Businesses should approach the SDGs

The majority of the business guides describe the way companies should engage with the SDGs in an easy to follow step-by-step process. Although varying slightly, they all follow roughly the same structure. The five-step process described in the SDG

Compass published by GRI et al. (2016) is shown in Figure 5.2 as an example.

Figure 5.2: The five-step process described in the SDG Compass (GRI, UNGC, and WBCSD, 2016)

Most guides start with a logical first step, described in Figure 5.2 as *"understanding the SDGs"*. Besides familiarising themselves with the SDGs themselves and how they affect their business, it is important that companies familiarise themselves with the business case of engaging with the SDGs, i.e. the opportunities that they bring to the business. One way of understanding the SDGs is to see them as a holistic framework of global priorities that companies can anticipate on and use to their advantage, as stated in the SDG Compass 2016:

"Covering a wide spectrum of sustainable development topics relevant to companies, such as poverty, health, education, climate change and environmental degradation, the SDGs can help to connect business strategies with global priorities. Companies can use the SDGs as an overarching framework to shape, steer, communicate and report their strategies, goals and activities."

When companies have familiarised themselves with the SDGs, they should proceed by mapping their positive, current and potential impact on the SDGs across their value chains. A good tool for identifying high impact areas is a materiality assessment, which many companies perform as part of the GRI G4 framework. For each area of significant current and potential impact, the company should identify one or more indicators that describe the company's impact on the specific area of

sustainable development, and collect corresponding data so it can track progress over time. When this 'baseline' of impacts is established, it provides a starting point for companies to define their priorities and identify opportunities for scaling up positive impacts and reducing negative impacts.

Next, companies are advised to demonstrate their commitment to sustainable development by setting meaningful, measurable, time-bound goals in alignment with the identified priority areas. These goals should cover all priority areas across the economic, environmental and social spectra. Selecting KPIs is an important part of this goal-setting step. The majority of the guides emphasise that, in order to reach set targets, it is critical that companies integrate sustainable development in their core business strategies and align objectives across all functions, as well as align objectives across the value chain.

Finally, all guides encourage companies to measure and report on their contribution towards achieving the SDGs. The SDGs provide common priorities and a common language, which facilitate more effective external communication, easier benchmarking and an improved dialogue among stakeholders.

5.1.3.2 The value chain perspective

Several guides stress that companies should obtain a value chain perspective, i.e. take into account the negative and positive impacts on the SDGs throughout the entire life-cycle of a product or service and not just consider the impact within the scope of its own activities. As is stated in the SDG Compass (GRI, UNGC, and WBCSD, 2016):

"The greatest social and environmental impact that your company has on the SDGs may be beyond the scope of the assets it owns or controls, with the greatest business opportunities being potentially further upstream or downstream in the value chain."

A good example of why it is important to focus on the entire value chain is given in Measuring Impact as published by GRI and Business Call to Action (2016):

"Once a company sees where that impact is greatest, it can concentrate on addressing it at that point in the value chain. Unilever did this when it used value chain assessment to analyse its water impact. The company found that 85% of its total water impact (use) came from product use, with only a small amount from sourcing and operations. This helps the company create better practises that target that point in the value chain. This activity was important because the company has revisited water impact as part of deeper engagement with the SDGs."

5.1.3.3 Data Collection

The success of the SDGs is said to rely heavily on data, and it is acknowledged in several guides that it is not always possible to establish measurable KPIs and collect accurate data that directly represent the respective impact. Challenges in

this respect arise due to the inherent intangibility of certain sustainable development issues and the complexity of value chains, as well as high costs and efforts for acquiring data. It is recommended that companies try to find solutions for these challenges rather than avoid them, as stated by in the guide Getting Started with the Sustainable Development Goals: A Guide for Stakeholders by Sustainable Development Solutions Network (2015):

"In many cases there will be data gaps, but these are instructive in and of themselves, because they demonstrate which areas do not receive sufficient attention, where institutional capacity may be insufficient, or where deeper analyses are required to understand what needs to be measured and how."

Suggestions to overcome challenges connected to data collection are to try to use existing systems and processes for data collection as much as possible, and to look for alternative, indirect measurements or estimates. The SDG Compass provides a database of commonly used indicators on their website.

5.1.3.4 Choosing focus areas

A commonly described pitfall is that companies select one or several SDGs that they focus on, without doing an adequate assessment of the main positive and negative impacts of the company across all SDGs. According to a survey performed by PwC, most companies currently rely on what they refer to as 'cherry-picking', which means that businesses choose what they focus on based on what makes sense to them in terms of their current strategies, processes and public image. This is a dangerous practice, as many companies do not have a holistic overview of their impact. As mentioned in the report *'Making it your business: Engaging with the Sustainable Development Goals'* published by PwC (2015):

"'Cherry picking' goals and aligning SDG action to business growth strategy is all well and good if companies have a fully rounded understanding of their sustainability impact and opportunity. With too many companies that isn't the case. (...) The SDG framework has been devised to be adopted as a whole with the business impact across all 17 goals intended to be viewed in its entirety. For business, the aim is to understand the impact of its operations and activity, taking into account its positive and negative effects."

Practically all SDG guides emphasise that the SDGs must not be seen as a set of goals that companies can pick from, but as a framework that should be adopted as a whole. It is acknowledged that not all 17 SDGs may be equally relevant to each company and it is therefore regarded to be acceptable that companies prioritise certain SDGs, because this enables a stronger focus; however, other significant impact areas should not be disregarded or ignored.

5.1.3.5 Setting goals and targets

Setting appropriate goals connected to the SDGs is recognised as a challenge. Usually, companies set their goals based on their potential for improvement and benchmarking, but this is often not enough to fully address global challenges. The *SDG Compass* refers to several initiatives that aim to change this by providing tools based on a so-called 'outside-in' approach, i.e. basing goals on the needs of global society. Although the inherent challenges of this approach are acknowledged, the *SDG Compass* emphasises the opportunity that the SDGs provide in this respect:

"The SDGs represent an unprecedented political consensus on what level of progress is desired at the global level – and this is an opportunity for companies to apply a similar approach across a wide range of sustainable development challenges. This means setting the level of ambition for your company based on the aspirations of the SDGs and defining what is 'reasonable share' for your company, based on your industry, geographical location and size."

5.1.3.6 Reporting on the SDGs

Only a couple of guides provide advice on how companies can report on the SDGs. EY (2016), for example, advices companies to use an existing indicator framework like GRI G4 to link their reporting to the SDGs:

"All SDGs can be linked to several GRI indicators, and as GRI G4 focuses on materiality, it can also help by choosing the right SDGs to contribute to and communicate on. By incorporating the SDGs into the GRI G4 framework, companies can report in a way that allows them to be compared with other companies on their progress on the SDGs. In this manner the SDGs provide a framework in which contribution and progress on collectively embraced challenges can be measured globally."

In order to support companies with reporting on the SDGs, *SDG Compass* has published two documents in which it shows how the disclosures in the GRI G4 Guidelines and GRI Standards are linked to the SDGs. These documents help for companies to link the SDGs in their GRI reporting framework. In addition, the *SDG Compass* provides some practical advice:

"Companies that integrate information on the SDGs into existing types of reports or communications can use visual solutions such as icons for each of the relevant SDGs to highlight the relevant SDG information. In addition, they can also highlight the relevant SDGs in the table of contents. For example, companies using a standard such as GRI to report their contribution to the SDGs can add a column to their GRI Content Index, mapping the relevant GRI disclosures against their list of relevant SDGs."

5.2 Interviews and observations

5.2.1 Introduction interviewees

An overview of employees that participated in the interviews is given in Table 5.3. They are categorised by their position in the organisation, as the interview questions were adapted to the specific positions. Each interviewee has been given an alias which is not linked to the role of the person neither to the position on the list. This has been done to ensure the privacy of the interviewees. At several occasions multiple people participated in the same interview. In those cases the interviewees are grouped under one alias and there is no distinction made between the individual interviewees.

Level in organisation	Role
Corporate Level	Manager at Corporate Environment
	Manager at Corporate Communications
	Controller at Corporate HR
	Manager at CSR Project
Divisional level	Environmental Manager at Division I
	Environmental Manager at Division II
	Environmental Manager at Division III
	Energy Manager at Division I
Plant Level	ESH Manager at Plant X
	Energy Manager at Plant X
	Energy Manager at Plant Y
Regional level	Regional Environmental Manager

Table 5.3: List of interviewees

5.2.2 Interview Data

The interview data presented below is structured according to the six key requirements that were constructed from the literature framework in order to keep the document readable. It is important to note that this is not a solid structure and that the requirements can somewhat overlap.

5.2.2.1 Key requirement 1: The SPMS must cover all aspects of the SDGs that are relevant

Based on the analysis of archival document data, several gaps and points of improvement have been identified in the current measurement framework of the case company. These gaps are described in detail in the Analysis section. The identified gaps have been further discussed in several interviews in order to identify issues related to expanding the measurement framework to cover all relevant SDGs.

It is interesting to note that, when asked about the completeness of the environmental KPI framework, nearly all interviewees stated that they believe the current measurement framework is rather complete and does not contain significant gaps; however, when asked directly about specific gaps that were identified in this study, the majority of the interviewees agreed that there are several aspects that are relevant and are currently not measured or of which the measurement can be improved. In the strategy workshop several of these gaps were discussed and a process was started to further evaluate the areas which have not been focused upon up until now.

Air emissions and water quality
The case company performs regular audits at its locations to check air emission levels, such as sulphur oxides (SO_x), nitrogen oxides (NO_x) and volatile organic compound (VOC) emissions, as well as waste-water quality in order to assure compliance with local laws and regulations; however, data on this is not collected and reported to the central organisation. For both aspects, the main drivers for not collecting this data seems to be the geographical variability in legal requirements and the cost of measurement. This cost-benefit relationship was mentioned as a key consideration for selecting KPIs by many of the interviewees, for example in this quote from Interviewee A:

"[Certain air emissions are not measured] because we do not rank them as a relevant issue and there are no legal requirements. For example, NO_X and SO_X emissions are not measured in some areas because the emissions are not regulated. [...] We have to decide between the effort and the benefit. In the moment we do not really see the benefit to measure this, because the technical effort and the money you have to spend to measure all this is very high. [...] We can spend millions of euros for technical solutions, but the question is, is it really necessary from an ecological point of view? And if it is not really necessary, it has to make sense from an economic point of view. We have to find a balance."

Scope 3 emissions and value chain aspects
Most interviewees who were asked about Scope 3 emissions emissions (greenhouse gas emissions that are occurring within the value chain but outside of the company) and impacts in the value chain acknowledged the importance of these aspects, but several interviewees mentioned that such external aspects are currently not in focus. As, for example, was stated by Interviewee B:

"Getting more information on the supply chain may be important for the company, but is it really important for the daily business? No, I don't think so. But it looks like it will become more important in the future."

Interviewee I mentions that focusing on the supply chain is very important, and that there is a lot of *"low hanging fruit"* to make the supply chain more sustainable but that these efforts have not been the focus of the case company yet.

Several Life Cycle Analyses (LCAs) were performed on certain key products categories in order to gain more knowledge about key impacts in the supply chain. The outcomes of these LCAs seem to have improved the internal awareness about value chain aspects, such as raw material extraction and the product use phase. The following quote from Interviewee C is illustrative in this regard:

"We don't measure this [value chain aspects] yet, but personally I was really surprised that the scope 3 emissions are like 10 times higher than our internal emissions. This means that if we just focus internally, let's say we reduce our internal emissions by 20 percent, then we still have 98 percent of the total emissions if we include scope 3. In this case we don't really achieve a lot for the global objective."

In the process of increasing the focus on supply chain aspects in the SPMS, several challenges have been encountered. One of the main challenges related to value chain aspects that were mentioned in the interviews is the difficulty of collecting data from outside of the organisation and from other departments within the organisation. For example, Interviewee A mentioned that he is dependent on other departments to collect certain data on scope 3 emissions, but these departments are not aware of the fact that they have to deliver this data. Some data is not collected at all at the moment, and according to Interviewee A, it is hard to convince them to start doing so, because *"they have no need in their department to collect this data, and when another department is asking for this, they are like, why should I do this, it's not for my business"*. When asked about why the other departments do not see this as a priority, Interviewee A stated:

"The problem is that we do not have targets for scope 3 emissions, so there is no need for other departments to collect data about this. So when we have to set up new targets for 2030, we have to think about scope 3 too."

Interviewee B mentioned that the current lack of a reporting infrastructure for supply chain data is a limitation. The current reporting system is only accessible for data collectors at the plant level, but the data about supply chain should come from for example the purchasing department or the logistics department, which are not included in the system. As Interviewee B explains: *"We do not have a direct connection to our suppliers, so we have no data source"*. There are several projects being set-up to tackle this problem, for example in division III, where they are implementing a new platform to monitor sustainability on a supplier level together with the raw

material purchasing department. Interviewee D explained how the process will work:

"We have a database and the suppliers will report their data there via a sustainability questionnaire. Then they will be evaluated, and then based on that we will do supplier audits in order to verify. Then we do supplier development for those that need to improve."

Environmental criteria are also already included in the evaluation of new suppliers, and the company has identified so-called strategic suppliers who they require to comply to the ISO 14001 standard. Interviewee J points out that *"it is not always so easy"* to assess and select suppliers based on environmental performance. The interviewee explains, and many other interviewee have mentioned this as a challenge, that the case company has a very large number of suppliers, some of which are very small (and presumably do not collect data on environmental performance), and for some parts there is only one supplier, so in those cases it does not have any choice but to work with this supplier. Furthermore, setting supplier standards is mainly driven by external requirements that are not directly within the case company's control, as Interviewee J explained:

"It really depends on the customer requirements. The market is very competitive, so we have to keep the competition in mind. If the competition can deliver their products at a lower cost and the customer chooses their product, we lose. It is therefore necessary to work together in the industry, to set standards together and avoid unfair competition."

Deforestation was acknowledged as a critical issue in the rubber supply chain by several interviewees. Currently, the data collected on this seems to be limited. In order to improve this, the case company is participating in several projects to improve the traceability of natural rubber and promote sustainable growing practises at rubber plantations.

Large amount of KPIs and data

An aspect that was mentioned by several interviewees as a limiting factor to expanding the measurement framework is the amount of KPIs that must be tracked, and the data overload that follows from it. The case company is tracking a large number of environmental KPIs, and due to the large number of locations around the world, this results in a very big effort to collect, process and verify the data. Interviewees A, B and C all stress that too many KPIs will lead to a high workload and lack of focus. Interviewee B explains:

"We have a very wide range of KPIs, and I think it is a bit too much. This makes it a bit difficult for us, because these are all data that are generated and then we have big excel sheets in the end from which we have to decide what is important and what is not important; Do I have to use this KPI now or not? Does this value make sense or does it not make sense?"

Interviewee A also sees this as a challenge, mainly because the GRI standard includes such a wide range of KPIs that it is impossible to include them all in one strategy. The interviewee suggests to select a limited amount of KPIs that will be prioritised in the strategy:

"It is not possible to roll out a new strategy to plant level with 50 new targets, because they will get confused. In my opinion it is necessary to focus on the priority topics that have most impact on the environment and that is what we should tackle with strategic targets."

The interviewee also notes that this approach involves the risk of neglecting certain relevant aspects, especially in regards to the SDGs:

"The SDGs especially are very wide and not very specified. The problem is to really avoid cherry picking, so that you say I only choose those targets where I think I am good. We should really challenge those topics and ensure that we work on all those that are relevant, and not only on the ones where it is easy to contribute. So I think we should make an analysis which targets are relevant for our business and these should be incorporated in the strategy."

Not all interviewees seemed to be fully aware of this risk, as illustrated by the following response from one of the interviewees when asked about how the case company should approach the SDGs:

"It is a risk to give insight in these things [that we don't do anything about]. [...] I think the first question is; where is my starting point? I am always thinking of what areas and activities we currently have as our starting point, and I would try to link the goals to the activities what we already do. You could also look at the goals and see how different activities can create a better goal achievement there. This is a more complicated one, and I like to choose the easy one."

5.2.2.2 Key requirement 2: The SPMS must include targets connected to the SDGs that are relevant

This requirement can be split-up in two sub-requirements:
1. The company should have targets in all relevant areas that are described by the SDGs
2. The company should set targets that resemble the fair share of the company in achieving the SDGs

Both interpretations are of interest in the context of this study and have been explored in the interviews. The first sub-requirement is also covered by Key Requirement 1, and as described in the previous section, Interviewee A believes that setting goals in all relevant SDG areas may lead to too many goals and a lack of focus, hence this could become a challenge. The second sub-requirement was also discussed with Interviewee A. The interviewee sees value in connecting corporate targets to the SDGs and especially believes participating in the science-based tar-

gets initiative as an opportunity for the future, as is apparent from the following statement:

"For me it is now important to find a connection between our contribution and global targets. For example, in the case of the Paris Agreement and the SDGs, I want to make it more visible what our contribution is to this. [...] Those that are already approved with science-based targets are in the direction of minus 20-30 percent and we have this target for 2020, with 3 percent per year, and this shows me that if we are talking about science based targets, that we are not so far away from this. This is a positive signal for me."

The feasibility of setting corporate targets that are connected to the SDGs has not been discussed in detail in the interviews, because in-depth knowledge about the exact formulation of the SDGs was lacking among all of the interviewees.

Communication

One of the main arguments given for linking corporate targets to the SDGs is that it can be valuable for communication purposes, as Interviewee A illustrates with the following example:

"If you have the connection between the global target setting for climate protection and the company targets then everybody understands this. Same with SDGs, they are very clear in terms of definition, and everybody can understand it. For me it is really important that our communication strategy for environment really picks up all these things to make the understanding better for the people inside the company. So if they are asked about it by an auditor, and our employees can say: Yes, our energy targets, or our CO_2 targets, are set by the corporate function so that we achieve the Paris agreement, if we are on that level, then we have really won our game. And I think it is possible."

Interviewee J agrees that it would be good to use the SDGs to show in which areas the case company is contributing. However, according to the Interviewee there is a general lack of awareness about the SDGs, which is a challenge when using them for communication purposes. The interviewee explains:

"I really think the SDGs are very important, so we have to create more aware-ness for these goals. I wish more people would know about them, and if they knew about them that they would care more about them. One of the problems I think is that people do not know the difference with the Millennium Development Goals and this confuses people. That is why we need to promote it more."

This is also seen as a challenge on the plant level by Interviewee G, who thinks it will have little influence on people in the plant:

"We are a producing plant, we have to make money. For sure it is a nice thing, but production people do not care about it. It doesn't convince them."

Internal target setting

What has become evident from the interviews, is that linking the external corporate targets to the SDGs will not necessarily lead to more performance improvement. Most interviewees mention the internal target setting, i.e. the way the targets are broken down and delegated among the different levels of the organisation, as one of the most critical challenges. Currently, the key corporate environmental targets are equally delegated to all divisions and plants, meaning the plants and divisions have to for example cut their specific energy consumption by 3 perfect per year to reach a decrease of 20 percent by 2020. Interviewee E explains why the targets are set this way:

"The targets are on a very aggregated level, and this has a reason. We have two completely different production areas, with automotive and the rubber group, where we are producing tires, rubber products for the mining industry and electronics for cars. It's very diverse and very hard to really have a meaningful and common KPI on an aggregated level. This is why the kWh per sales revenue was introduced. This is our KPI on a corporate level and this is where we really have our targets. So we don't have only one possibility to achieve the targets, we have at least two possibilities. One is to reduce the energy consumption. The other is to increase the sales."

Almost all interviewees on divisional and plant levels mention this sales-based target setting as being problematic, mainly because products, sales volumes and sales turnover can change a lot from year to year. This makes that it is difficult for the plants and divisions to monitor target achievement over time and to achieve the targets overall, as explained by Interviewee C:

"We have a lot of plants and we do not achieve the divisional targets with these plants. For example, we see an increase in energy consumption in our KPIs and we realised that in the meantime, even in this short time (3 years), a lot has changed. In our division we have so much changes that we can not really compare a site with the same site two years ago."

Several interviewees have mentioned that the current target setting is leading to frustrations at the plant level, as illustrated by this statement from Interviewee G: *"We are working so hard to achieve our targets, but in the end of the day we can not achieve them because the rules of the game just change"*. Such frustrations are not only caused by the sales-based targets, but also due to the fact that all plants have equal yearly targets while their improvement potential varies. Interviewee B explained that many locations are frustrated, because they are already performing really well and can therefore not fulfil the targets anymore. According to the interviewee, it is *"a bit bitter that those locations who have invested much money in the past, are not able to achieve the targets, while for those locations who did nothing over the years, for them it is easy"*. According to the interviewee, it is not a good idea to keep targets like this; *"It was okay for the last years, but not longer"*.

Plant-specific target setting
An alternative way of setting targets that was discussed in several interviews and in the strategy workshop is a more diverse target setting that is plant-specific or division-specific. According to Interviewee A, it might be more future oriented to create more diverse targets. The interviewee notes that the case company has grown a lot in recent years, which has created new requirements for the target setting, such as making it more regional or divisional. A more diverse target setting could have some advantages, but there are also challenges, as Interviewee points out:

"I see the possibility to set specific targets for plants. More ambitious targets for older plants and less ambitious targets for plants that are already very efficient. And if we make it a little bit more diverse, and they can also select, then you will see that the motivation is higher. If everything is only decided by the corporation, then the motivation is low. [...] The most difficult thing would be that some plants would say; why should I have more ambitious targets than the others? All other things are no problem, but I think equality between the plants and the discussion about why should I contribute more than the other, that is definitely the problem."

This problem was confirmed in a discussion at one of the plants, in which Interviewee F stated that they are not in favour of a diverse target setting, because *"when plants have special rules, then you do not know if plants are doing it better or worse. It is good that people have the same rules and we are working on the same level"*; however, in a different division they have a different experience based on a pilot they did using plant-based targets, as Interviewee D explains:

"We have started a process in the our division where the plants have to budget and plan their targets, and tell us what a target can be. Then we would have some discussion, like you know, we would ask for higher targets, and then we come to an agreement, and that would be the target for the division (If we consolidate all these targets). That could be lower than 3 percent, but it would be a realistic target. And the plants would feel more justified to be measured on that, because that is what they have committed to themselves, and it does not come from the top. We have to get a bit more feedback from other plants, we have only done one pilot with one plant, but this is probably the way we will be going."

During the strategy workshop these issues were repeated, but an emphasis was put on the KPIs where location is important, like water. These local problems should, according to consensus at the workshop, have local targets. The discussion about other ways of target setting for global issues like CO_2 emissions did not reach a clear conclusion.

5.2.2.3 Key requirement 3: The SPMS must enable timely monitoring of the company's progress towards set goals

Monitoring capability on plant level
An adequate performance monitoring system is needed on a plant level to give direct insight into performance development, to keep track of target achievement and to

identify areas for improvement, or as Interviewee E puts it: *"To be able to really do meaningful management you need to have the transparency"*. According to Interviewee B,C, D and E, the monitoring capabilities vary per location; some plants have complete and real-time information on their performance, whereas other plants have limited insight in their performance. Several interviewees mentioned that there is a clear link between the monitoring capability of a plant and its performance development over time. *"Plants with good monitoring systems also perform better"*, according to Interviewee E. Interviewee A acknowledges that there is room for improvement, as he sees that many plants are doing double work because they use several systems and excel sheets simultaneously. The interviewee stated that a standardised monitoring system should be implemented across all locations to improve the monitoring quality and make it more efficient.

Insights from Plant X indicate that several challenges can arise when the performance monitoring capability is limited. Interviewee F provided the following example:

"Last year we had an increase in carton, paper and plastic. And then you ask yourselves; where is this coming from? We do not know which department is bringing so much waste, because everything is put together, so we have to talk with them to identify the origin of the waste (…) And the problem with the invoices is that we receive them in the end of the year, so often they don't remember."

Another problem mentioned by the Interviewee is that they currently do not have enough monitoring capacity to know if improvement projects have the desired effect. As the interviewee describes:

"We are completely blind. […] We just do not know if the projects that we are doing are having an impact or not. Also, because our production is always changing, so we can not compare year by year. We do not measure, so we just have to trust."

To address this problem, division I has started to implement a standardised energy monitoring system, that will automatically collect energy data and provide several additional functions to help handle the data. Interviewee E explains that this is necessary, because *"you need a certain number of measuring devices in the plants, and by increasing the number of measuring devices, you increase the effort for the evaluation of the energy data, so if you want to do this seriously, you have to invest a lot of time in this evaluation. An energy data monitoring system helps with that"*. The goal is to have a standardised energy monitoring system that provides all the plants with the transparency and the support that they need to really manage their performance. For Interviewee G, this would be a big improvement:

"I would love it when all information is completely clear. That I have a complete overview. (…) When I can really know what is running right now, then I can optimise for this. It would be like a dream to have this insights. Then you really know what you are doing."

Monitoring capability on divisional level
On the divisional level, the goal is also to have a better overview of the plant's performance, to allow for more targeted and timely steering. The reporting system, with yearly collected data, provides enough monitoring capacity on the corporate level, however, several interviewees have noted that at the divisional level there is a need for more detailed and more frequent information, as is also acknowledged by Interviewee A:

"We know relatively detailed in the end of the year, how we reach the targets. So the monitoring for the corporate level is okay. But if you want to steer this a little bit more in detail, and shorter intervals, the frequency should be reduced regarding data collection. This is something we do not do at the moment and I think that if you want to use targets as a steering tool you need minimum monthly data in order to see the development and to make better analyses than we can do on a corporate level."

Interviewee E elaborates on this from a divisional perspective:

"For me as a central function, with 128 plants, I will not go into detail into each metering value in this system. I dont have the time for that. So for me it's very interesting to get an idea of how efficient the plants are working in one glance. And how efficient a plant is working I can not determine on the basis on the basis of kWh per 1000 pieces product output or kWh per million euros sales, these are management figures that only make sense on a very high aggregated level. If you want to determine if a plant is working efficiently, then these figures just don't make sense. So what I am interested in is, for example, how efficient is a compressed air system in a plant working, how efficient in the heating system working, how efficient is the cold water system in the plant."

Several interviewees mentioned that monitoring capability on the divisional level is expected improve when the reporting interval is reduced (as described in the next Section) and when the energy monitoring system is implemented. Interviewee E explains, that the energy monitoring system will not only improve transparency on a plant level, but will also create a central overview of what plants are performing well and what plants are performing less, which will allow them to identify potentials for improvement.

Reducing reporting interval
All locations currently report their environmental KPIs to the central functions once per year, but is being changed to quarterly reporting. According to Interviewee A, this reduced frequency will *"allow for better performance monitoring, especially on divisional level"*. Interviewee C adds to this by stating: *"We are lucky if we have monthly values, so we have information about what is different one month to another and have a better understanding of the development over the year"*. Several interviewees have expressed the expectation that this reduced reporting interval will improve the ability of the divisions to steer performance, as explained by Interviewee E:

"What will change from this year on with the monthly reporting in SOFI is that we at least have the possibility to check if the plants are able to reach the target of 3 percent during the year. At the moment we do not really have the transparency to interfere or to put more emphasis on certain plants during the year."

A couple of interviewees also expressed concerns considering this frequency change. The main critique mentioned is that it will increase the workload on both the plant level and the divisional level, while there is already a lot of work to do. Interviewee B formulated this as follows:

"At the moment I see another challenge [...] Now we have to do it quarterly, and at the moment I have no idea how we can check the plausibility and the completeness of the data on a quarterly basis, I do not know how to do this. We are already struggling to do it yearly, so we can not do it in the way we do it now at the moment. We do not have the capacity, because then we would do nothing else."

On the other hand, the Interviewee hopes the change will have positive effects on the quality of the data, as he explains:

"It brings more routine in this business, that is true. I hope that the understanding on local level will increase. But this is a hope! They will not have much more time then, also in the future, so I am not sure how this will develop. I am optimistic in most cases, so I hope that the data quality will improve."

Interviewee I is not convinced that this change in frequency will lead to significant improvements in the data-quality: *"I think if people misinterpret the definitions once, they will keep misinterpreting them, no matter how often they report it. A problem we sometimes encounter is that the definitions are interpreted differently in different countries. I do not see the frequency solving those issues."* More issues concerning data quality and limited human resources is further elaborated upon in subsequent sections.

Leading indicators

A topic that has not been thoroughly discussed in the interviews, is the concept of leading indicators, i.e. KPIs that have a predictive ability. It was shortly addressed in some interviews, for example with Interviewee E, who thinks tracking current energy efficiency projects can give an indication of future energy efficiency improvement:

"In the SOFI tool, there is a module called Actions and Targets, and from this year we want to start using this database solution where the plants enter their projects and track their finalisation. Then you will have the KPI from the last year, you can have the KPI from the current year, and we will have at the same time the co-relation to the number of projects and the savings in kWh that you will generate from these projects."

5.2.2.4   Key requirement 4: The SPMS must enable improvement of the company's performance towards set goals

One of the main uses of the measurement system is ultimately to improve the performance of the whole case company towards the environmental targets and goals. The system is there to provide insight in performance and information on potential areas for improvement.

Measurement on corporate and divisional level
The case company currently uses the SOFI-tool to gather a set of environmental KPIs from the plants. The aggregated overview provides insight for the central function to identify problematic areas, and steer the plants towards improvement. The importance of this system for the corporate environment function is stressed by Interviewee A:

"The system is one of the most important data sources to steer the environmental management system and the environmental performance. By using the SOFI system we permanently see the development of environmental performance on a high level. It provides insight in the environmental performance of the divisions so we can focus on really identified action topics to improve their environmental performance. Basically, you do not know what you are talking about when you do not measure, and thus you can not steer".

The SOFI data collection system provides the corporate and divisional levels with valuable information on performance levels and allows them to identify focus areas for improving the environmental performance. This has been confirmed by several Interviewees in a central function. As Interviewee D notes: *"it allows us to see where we have big issues, and focus our support them, all since we gather the information"*.

Measurement on plant level
Interviewees mention that the SOFI-system fails to provide the plants with data which has high enough quality to improve their performance as the required KPIs are too aggregated and only provide insight a few times per year. The data that plants report to the corporate function are generally acquired from invoices from for example the energy suppliers and waste handling companies. The case company's plants have different systems next to SOFI to measure to collect and monitor data in environmental topics, which reportedly fluctuate much in quality. Where in some plants detailed energy monitoring systems are in place, the general standard is to use only a few high-level meters (Interviewee G: *"We know the exact consumption and where it comes from, but not linked to production floor".*), or even just use the invoices to track their intra-plant performance. As Interviewee E illustrates the issue at hand; *"Imagine you take a car and cover the dashboard; if you are driving you know that you are moving and thus consuming, but you do not know how fast you are going, or how much gas is left".*

The tendency within the case company's plants is that the plants which have a

good measuring system implemented tend to have a better performance in energy reduction. Interviewee E notes that *"plants with such a system have a good basis for the further steps towards improvement. They can analyse their data and do not have to believe everything the service provider tries to sell"*. Interviewee A supports this observation: *"The well performing plants have detailed information about energy consumption on cost-centre level or on an hourly level during the production. The insight this provides you with potential for reduction"*.

Communicating with decision makers

In the interviews, the use of performance data for communicating with decision makers was commonly named as one of the factors that is important for improving sustainability performance. During the Strategy workshop this point was emphasised as the acceptance and awareness of the middle management was mentioned as one of the key aspects towards sustainability success. At one of the divisions the environmental data is incorporated in the performance review of the plants. Interviewee D mentions:

"We use the data to inform the manufacturing functions in the quarterly P.O.R. (Plant Operations Review). Since we have started to do this, we have achieved significant reductions, which shows that it is a powerful tool."

On plant level, insights from the SPMS are also used to convince the plant manager or production managers to make certain decisions. Interviewee G gave an example from Plant X:

"You have to show the numbers when communicating about new measures that could be implemented. With an improved energy management system we will be enabled to link consumption to production and thus make even better calculations to convince the plant manager. Currently this is difficult, as we do not have all the data".

Interviewee H experiences the same attitude: *"Only if I come with data and show graphs to managers in production, I am able to convince them to change their ways of working"*. Interviewee E agrees and provides a example:

"We once were able to save 60 thousand euros per year by shutting down an oven which was generally on stand-by. In that case everyone involved claimed it was not possible, but after showing the data they couldn't say they do not believe you anymore!"

It is mentioned that currently most of the analysis of the data is done manually using excel sheets, next to the SOFI system. Interview A thinks this is a lost opportunity: *"With the SOFI system plants could make really nice graphs, they can even drill down in the data and analyse it, and even make benchmarks with other plants, but people do not seem to be aware."*

Several interviewees have acknowledged the importance of engaging the R&D, design

and industrial engineering departments in environmental performance improvement. Interviewee E: *"What is really lacking is the measurability; as soon as we can show the effects of a more energetically optimised product and we can compare it with existing products, then we build acceptance. If these proposals are based on data then it becomes supported by facts and no by longer estimations".* According to Interviewee E the current SPMS does not allow for to right communication to establish this way of working; *"In the future we will be at the point where we have the data at the start of the design phase, which enables us to implement a good solution from the start".*

Lack of human resources to follow up on measurement
In many cases it requires more manpower than currently available to identify opportunities to improve performance. As Interviewee H mentions: *"Currently I am only an energy manager for 20-30 percent of the time"*, whereas Interviewee E states; *"In ESH the amount of work done for the Safety and Health part is higher, than for the Environment part. We just have no person who is responsible for looking at these topics."* and Interviewee E adds: *"I used to provide regular consulting but I do not have time for that at the moment".* The Interviewees hint that this is the case since the SPMS provides data, but not the information that people need to make decisions. Interviewee E explains: *"When your system exists of many meters, you get enormous quantities of data, from which you still need to extrapolate the information. We are working on standardising reports which would take away this burden from the plants, and give them more time for other tasks."*

On the divisional level, Interviewee B mentions that the division currently lacks the capacity to properly evaluate the data available. The divisional team mainly focuses on checking the quality and the completeness of the data. As Interviewee D illustrates; *"It is more or less daily routine to follow up, not only on plant level but also on divisional level. Maybe it is a bit too much".* The interviewees also mention that if the quality of the data is not sufficient, or if it is incomplete, the efforts towards improving cannot be started, as the system does not provide enough insights. Interviewee B continues; *"It would be great to make a special analysis and find a focus project, but currently we are drowning in the wide range of KPIs we currently have".*

This lack of time to dedicate towards the use of the data could according to Interviewee B be overcome by having a person responsible on corporate level for checking data quality which would allow the other functions to focus more on support and further analysis:

"I think we could be more effective in improving or supporting our locations, but only if we can let go of other things. I fear that with the shorter reporting interval we will not have time to focus on improvement and support anymore as we will be checking all the collected data. And I do not want to use bad data."

The data gathered lacks the quality to act upon, and thus needs to be checked which as a result has that the people who have insight in the data are occupied with other tasks due to a measurement system which does not provide quality informa-

tion. Interviewee B also notes that *"the KPIs are not so important for the divisional performance improvement, but the audit reports are the essential part. They allow for improvement of the management system and that for me is real sustainability. Although it would be great if the KPIs would give us insight in how to improve the management system"*.

Feedback to the plants

In order to improve the sustainability performance many interviewees mention that the efforts towards improvement should be done on plant level or on the manufacturing and R&D departments; however, Interviewee H and Interviewee F both mention they would require more support from the central functions as improvement is not that obvious in many cases. Both interviewees mention that they would value comparison and knowledge sharing between plants, yet they see it could be difficult to compare different plants. Additionally, Interviewee F explains that having an external view on their processes might be really valuable. Another aspect seems to be the involvement and support that the central functions offer the plants. As interviewee F mentions: *"Sometimes I get the feeling that corporate just throws the targets over the fence and just expects us to achieve them, without us getting support!"*.

5.2.2.5 Key requirement 5: The SPMS must enable complete and accurate reporting on the contribution of the company to reaching the SDGs

Reporting on the case company's environmental performance is regarded as important by the interviewees. The external reporting of environmental data is regarded as the main function of the data collection system.

Data quality

A key issue mentioned by many interviewees is the accuracy of the final data reported. Interviewee C states that *"our [division] board expects way more exact numbers, but in the daily work process there are many stumbling points"*. In order to improve the data quality divisions perform plausibility checks which take a lot of work; Interviewee B mentioned that it is one of the most time consuming tasks they currently have. The fluctuations in the quality of the reported data are explained by Interviewee A, they mention that this is important to understand as the collection system itself does not determine the quality of the data, which is dependent on the measurement system where the data comes from; *"The sources of the data differ; it can be an invoice, it can be a meter, but it can also be calculated or estimated."*

The system allows for easy mistakes to make, where a typographical error or a mistake in comma/point choice can lead to wrong information. Interviewee A mentions that sometimes it can even be wrongly selected or forgotten unit that causes problems. As a reason the interviewee poses that the data collectors on plant level seem to have a too high workload to verify and check their own reported data.

The data gatherers often do not read what corporate is requesting from them. In some cases the data gatherers just do not understand the definition as provided by the corporate function as Interviewee I explains. Interviewee A mentions that the definitions are important as some of the requested KPIs have a name that makes the data gatherers assume it means a certain thing, while the actual definition is different and thus the wrong number is reported. For Interviewee C this is a challenge:

"Even though we started with this reporting system in 2007, and in some plants as early as 2000, we still have systematic misunderstandings on the plant level about the definitions. And with more than 100 plants in our division, we just cannot discuss the details with each plant individually."

Estimations and invoices

Interviewees are aware that the source of the data changes the quality of the overall system drastically. Some plants rely on the invoices for certain parts of the reporting portfolio. They face problems when the invoice has not been sent to them timely by the energy providers, or when the invoices lack the right information. Interviewee C gives an example:

"When I was in China they faced a problem with an invoice as no unit was mentioned on the invoice. The data gatherers reported the invoice, but were not able to provide a unit of measurement. This has a significant toll on our data quality."

On plant level people seem to be aware of this issue, Interviewee F mentions: *"We have four waste handling companies, and we just have to trust them that what they report to us is also the actual amount of waste they picked up. It is really old fashioned but we do not have another way".*

The KPIs that are not measured can are estimated. The interviewees stress that data that is extrapolated or estimated is often based on one person's experience. This knowledge can change as one person leaves the position and then all the knowledge is lost. Interviewee C explains: *"Sometimes we can trace these changes in approach due to a spike in the reported performance, but sometimes it is unidentified".* Having a process that depends on the knowledge of one person also leads to different ways of calculating a certain KPI throughout different plants; however, efforts have been started to standardise the methodology to estimate these numbers. This process shows varying levels of maturity, as Interviewee D working on divisional level explains:

"We ensure that it is not the case that in some plants they do it a certain way, and in one plant they do it in another. They have the same exact measurement or they use all the same estimation method."

The interviewee mentions that within other divisions that there is more need to train the plants on how to collect and estimate the numbers. Interviewee L explains

that this training process is expensive and extensive: *"Stability in the KPI set and changes in employment are the main challenges, if we need to train all people again, this is a lot of training and a lot of extra costs, so then it comes down to costs versus benefits."* Estimating KPIs is not optimal, but the interviewees agree that in certain cases it is not a problem to estimate since there is not really another option. Interviewee D gives an example: *"For example we have a situation where the municipality just does not weigh the waste so it is impossible to measure, hence we estimate those numbers. We can not measure it ourselves without huge costs."*

Changes in processes

The case company exists of many plants which, depending on division, have a wide range of products and processes. The interviewees mention that it is difficult to compare KPIs from one year to another as these processes tend to change as soon as a plant starts to produce a different product. Interviewee C explains:

"Our customers expect products with lower weight so we have to change materials or processes which lead to big changes in the plants every year. So even if we have activities to improve our energy efficiency these improvements are offset by a more waste or energy intensive production process. This means that the improvement is not traceable. As an additional layer of difficulty we sometimes have multiple business units within the same plant, which both use the same facilities, and thus their consumption is aggregated."

This fluctuation can currently not be explained as the data is not sufficiently detailed. These fluctuations were a commonly mentioned issue during the strategy workshop. In the case of energy data these fluctuations will have less impact when an energy monitoring system is in place. In that situation the KPIs could be linked to a certain product item, which according to the interviewees would help in order to figure out efficiency improvements.

Supporting IT-systems

In order to ensure higher data quality, the IT system has build-in plausibility checks. When an entry deviates more than 20 percent from the value of the previous reporting period, a notification is given and a reason needs to be provided for the deviation; however, these reasons provided by the data collectors in the form of a comment, are not always clearly formulated as was stated by Interviewee D: *"Sometimes we wish they would make the comments more understandable, because for the data gatherers it might be clear, but for us it is not clear at all when we read it. I think this leads to a lot of follow up."*

Even though this process takes a lot of time, the reported data quality is not compromised, as according to interviewee A, the checks done on divisional level correct most of these mistakes. Interviewee A further mentions that the SOFI-system is flexible, so it is easy to update the system and ensure that it enables high quality reporting.

Additionally, many plants and divisions have their own IT-systems which are not automatically linked to the corporate IT system, which then is a manual task and that leads to human mistakes. According to interviewee A and B these human mistakes are also caused due the fact that people are not used to working with SOFI. According to Interview A one of the reasons for this is that *"it is not a living system, people just use it at max a few times per year, so they do not fully understand it"*. In the interviewed plants there are multiple systems in place to measure the same thing, but in different parts of the plants, they highlight that even on plant level the systems are not aggregated automatically. Interviewee E mentions:

"When we are able to link the systems that are used on plant level, so measurement and collection system, we will both get higher data quality, as well as real-time data, which will give us more insights in the details. This is something the KPIs currently do not provide."

Most interviewees mention however that implementing a system like this in all plants is difficult as the case company is really finance-driven. An expensive system that does not save a lot of money by itself is hard to sell to a plant manager. This leads, according to Interviewee C, to a vicious circle:

"If you do not measure, you cannot prove it saves money, and if it does not save money, they will not implement a measurement system."

Lack of focus on environmental reporting
A commonly mentioned issue with reporting is that the people who gather and provide the data do not see it as a priority. Interviewee C illustrates this; *"I was told; we just report to do it for you! This shows it is not a priority for them."* On plant level, the responsible to gather the data is ESH manager. Herein several interviewees see a problem. Interviewee B mentioned; *"I have the impression they tend to focus more on the other things they are dealing with, and unfortunately these are not only environmental topics."* This impression is agreed upon by interviewee F from plant level: *"We do not have anyone responsible for environmental topics, we mainly focus on the safety and health topics"*. This lack of focus is identified by Interviewee A as a reason why people on the plant level do not take the time to verify their data which, according to the interviewee, is as one of the causes for lower quality data.

5.2.2.6 Key requirement 6: The SPMS must be aligned and integrated with other- performance management tools and vice versa

Key requirement 6 indicates that an SPMS is not an independent system, but it has certain functions and interfaces in relation to other performance management systems and tools. During the interviews the alignment and integration of these organisational systems was addressed and during the strategy meeting it was fuel for discussion.

Strategy and business process

The case company strives to become a more sustainable business, which is currently expressed in their CSR-roadmap 2020. According to Interviewee C, the environmental part of the CSR-roadmap is not integrated with the overall strategy:

"We need to have a strategy for production and economic development where the sustainability topics are integrated in. Currently we have two strategies that are separated."

Interviewee A agrees, and adds that *"the most important thing is that we build up a common approach and understanding. We have to ensure all departments work together in a network. That is essential to enable certain strategies as everything is connected. We cannot have everything in separated pillars. I believe we are moving towards this state."*

Interviewee D described the current situation as good. The interviewee mentions that currently the environmental aspects are always balanced with profitability, but they do see room for improvement in the procurement of raw materials. In another division, Interviewee C sees that not all plants are committed to the strategy but it is improving by focusing on a smaller subset of plants. The current CSR-roadmap is rather high level as explained by Interviewee A:

"The CSR-Roadmap 2020 provides a good framework but it lacks a more detailed strategic plan that would support the it. This is something we need to work on in the future".

During the strategy workshop it became apparent that this lack of integration in the strategy, and thus in the business processes was a limiting factor in many cases as it leads to management not seeing the full implications that sustainability has for their part of the value adding process.

Management Support

The interviewees agree that management is increasingly committed to the sustainability strategy, which they state as important to the implementation of said strategy. Interview A thinks *"it is essential"*. According to interviewee B the current CEO is interested in sustainability, and this really helps the cause. Interviewee I sees the executive board's support as the politically correct thing to do and explains that the actual implementation, which is mostly driven by the middle management, is lacking.

Other interviewees agree that the situation regarding middle-management (e.g. plant managers, business unit managers) layers is different. Interviewee E and I see that it highly depends on the person in charge and that mainly the awareness and commitment of the middle management should be improved. As Interviewee I calls it; *"The middle management is where the rubber meets the road; if you want things to be implemented you have to have the buy-in from the Business Units and the*

plant managers.'' Both Interviewee B and C agree that not all plant managers see it as an important aspect yet, but also see that there are some who are highly interested. This is seen as a big influence on plant performance, as said by Interviewee B:

"The plant managers have a lot of power, and since the ESH manager is employed by them, the plant manager in the end decides about the environmental topics."

From the plant perspective people agree to this notion. Interviewee G describes that *"when the plant managers says what needs to happen, it will happen. If as a ESH manager you do not have support from the plant manager it is completely impossible to reach the environmental targets"*.

The interviewees C and D have noticed a change in the prioritisation of the divisional boards:

"It used to be that the management did not really care, but recently they show much more interest in understanding the numbers and they even make statements indicating that we need to improve and ask for our help with achieving that!" Interviewee D also makes a realistic comment: "They show interest, but sometimes they say that we are already better than our competitors and then they do not see the reason to improve even more as that would cost money".

Concluding, the interviewees see the engagement of corporate and divisional level management, and a fluctuation in support of the plant and business-unit management levels. Interviewee L sees the CSR project as a test to see how important the board views sustainability for the corporation: *"There is a huge range of decisions, we can choose to be the best, or just to be in the middle field; what we do decides on the decision of the board".*

Performance evaluation and Reward System
As mentioned before, the interviewees explain that the results are now included in Performance reviews on divisional levels. Yet interviewee A explains that currently there is no link to the reward system regarding sustainability performance: *"Currently there are no incentives regarding environmental or sustainability issues. The incentives are mainly based on financial performance and growth."*

Interviewee C agrees and adds: *"It does not have any consequences if we do not achieve the environmental targets, but if we do not achieve our financial target there will be a big impact for management. I think that if there is no concrete incentive or responsibility in regards to sustainability they will just not prioritise sustainability as much as other things. Even though our policy says we value economy, ecology and social responsibility evenly, I believe this is not true. Perhaps in regards to social responsibility we do more, because work incidents look bad in the public opinion, but on environmental topics it is basically; we try, but if we do not achieve it, who cares?"*

Other interviewees seem to agree that there should be some consequences if there targets are not reached, but how this exactly will be implemented is not clear.

On plant level there are no specific targets for the ESH manager to achieve. Interviewee B states that this is not possible as the ESH managers do not have the power to make budgetary decisions, which is why the targets are the plants' responsibility. They continue explaining that the ESH manager only tracks the performance and support improvement activities by for example pushing them in management meetings. Interviewee C believes that the ESH managers' personal incentives should not be linked the plants KPIs or to the audit results, the interviewee explains that *"this would be very unproductive as the ESH manager would then try to hide problems, and then we cannot find gaps and opportunities for improvement"*. Interviewee D agrees and sees the same problems with getting the right data if the incentive system is linked to the performance review.

Another aspect is the fact that the audits are conducted by internal employees, which mainly are other ESH managers. Interviewee C explains why this could be problematic if personal rewards are coupled to environmental performance:

"They are colleagues and thus they do not want to hurt each other. So they will be more lenient in their audit reports. This would be really bad to have; this is why I even instructed plant managers to make sure to not link the performance reviews of ESH managers with these results."

The plant perspective, given by Interviewee G and H, agrees with this notion; furthermore, they stress that the KPIs also do not tell the whole story as they do not fit the plant so that would give a wrong impression if evaluated based on them: *"We just have to explain the situation and show what we are working on, then there is no problem".*

Company Culture   Interviewee J believes it would be good if some evaluation and incentives would be linked to the performance, but stresses that the most important thing is the achievement of sustainability focused mindset. Interviewee A believes that the company already has a sustainability focused culture. The change of CEO is an important driver for this according to Interviewee J as the new CEO gives it more importance. This can be seen, for example, in the CSR council which has two board members as council members. The changing mindset is also observed by interviewee B and G, they see this as a global trend which is visible in the company as well. Interviewee B also emphasises that the new, younger employees have a better understanding of the environmental topics.

Interviewee C is also seeing a change:

"Yes it is part of the company culture, even though people still view economical data as more important people start realising that we cannot just do ecological projects if it results in a 100% financial improvement as well."

In the plants, interviewee F notices the difference that people in production are sometimes so stressed that they do not care about the sustainability topics anymore. They mention that for most people they see that in the end of the day quality and money are more important drivers than environmental topics: *"We have to save money but these environmental things we have do for corporate just cost money".*

Interviewees D and J mention that it also depends on the country people are located in. Interviewee J describes that *"in, for example, China they have noticed that the pollution levels are so high that people have realised the importance of these issues, but in, for example, South-America this understanding is a lot lower".*

Cost-benefit trade-offs

Sometimes conflicting requirements make it difficult to achieve better environmental performance. Interviewee F repeats: *"It is all about money; we are a production company, and unfortunately environmental protection mainly costs money".* This trade-off is mentioned by all interviewees. As Interviewee J states: *"We need to remain competitive, so if our products get more expensive than the competitors', we will lose business".* Interviewee B explains that this also has been one of the key reasons why the energy savings are much in focus:

"Saving energy saves money. This is why energy is an easy topic to convince people to work on and for other environmentally important aspects, like water; this not so much the case. I would even say we are not a green company, we are a money saving company."

The cost-benefit trade-offs are a result of internal investment policies according to the interviewees. Interviewee A explains:

"We have a fixed 2 year amortisation time and for energy projects that sometimes is too short. If we do not have a clear investment policy linked with our environmental targets we will just do some small projects but the bigger projects will not be implemented."

This was identified by most of the interviewees as a main roadblock towards improvement. Many interviewees have examples where they had projects that were not implemented due to amortisation time that is just a bit too long. Interviewee H mentions that this can be really frustrating as there are many options for improvement, but the money is just not available. The interviewee stated that *"people just do not see the importance, it is always; money, money, money, but I understand it, we are a company".* Interviewee H believes it might be a good idea to have a different ROI for environmental or energy saving projects, and Interviewee E proposes that the company should move from a return on investment (ROI) approach to a total cost of ownership approach to projects:

"The way we use ROI only tells part of the story, total cost of ownership includes

all costs included; for example the maintenance activities, the energy consumption, the space consumption and so on. This would already help us a lot in implementing energy saving projects. This change would lead to people not focusing on solely the cheapest option at the time of purchase, but people would look at the costs of the whole life-time of a product."

The monetary concerns were often mentioned as one of the leading causes for the lack of improvement during the strategy meeting.

Coordination within the organisation

Not only the monetary cost versus environmental benefit trade-off is deemed to be leading. Interviewee A explains that sometimes customer requirements prohibit the choice for a more sustainable, or recyclable material. The interviewee gives the example of a safety part:

"Sometimes the requirements state clearly; do not use recycled material. Even if we explain it has the same quality the customer can still say no, and then we have to listen. We have many ideas, but we are not always able to convince the customer."

This notion is agreed upon by Interviewee D: *"Our increase in waste comes from quality requirements and if our quality department does not allow a certain change, it will not work".* The customer requirements lead to products to be more and more complex, which in most cases costs more energy to produce these products. As explained by Interviewee D: *"You need new machines, more machines, more production steps for the production and this in the end counteracts our savings".*

Several interviewees have mentioned that the current organisation makes communication and coordination with other departments, for which sustainability topics are not the main focus, difficult, while they do have a large impact on the environmental performance. The environmental organisation could be seen as a parallel organisation which tries to lessen the impact which the other departments create. The environmental department in the case company sets the targets, but they are, for example, not the ones creating projects to improve the efficiency of production. Interviewee E calls this way of working *"trying to optimise a system which does not allow for optimisation from the start".* As the interviewee explains, the current improvement efforts are basically sub-optimising a system that was not built to be environmentally friendly. Interviewee D and B explain that in order to improve performance in regards of energy, waste and water the engineering and product development department have the biggest influence. The environmental organisation can only try to inform the departments about environmental friendly production and design, however Interviewee B notes that this is difficult: *"We are a really heterogeneous organisation, and we do not know all people involved in these processes. It is just difficult to communicate all these people about certain environmental requirements".*

Also in the plant these challenges were highlighted by interviewee F:

"Why do we have these goals? For example, when we talk with people in production, and we ask why they waste so much metal, they just laugh at us and say that these are the processes and we need to follow them for quality reason. Yes, we have some areas where we can improve by training people, but we are expected to improve in areas where we do not have any influence."

This issue is mentioned by interviewee A as well, who stated that the product development department lacks knowledge about how to make parts for environmental products and that due to their high level of influence on the production processes this is highly important. During the strategy meeting the need for closer interaction with other departments was mentioned several times as a prerequisite for the next steps in the process of becoming more sustainable.

Measurement of social responsibility
Two of the interviewees are involved in the reporting and gathering of social responsibility data. These interviews were conducted as part of an exploration which aims to see if similar problems are present in the process of gathering social responsibility data as is the case in the process for gathering environmental sustainability data. This exploration enables a broader understanding of the problems faced while aligning with the SDGs and enables the researchers to identify if the challenges between the environmental and social responsibility aspects are comparable.

According to interviewee J the social part of sustainability is finally gaining traction within the organisation. They mention this is important as the future of the company depends on it; however, they explain that at this point the processes and responsibilities are not well defined when it comes to gathering the data required to report on the social sustainability dimension. This makes the process slow and makes it difficult to get the quality and the detail in the information that is required.

Interviewee K and J mention that the many acquisitions made by the case company leads to problems; *"we now have a lot of different SAP systems, which are not linked, if I need to get a small detail from all these systems it takes a lot of time"*. This becomes even more of a problem when the organisation requires new information as many different systems would need to be adapted and the people who use it need to be trained.

Interviewee J believes a team of people who collect and check the data from all these systems is needed even more now due to the mandatory disclosure that new EU legislation requires: *"Currently we do not have a system in place that allows us to measure all the things we need to measure if we want to report according to the GRI standard"*. According to the interviewee the result of a system is only as good as the people who put in the data, and as long as nobody is responsible for collecting the data it will not work. Interviewee K agrees that *"if you need to ask many people before you find a person who is able to provide the data, it is just inefficient"*.

Interviewee J recognises another difficulty in regards of measurement in the social responsibility area. The interviewee explains that for some topics people rather not report their performance, for example, the amounts of money spend on donations. Interviewee K explains that there are several reasons for this, and that the only solution is to make clear that it is needed and not bad to report on these KPIs. Interviewee L explains that the definition of some KPIs make it hard as well. They give an example regarding reporting the amount of money spent on employee training: *"If you have a training that costs 1000 euro, but you have additional costs like travel, are the travel costs included or not".*

Furthermore, interviewee L highlights that in the social responsibility area much more legislation is in place which sometimes makes it difficult or even illegal to collect data. Another aspect that is mentioned is the lack of perceived benefits for the organisation: *"If we want to make production more lean, there are clear benefits for that, but the benefits of measuring HR related KPIs is not always that clear".*

6

Analysis & Discussion

The results of the analysis of empirical data are presented in two parts, corresponding to the two research questions. The first research question was answered by analysing archival document data, and the conclusions were verified through discussion with the head of Corporate Environment and observations during the strategy workshop. The second research question was answered based on the analysis of interview data, complemented with observations of informal meetings and situations as well as the strategy meeting.

6.1 How does the case company's current sustainability performance measurement system overlap with the Sustainable Development Goals and what are the gaps?

In order to determine to what extent the current SPMS of the case company covers all areas described by the SDGs, a gap analysis was performed. The purpose of this gap analysis is to provide information for the assessment of the SPMS based on the following first criteria for alignment with the SDGs "The SPMS must cover all aspects of the SDGs that are relevant", which refers to both KPIs and targets.

The focus of the gap analysis is on the KPIs and targets that are used on the corporate level of the case company. In line with the scope of this study, the gap analysis is limited to environmental aspects and therefore addresses only six out of 17 SDGs. The outcomes of the gap analysis have been verified through discussion with the Head of Corporate Environment, and again through group work and a plenary discussion during the strategy workshop. Remaining unclarities were brought up during the interviews in order to acquire additional data. A full overview of the measurement framework and corporate targets of the case company and how they are linked to the SDGs is shown in Appendix E and Appendix F respectively. Each individual SDG is addressed in more detail below.

6.1.1 SDG 6 - Clean water and sanitation

6.1.1.1 Target 6.3 - By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated waste-water and substantially increasing recycling and safe reuse globally.

The policy of the case company is that all sanitary and production-specific waste-water, of which the latter may contain hazardous substances, are treated and disposed of in compliance with local laws and regulations. The individual locations are responsible for keeping track of waste-water quality and ensuring legal compliance. Corporate performance in terms of waste-water management is measured by the amount of reported cases of release of hazardous substances and non-compliances with environmental laws and regulations. The objective is to have zero non-compliances.

The case company does currently not collect data on waste-water quality and the amount of water that is recycled and reused at their locations. This is identified as a gap in their measurement system in relation to SDG target 6.3; however, it must be noted that these topics are addressed in their environmental management system. The lack of KPIs and targets, especially related to waste-water quality, was also emphasised during the strategy workshop and the case company is planning to address this gap in the future

6.1.1.2 Target 6.4 - By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

The case company is addressing the topic of water efficiency with a specific water consumption reduction target of 20 percent by 2020, based on 2013 levels. Specific water consumption is defined as water consumption volume (in m3) per adjusted sales revenue (in million euros). The company tracks progress towards this target using KPIs based on total water used globally by source (absolute amount) and relative changes in water consumption (specific and absolute water consumption).

The above stated KPIs and targets cover the water efficiency aspect of target 6.4, but it does not sufficiently cover water scarcity issues. Water scarcity is typically a local problem and must therefore be addressed on a local or regional basis. The SPMS of the case company does currently not address water efficiency and sustainable withdrawals and supply of water on a local or regional basis, which is identified as a gap in the measurement system in relation to SDG target 6.4. The case company has acknowledged this is an area of improvement and is planning to adjust their measures and targets accordingly, as the company has formulated in their 2015 sustainability report (*Citation removed due to confidentiality issues*)

"In order to achieve a more targeted response to water risks, a strategy for wa-

ter risk areas is currently being prepared. The objective is to be able to respond better to negative effects of water shortages and to align the local water targets and savings projects to the challenges of the specific regions."

6.1.2 SDG 7 - Affordable and clear energy

6.1.2.1 Target 7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix

The case company strives to source five percent of its energy consumption from renewable sources by 2025. The KPI it tracks connected to this target is the total amount of self-generated renewable energy. Data on the procurement of renewable energy is not collected, which is a clear gap in the SPMS in relation to SDG target 7.2. The head of the Corporate Environment department clarified that the case company does currently not have a policy for green energy procurement, hence there is no data collected. In addition, the company does not track a KPI based on the relative share of renewable energy of the total energy consumption (in percentages). Such a KPI would better facilitate tracking progress towards the set goal. This gap was also specifically addressed during the strategy workshop, and the case company is considering the possibility of creating a corporate green energy purchasing policy.

6.1.2.2 Target 7.3 - By 2030, double the global rate of improvement in energy efficiency

Energy efficiency improvement is one of the focus areas of the case company. They aim to reduce specific energy consumption by 20 percent by 2020 (baseline: 2013). The energy efficiency KPIs are based on absolute and specific total consumption as well as absolute and relative change in total consumption. The absolute numbers are specified by energy source. In addition, several KPIs are used to track the amount of energy efficiency projects and their corresponding estimated reduction in annual CO_2 emissions, specified by *"implemented"*, *"implementation commenced"* and *"to be implemented"*. No gaps have been identified in relation to this SDG target, apart from a lack of value chain integration, which is further elaborated upon further on in this section.

6.1.3 SDG 12 - Responsible consumption and production

6.1.3.1 Target 12.2 - By 2030, achieve the sustainable management and efficient use of natural resources.

Efficient use of natural resources is addressed by a corporate target of 20 percent reduction of specific waste production in comparison to 2013 levels. Progress towards this target is tracked through KPIs that measure total specific and absolute waste generation, as well as relative changes in absolute and specific waste generation. In addition, the total amount (weight) of input and output of materials, specified by

type of material, are measured.

The case company has a strong focus on waste reduction; however, the SPMS does not include any measures or targets that are directly related to efficient use of resources in products, e.g. the amount of material used per product or per sales volume. This is identified as a potential point of improvement in relation to SDG target 12.2. Furthermore, the case company does not make any distinction between scarce natural resources and abundant natural resources. This is also identified as a potential point of improvement.

6.1.3.2 Target 12.4 - By 2020, achieve environmentally sound management of chemicals and all wastes throughout their life-cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on the human health and the environment.

Similar to the approach to waste-water management, management of hazardous substances is tracked by measuring the amount of reported non-compliances with local laws and regulations, for which the case company has a zero tolerance policy. In addition, the company tracks the total amount (weight) of chemicals used and estimates the share of hazardous waste as a percentage of the total waste production. The SPMS of the case company includes two goals specifically related to chemicals emitted to the air:

- By 2025, reduction of absolute solvent emissions by 20% (baseline: 2013)
- By 2020, contribution to the improvement of air quality through the prevention of particles and nitrogen oxides in gasoline and diesel vehicles

There are currently no KPIs that specifically measure progress towards these goals. The case company is planning to start tracking NO_X, SO_X and VOC emissions in the future, in order to track progress towards the first goal. The second goal does not include a quantified objective and is therefore not measurable. Furthermore, the SPMS does not include KPIs and targets in relation to sustainable use of hazardous chemicals (e.g. a reduction of the amount of hazardous chemicals used in products and production) and the emissions of ozone depleting substances. These are identified as gaps in the measurement system.

6.1.3.3 Target 12.5 - By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

As mentioned before, the case company strives to reduce its specific waste production by 20 percent by 2020. In addition, the company aims to increase its specific waste recycling rate to 90 percent and increase the share of raw material used for tire production covered by recycled materials to 10 percent. The KPIs is used to track progress towards these goals are the total amount of recycled waste, the share of recycled waste as a percentage of the total waste and the percentage of recycled material used in products, in total and by material type.

The company does not track any KPIs that specifically address waste prevention and reuse, which could be identified as a gap in regards to Target 12.5. Although it must be noted that both issues are indirectly covered by the waste reduction target and KPIs. Furthermore, the information provided about waste recycling and recycled material use in products seems rather limited and incomplete, and could possibly be improved.

6.1.3.4 Target 12.6 - Encourage companies, especially large and transnational companies, to adopt sustainable practises and to integrate sustainability information into their reporting cycle.

The case company assures the adoption of sustainable practises through certification of their locations according to the ISO 14001 (Environmental management) and ISO 50001 (Energy management). Targets are defined per division that describe the share of the locations they aim to get certified in a specific time period. Most divisions aim for 100 percent ISO 14001 certification by 2020. The amount of plants that are certified for ISO 14001 and 50001 are tracked by the divisions. The second part of target 12.6 focused on sustainability reporting. The case company publishes an annual sustainability report and does therefore comply to this target. Hence, no gaps are identified in relation to target 12.6.

6.1.3.5 Target 12.7 - Promote public procurement practises that are sustainable, in accordance with national policies and priorities.

The case company assures sustainable procurement practises through their supplier 'Code of Conduct' and encouraging suppliers to become ISO 14001 certified. The company aims to have proof of acknowledgement of the Code of Conduct from 100 percent of the suppliers, as well as a 100 percent ISO 14001 certification among strategic suppliers by 2020. The company measures the amount of suppliers that signed the Code of Conduct and are ISO 14001 certified in order to track progress towards the first two goals. Hence, there are no identified gaps in terms of promoting procurement practises. The environmental impact in the supply chain is not sufficiently included in the SPMS, as described in a subsequent section.

6.1.3.6 Target 12.8 - By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.

Whether or not Target 12.8 should be included in this analysis could be debated, as it could be seen as an HR topic. The researchers argue that educating employees and stakeholders about the importance and value of sustainable development is essential for enhancing environmental performance, hence this target is taken into account. The case company has formulated two goals in the category *'Compliance & Supply Chain'* in regard to training, which express the intention to perform regular

classroom and e-learning training. The goals do not specify the focus of the training programs, nor do they include a measurable objective. The company does also not track KPIs in relation to these goals. This is identified as a gap in regard to Target 12.8.

6.1.4 SDG 13 - Climate action

6.1.4.1 Target 13.2 - Integrate climate change measures into national policies, strategies and planning.

Reducing CO_2 emissions is one of the main focus areas in the current environmental strategy, which contains the target to reduce specific CO_2 emissions by 20 percent by 2020 (baseline: 2013). The company measures total Scope 1 emissions, Scope 2 emissions and Scope 3 emissions emissions by source, specific CO_2 emissions and relative changes in specific and total CO_2 emissions. Scope 1 emissions are defined as direct CO_2 emissions from company activities, scope 2 are indirect CO_2 emissions as a result of purchased energy and scope 3 emissions are emissions occurring within the supply chain but outside of the company. In addition, the company measures the number of CO_2 reduction projects and the total amount of capital invested in emission reduction projects.

The KPIs in this area are strongly focused on CO_2, as this the greenhouse gas that is emitted most. Data on emissions of other greenhouse gasses are not collected, which is identified as a gap in regards of SDG target 13.2. Scope 3 emissions are estimated, but not all categories of scope 3 emissions are currently included in these estimations, for example business travels. This is a point of improvement that is acknowledged by the case company. It has set the goal to gradually acquire all scope 3 emissions by 2020. A next step would be to include scope 3 emissions in their emission reduction targets.

The case company has also set several targets related to emission reduction within the use phase of their products:
- Sustainable products: By 2020, contribution to the EU target of reducing CO_2 emissions by 20 percent compared to 1990
- Sustainable products: By 2020, provision of technologies for reaching the target of 85 g CO_2/km with gasoline vehicles (mild hybrid, "Best car" as reference vehicle)

It is unclear how progress towards reaching these goals is measured. Creating more transparent and specific KPIs for these goals is therefore identified as a potential point for improvement.

6.1.4.2 Target 13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

This target is similar to target 12.8, but it is specifically focused on climate change.

The same reasoning applies here as to target 12.8.

6.1.5 SDG 14 - Life below water

6.1.5.1 Target 14.1 - By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

As mentioned before, the case company does not specifically report on waste-water quality and discharge, as this is not seen as a material issue; therefore, the SPMS does not include KPIs or targets that specifically address SDG target 14.1. Issues related to marine pollution are measured by the number of non-compliances to local laws and regulations.

6.1.6 SDG 15 - Life on land

6.1.6.1 Target 15.1 - By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

The same reasoning applies to this target as to Target 14.1.

6.1.6.2 Target 15.2 - By 2020, promote the implementation of sustainable management of all types of forest, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

The SPMS does not include any measures or targets related to deforestation. This is identified as a gap in relation to Target 15.2, because the rubber industry is often associated with deforestation of tropical rain forests. The case company does currently not collect any data on how their operations affect forest management practises. It does acknowledge the issue and have set up projects to create more transparency in the supply chain and promote sustainable forest management practises. In addition, the case company is developing a new sustainable rubber replacement made out of dandelions, which is planned to be introduced in production around 2021. This alternative rubber product is expected to reduce pressure on tropical rain forests.

6.1.6.3 Target 15.5 - Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species.

Target 15.5 is directly related to the previous target, because deforestation might lead to the destruction of natural habitats and the loss of biodiversity. The case company does not collect any data in this regard, hence the same reasoning applies to this target as to the previous target.

6.1.7   Value Chain Perspective

As mentioned in Chapter 5.1.3, companies are expected to take a value chain perspective on the SDGs. The case company has started to incorporate supply chain and product use aspects in its SPMS in several areas, for example scope 3 emissions, but in general value chain impacts are largely lacking in the current measurement system. This is identified as a gap in regards of the SDGs. The company is working to improve in this respect, illustrated by their goals for supplier sustainability (See target 12.7) and sustainable products (See target 13.2), as well as their goal to have LCAs available for all defined core product segments. The amount of LCAs (Life Cycle Analysis) that is currently available is unclear. The LCAs could be used to identify high impact areas in the value chain and update the materiality analysis, the SPMS and the strategy accordingly. Besides, the case company is participating in several industry projects and collaborations to improve data collection in the supply chain.

A full overview of all identified gaps and points of improvement is given in Table 6.1 below.

SDG	Gap description
6.3	No corporate KPI for waste-water quality
	No corporate KPI for water recycling and reuse
6.4	No corporate KPI related to water scarcity / sustainable water withdrawal
	No regionally specific water efficiency KPIs and targets
7.2	No appropriate KPI for renewable energy usage
12.2	No KPI directly related to material resource efficiency in products
	No distinction is made between scarce natural resources and abundant natural resources
12.4	No corporate KPI for solvent emissions
	No corporate KPI for SO_X and NO_X emissions
	No corporate KPI for emission of ozone depleting substances
	No corporate KPI for reduction of particles and nitrogen oxides emissions in gasoline and diesel vehicles
	No KPIs and targets for the sustainable use or reduction of hazardous substances
12.5	No corporate KPI specifically for waste prevention and reuse

Table 6.1: The full overview of identified gaps and points of improvement (Continues on the next page)

(Table 6.1 continued)

	The quality of reporting on waste recycling and use of recycled material can be improved
12.8	No corporate KPI and targets for sustainable development education for employees and suppliers
13.2	The reporting quality of Scope 3 emissions can be improved
	No corporate target for Scope 3 emissions
	No corporate KPI and target for greenhouse gasses other than CO_2 (e.g. methane, nitrous oxide)
	No specific KPIs related to emission reductions in the use phase of products
13.3	Similar to Target 12.8
14.1	No corporate KPIs on wastewater quality and water discharge
15.1	Similar to Target 14.1
15.2	No corporate KPI and target on deforestation in the natural rubber supply chain
15.5	Similar to 15.2
Overall	Measurement and reporting on value chain impact can be improved

Table 6.1: The full overview of identified gaps and points of improvement

6.2 How can the case company improve their sustainability performance measurement system in order to align with the SDGs, and what are the main barriers that should be overcome?

In order to answer this research question, the interview data was analysed and compared to relevant aspects in the theoretical framework. This has resulted in the identification of 30 key barriers to SPMS alignment with the SDGs. Identified barriers have been grouped and consolidated where possible, in order to present the analysis in a concise way. The researchers acknowledge that the amount of 30 barriers is still rather large, but argue that consolidating the barriers even further will make their formulation overly general and therefore meaningless in the context of this study. The relatively large amount of identified barriers is a result of the explorative research approach and the broad scope, and is illustrative for the complexity of the studied problem. The individual barriers are shown in bold and structured according to the six key requirements for easier reading, but this is not a solid structure and barriers may apply to multiple key requirements.

6.2.1 Key requirement 1: The SPMS must cover all aspects of the SDGs that are relevant

As described in the *SDG Compass*, for companies engaging with the SDGs the first step is to understand what the SDGs are and what they mean for the business. In terms of key requirement 1, this means that companies should understand which SDGs are relevant for their business, how these are covered by their SPMS and what, if any, gaps exist between their SPMS and the SDGs. An obvious requirement for this step is that the people responsible for updating the SPMS have adequate knowledge of the SDGs and are aware that gaps may exist.

From the interview data is has become apparent that the knowledge about the SDGs within the case company is very limited, and that the vast majority of the people are of the opinion that the current SPMS is covering all relevant environmental topics, while the gap analysis in this study has indicated that several gaps exist. Logically, if people who work with the measurement system are not aware that gaps may exist, there is little reason to evaluate and update the SPMS. Searcy (2012) confirms that a lack of knowledge about sustainability as a critical barrier to updating an SPMS. Hence, two initial barriers to aligning an SPMS with the SDGs can be identified:

Barrier 1: A lack of knowledge among internal stakeholders about the SDGs and their relevance for the business.

Barrier 2: A lack of awareness among internal stakeholders that gaps in the SPMS may exist.

At the strategy workshop of the environmental organisation, the core team got familiar with the SDGs and identified gaps in the current strategy. This proved to be an effective way to overcome barrier 1 and 2. The workshop was structured according to the first steps described in the *SDG Compass* and has proven that the process described in the *SDG Compass* can be a helpful guideline for companies when engaging with the SDGs. Besides, it has shown that involving a broad range of people in the process of engaging with the SDGs is valuable as their different points of view . The latter finding is in line with Searcy (2011), who states that key stakeholders should be involved in the process of updating an SPMS.

The gap analysis performed in this study has identified a set of gaps and points of improvement in regards to the SDGs, and in order to align the SPMS with the SDGs the SPMS should be updated with new KPIs and targets that cover the existing gaps. The found gaps have been brought up in several interviews and from the resulting conversations a set of potential challenges have emerged.

In the cases of certain air emissions and water quality, it turns out that legal requirements are a determining factor for the decision on whether or not to collect measurement data. The lack of legal requirements, combined with the fact that

these issues have not been identified as priority aspects, make that the benefit of installing new KPIs is limited. On the other hand, the financial cost of installing meters and monitoring systems for water quality and air emissions is substantial. This makes that a trade-off between financial costs and environmental benefit exists, which has been described as a common barrier to installing new performance measures by Searcy et al. (2005). This barrier is especially influential in situations when measurement data is not readily available (Hubbard, 2009; Braz et al., 2011) like in the examples mentioned above. This cost-benefit trade-off has been identified as a critical factor in many situations in this study, hence the third barrier:

Barrier 3: Proposed actions lack a clear positive cost-benefit relationship.

As described by Hubbard (2009) it is not always obvious which indicators to use or how to aggregate indicators for higher-level use, especially in organisations that are geographically and functionally diverse. This challenge has also been identified in this study, which can be illustrated by the example of water efficiency. Currently, the case company measures water efficiency on a corporate level, connected to a corporation-wide water efficiency target. Such a corporate wide target has the advantage of being easy to understand and as it the same KPI applies across the organisation, it is easy to aggregate location data to a corporate-wide KPI; however, as water scarcity is more of a local rather than a global problem, the company is now moving towards a regional approach, which is more in line with SDG Target 6.4. Creating regionally based KPIs will pose the challenge of aggregating the regional KPIs to a corporate KPI that is meaningful and can be used for, for example, external communication. Similar challenges have been mentioned on multiple occasions, and are likely a result of the fact that the case company is diverse, both geographically and in product types, which makes it difficult to choose KPIs that are meaningful on a location level, but can also be aggregated to a meaningful KPI for higher-level use. This confirms Hubbard's notion, hence this is identified as the fourth barrier:

Barrier 4: Which KPI to use and how to aggregate a KPI for higher-level use is not always obvious.

Both in literature (Searcy et al., 2016; Veleva et al., 2001; Folan and Browne, 2005) and in the various SDG guides, there is a strong emphasis on the need for companies to obtain a value chain perspective on sustainability topics. In this study there has also been a strong focus on value chain aspects, which has led to the identification of several key barriers.

Due to increasing requirements for a stronger value chain focus, the company has relatively recently started to collect data in the supply chain, for example, in the area of CO_2 emissions. As the environmental organisation is not in direct contact with suppliers and other external parties, other departments have been asked to collect this data. In those cases, it has occurred that other departments have been reluctant to collect and report the necessary data. In literature this phenomena

is described as resistance to measurement or a lack of support for change (Bourne et al., 2002; Kennerley and Neely, 2002), which is the fifth barrier identified in this study. From the study it seems that this problem is likely to occur when the affected person or department is not aware of the need for the change and does not recognise the benefit of the change; it seems likely that similar resistance will be experienced when directly interacting with suppliers.

Barrier 5: Resistance to measurement and/or a lack of support for change.

In some cases, the problem is not that there is resistance, but that the needed data is not available at all. This has been the case for data in relation to deforestation (SDG 15.2). The case company has acknowledged that the lack of traceability in the natural rubber supply chain is a problem, and is participating in several projects to improve this. A lack of data availability has been recognised as a barrier in literature (Hubbard, 2009; Braz et al., 2011), and has also been identified here:

Barrier 6: Performance data is not always readily available.

Another issue related to supply chain integration that has come up in this study is that there is currently no reporting infrastructure in place for supply chain data. As mentioned earlier, such data must come from other departments outside of the environmental organisation and/or suppliers themselves, and these parties do currently not have access to the environmental reporting system. This lack of accessibility of supply chain data makes it very difficult to create appropriate KPIs. The case company has started the process of creating special supplier platforms, but this takes time and effort to implement. This effort is increased by the fact that the case company is dealing with a very large amount of suppliers, some of which are very small and therefore might not have the same level of measurement capacity as large companies do. Hence, the lack of supply chain integration in the reporting infrastructure can be identified as a barrier to SPMS alignment. The need for an adequate, efficient and flexible supporting infrastructure is also widely recognised in literature ((Kennerley and Neely, 2002; Tung et al., 2011; Bourne et al., 2002, 2000; Bititci et al., 2005; Kennerley and Neely, 2003).

Barrier 7: A lack of supply chain integration in the reporting infrastructure.

Besides the upstream value chain, taking into account environmental impact in the downstream value chain is also of great importance. The case company has performed several LCAs, from which has become apparent that for many of their product categories the largest environmental impact takes place in the use phase of the products. The case company has attempted to estimate the impact of their products in the use phase on several occasions, however, this impact turns out to be hard to quantify due to the large complexity of the products and their use. Similar quantification problems occur in the area of training and measuring the knowledge of employees on sustainable development (SDG target 12.8), as awareness and knowl-

edge are intangible and qualitative by nature. Bourne et al. (2002) mentions this as a commonly occurring challenge. This challenge is amplified by the fact that the case company is very geographically and functionally diverse (Hubbard, 2009) and has a broad and quickly changing product portfolio, which makes that much effort and resources are required to make a reasonable estimation of the impact (Bourne et al., 2002). Based on the above, the following barrier is identified:

Barrier 8: Certain areas of impact are hard to quantify due to their complex and/or intangible nature.

Possibly the most significant challenge that has been identified in this study in relation to key requirement 1 is the high amount of KPIs that the case company is tracking and the data overload that follows from this. The SPMS of the case company is largely based on the GRI G4 indicator framework, and as was mentioned by Searcy (2012), this framework has often been criticised for containing too many indicators. The fact that frameworks like this are so extensive is possibly a result of the large amount of requirements that companies are regarded to fulfil in regards of the coverage of their SPMS. A quick overview of requirements from literature illustrates this. For example, SPMS are regarding to cover internal, external, financial, non-financial, short-term and long term aspects (Neely et al., 1995; Searcy, 2016; Maskell, 1991; Folan and Browne, 2005), they should cover the entire value chain (Searcy, 2016; Veleva et al., 2001; Folan and Browne, 2005) and address all three areas of the triple bottom line (Searcy, 2016; Veleva et al., 2001). There seems to be a consensus in literature that an SPMS should consist of as few and as simple a set of KPIs and targets as possible in order to keep at manageable and practical (Bourne et al., 2000; Searcy et al., 2016; Veleva et al., 2001; Folan and Browne, 2005), which becomes difficult to achieve considering the broad range of requirements described above. Add to the equation that SPMS should be specific to business units and locations (Bititci et al., 2005; Folan and Browne, 2005; Maskell, 1991) and that in geographically and functionally diverse organisations it can be hard to define which indicators to use (Neely, 1999; Hubbard, 2009) or how to aggregate indicators to a higher-level (Hubbard, 2009) and one can see that the design of an indicator framework that fulfils all these requirements becomes a complex puzzle. There is a risk that the SDGs only add to this problem, in as they form quite an extensive framework of 17 goals and 169 targets that companies are regarded to take into account. As it is clearly not possible to measure everything, it is likely that trade-offs will occur about what aspects should or should not be measured, which is emphasised as being inevitable by Searcy et al. (2005).

The *SDG Compass* advices companies to solve this puzzle by doing a baseline assessment of SDGs and afterwards prioritise the SDGs. When having done this, companies can align their SPMS according to their priorities. Experiences from this study show that the the SDGs have the potential to be used as a framework or tool to identify gaps and prioritise aspects in an SPMS. The SDGs are useful in this respect, because they represent a limited set of global priorities for sustainable development that companies can focus on and align their SPMS with; however, it

is emphasised that the SDGs should still be regarded as a holistic framework and that cherry-picking the goals and targets should be avoided. This is a risk that has also been identified in this study, and some people in the case company seem to be more aware of this risk than others. Hence, the following barrier:

Barrier 9: The large amount of SDGs and targets pose the risk of 'cherry-picking'.

6.2.2 Key requirement 2: The SPMS must include targets connected to the SDGs that are relevant

Common practice among companies is to set environmental targets based on historical achievement, remaining improvement potential and stakeholder requirements (Rauch and Newman, 2009). According to the SDG Compass, the SDGs provide a unique opportunity for companies to set their targets based on the global needs of society. Companies should set their targets in line with what the SDG Compass refers to as a company's '*reasonable share*', *"based on its industry, geographical location and size"*. A similar statement was made by the UNGC in a report to the UN Secretary General (UNGC, WBCSD & GRI, 2013). Although the inherent challenges are acknowledged, it is unclear how exactly companies can define their '*reasonable share*' to achieving the SDGs and set their targets accordingly. Trexler and Schendler (2015) have found that only a few companies have made references to planetary limits in public statements, which shows that the target-setting approach described proposed above (referred to as the '*outside-in*' approach) is far from common practice. Studies on the feasibility of linking corporate targets to the SDGs according to their '*reasonable share*' seem to be non-existent or are at least not publicly available until now.

The first known initiative that attempts to help companies base corporate targets on their fair share to achieving global sustainability in the science-based target initiative. Science-based targets are based on scientific models that predict the maximum amount of greenhouse gasses that can be emitted globally for global warming to stay below the 2 degree limit that was agreed upon in Paris in 2015. The 'reasonable share' of emission reductions of a company is then calculated based on its industry, the size of the company and several other factors. This initiative has received increasing attention. Many large companies have committed themselves to science-based targets in recent years and the case company is also exploring the possibility of joining the initiative.

A science-based emission target would only cover SDG target 13.2, and if it is possible to apply similar methods to the other SDGs and targets is questionable. As mentioned, the feasibility of linking corporate targets to the SDGs has not been studied so far, however; a close look at the formulation of the SDGs shows that creating such targets will become very challenging if not impossible. The exact formulations of the SDGs are clearly a result of long negotiations between UN countries, and while they have attempted to create specific, measurable and time-bound

targets (The MDGs were widely criticised for not fulfilling these requirements) many of the goals and targets are still poorly quantified. Furthermore, while it is clear that reducing greenhouse gas emissions to the atmosphere is the only way to reach the Paris agreement, for many goals and targets it is not so clear what is needed to reach them. Add to this that the debate about what should be a company's reasonable share has not even started yet, and it is fair to conclude that creating targets based on a company's reasonable share is highly complex. Hence, the following barrier:

Barrier 10: The SDGs are generally poorly quantified and determining a company's reasonable share to achieving the SDGs is highly complex.

A proposed alternative is to let go of the idea of determining a company's fair share, but to simply communicate the company's contribution to the SDGs in absolute terms rather than as a relative share. By doing this, companies can use the SDGs to communicate their contribution to global sustainable development to stakeholders. Multiple people in the case company have mentioned that the SDGs can be valuable in this way, as well as for other communication purposes, both for motivating internal stakeholders and appealing to external stakeholders; however, it has been mentioned by several interviewees that due to limited general awareness and knowledge of the SDGs the added value of using them for communication purposes can turn out to be rather limited. The lack of knowledge about the SDGs among internal stakeholders was already identified as a barrier (Barrier 1), and based on the above the following barrier regarding external stakeholders is added:

Barrier 11: A lack of knowledge about the SDGs among external stakeholders decreases the value of communicating on SDG impact.

What has become clear from this study is that connecting targets to the SDGs would only be a first step. These corporate targets then have to be broken down into separate targets for the different divisions, business units and plants to work with. The case company's current targets were set using what could be described as a top-down approach, and all divisions and locations have to achieve the same reduction targets. This study has shown that there is quite some critique on this target setting approach from the divisional and plant levels. The main critique is that the target setting is unfair because the plants and divisions are very diverse and have different levels of improvement potential, which can lead to frustration and demotivation when targets seem unachievable; however, many interviewees also acknowledge that it is hard to find a better alternative approach to target setting.

Literature describes that targets should be specific to business unit and location (Bititci et al., 2005; Folan and Browne, 2005; Maskell, 1991)and that they should be controlled by the evaluated organisational unit (Globerson, 1985; Kennerley and Neely, 2002, 2003; Bourne et al., 2000; Keeble et al., 2003; Folan and Browne, 2005). In line with this, several interviewees have mentioned the possibility of moving towards division or plant-specific targets. Ideally, such targets would be set and controlled by the plants themselves in consultation with the central functions. This

approach is expected to boost motivation as the plants commit to targets that they set themselves.; however, it is also expected to bring several challenges. For instance, not all employees seem to agree with this target setting approach and prefer the current approach, and it is likely that the central functions will experience some resistance to this change (similar to Barrier 5). In addition, using such a bottom-up approach is likely to lead to a very diverse set of targets across the organisation and it will be challenging them to consolidate to one corporate target. This is especially hard to match with a science-based target approach, because coordinating all the different target setting activities in such a way that they add up to the required ambition level on a corporate level will require a lot of time and effort. This shows that internal target setting is a challenging process, which can be summarised in the following barrier:

Barrier 12: Breaking down corporate targets to specific lower level targets that divisions and plants can achieve is challenging.

6.2.3 Key requirement 3: The SPMS must enable timely monitoring of the company's progress towards set goals

Adequate performance monitoring capacity is important for a business to keep track of progress towards set goals and to manage performance in general, as was emphasised by several interviewees in this study. On the plant level, a good performance monitoring system allows plants to track progress over time and identify potential improvement areas. In this study, it has become apparent that the monitoring capacity at many locations leaves room for improvement. Interviewees have mentioned that in some cases it is hard to track the development of a KPI over time, because of a low frequency of data collection and a low level of detail in the data. The most commonly provided reason for this problem is that installing new measurement devices and creating new procedures for measurement requires significant financial and human resources, while the direct benefit of installing the new equipment or procedures in terms of cost savings is not always obvious. That the cost-benefit relationship of proposed actions can be a challenge was already addressed by Barrier 3, and this is also applicable here.

Several interviewees have pointed out that collecting more frequent and detailed measurement data is necessary, but does not directly lead to a higher monitoring capability. Collecting more data also means that more effort and time is required to analyse the data and turn it into useful information. IT systems have been mentioned as critical supporting tools to reduce the effort of collecting, analysing and presenting data by automating large parts of this process (Kennerley and Neely, 2002). Currently the majority of the locations use excel sheets to handle the data and manually create reports, which is very time-intensive. Kennerley and Neely (2002) identified that time wasted due to producing reports is a common problem. Collecting more data will only increase the workload in this case.

The diversity of data collection and monitoring systems in the plants have also

been mentioned as a cause for problems on the divisional level. Due to the fact that the locations use different IT systems, which are not connected to each other, a lot of time and effort is required to collect and consolidate all the data on a divisional level. Currently, performance data from the plants is collected once per year, which limits the monitoring capacity on the divisional level. This monitoring capacity is expected to increase as from this year on performance data will be collector on a quarterly basis; however, on the divisional level major effort and time is invested in handling and verifying, which is only expected to increase as the amount of data grows.

IT system issues have been identified by Bourne et al. (2002) as a common problem of measurement systems, and IT systems also play an important role in the challenges described above. The main problem in this case is that the IT infrastructure is very diverse and is not connected across the organisation, which is leading to a lot of manual work, both on a plant level and a divisional level. The proposed solution to this problem is to standardise the data collection and data management systems in the plants and link them together in a common IT system. This would reduce time and effort on the plant level, as much of the manual work can be automated. The divisions would have direct access to real-time data from the plants, which would decrease the workload for collecting data and increase the monitoring capabilities. Several interviewees have mentioned that they are planning to move in this direction, however, as Bourne et al. (2002) point out, the time and effort required for implementation can become a challenge. Based on the observations described above, the following barrier has been identified:

Barrier 13: Data monitoring systems are not standardised and linked across different levels in the organisation.

Another challenge that has come up many times during this study is the fact that the industry is very competitive and dynamic, which makes that circumstances change quickly and frequently. For example, one interviewee mentioned the example of how changes in the product portfolio led to more energy intensive production processes. Another interviewee mentioned that due to frequent changes in production volume and products the environmental KPIs fluctuate a lot. Changes in circumstances similar to the examples given here have been mentioned in several occasions, which is problematic because they make it difficult to compare the performance in different years. As a result, some plants and divisions stated they have limited knowledge about how much progress they are making towards set goals, and whether or not the carried out improvement projects have had the desired effect; therefore, this is identified as a barrier in regards of key requirement 3:

Barrier 14: Changing circumstances in the plants make it hard to compare the performance of one year to another.

Another concept that must be mentioned here is that of leading indicators. As Searcy (2016) points out, SPMS should include leading, as well as lagging, indicators.

Leading indicators allow companies to make predictions about future performance rather than purely looking at historical data, which can bring great value in terms of performance monitoring. Leading indicators have not been thoroughly discussed in this study and therefore we can not draw any conclusions in this regard.; however, it is interesting to note that the current SPMS of the case company includes very few leading indicators and that the interviewees generally seemed to have little idea about what the performance of the company, division or plant will look like in the near future. Based on this, it could be valuable to look into the possibility of incorporating more leading indicators into the measurement framework.

6.2.4 Key requirement 4: The SPMS must enable improvement of the company's performance towards set goals

From the interviews, it becomes clear that the SPMS does provide insight in the case company's performance. However, it seems that the data gathered with the SOFI-system is not specifically interesting for the plants as the information is too general, and the KPIs are too aggregated to influence decision making on the plant level. The other measurement systems, deployed on the plant level are deemed to more relevant for the plant itself. Kennerley and Neely (2003) and Keeble et al. (2003) describe that the KPIs forming the SPMS should be providing useful information. This does not seem to be the case at all levels of the organisation. On corporate level the information can be used for assessing the corporation's performance and for reporting, but on plant level the information gathered in the SOFI-system does not seem to be used for performance improvement due to this different level of aggregation. Staniškis and Arbačiauskas (2009) have noted that this focus is a common problem; "*The biggest shortcoming of many existing sustainability performance evaluation systems is their focus on external reporting and underestimation of internal information needs for decision-making, increased management effectiveness and actual performance improvement.*" In the case company, most of the plants do not measure consumption or emission by produced part which is mentioned to be required to identify areas of improvement. It is important to monitor their performance on a rather detailed level in order to be enabled to identify which specific parts of the plant allow for improvement. Even the local systems often provide too aggregated level which makes tracking consumption difficult, and thus makes it difficult to identify improvement.

Barrier 15: The SPMS does not allow for detailed measurement and lacks monitoring capabilities on plant level.

For plants to improve their performance, it is required to have the right knowledge about methods regarding environmental efficiency and protection. The interviewees indicate that people at the plant level lack the concrete support needed to reach the targets as set. Providing sufficient support is commonly mentioned in literature as an important requirement for having an effective SPMS (Kennerley and Neely, 2002; Tung et al., 2011; Bourne et al., 2000, 2002; Bititci et al., 2005). One of the requirements for an SPMS as identified by Kennerley and Neely (2003) and Maskell

(1991) is the availability of feedback to the data gatherers. It seems that the plants would like to get feedback on their performance one way or another. The divisional levels' efforts towards supporting have been in place, but are apparently not perceived to be sufficient and effective enough. These two aspects can be identify as a barrier:

Barrier 16: A lack of effective feedback and support for plants.

The interviewees mention they would appreciate more opportunities for benchmarking and knowledge sharing with other plants as well as benchmarking with other, external parties within industry, as this would help them to identify potential for improvement and best-practises. This is often identified as a requirement for a good measurement system (Globerson, 1985; Searcy et al., 2005, 2006; Veleva et al., 2001; Keeble et al., 2003; Neely et al., 1995). Interestingly, the interviewees mentioned that benchmarking between plants is not that useful if done based purely on data. Plants differ a lot in many aspects; they vary in size and geographic location; some plants are new and highly energy efficient, while others are older and need investment; and they produce very different types of products for which they use different machines and processes. Hence, the environmental KPIs of the different plants cannot easily be compared and benchmarking becomes difficult. Hence, we can identify the following barrier:

Barrier 17: Identifying best-practices through benchmarking is difficult, due to significant differences between plants.

To be able to convince decision makers, it seems to be critical to be able to provide them with proper, factual information to allow them to make an informed decision. The SOFI-system allows people to create insightful charts and reports, however, most people do not seem to be aware of these features and manually create charts and reports in excel. Furthermore, the aforementioned benchmarking can be done by the SOFI tool which is again something the people on plant level do not seem to be aware of. There seems to be a lack of understanding of the full functionalities of the system, which is often a barrier when implementing an SPMS (Kennerley and Neely, 2002; Nudurupati et al, 2011). A full understanding of the IT-system could allow for more benchmarking and would help to make the creation of data visualisations and reports more efficient. The latter will help facilitate the process of identifying improvement areas and convincing management to work towards improvement. Hence, the lack of knowledge about how the IT systems can be used is identified as a barrier:

Barrier 18: A lack of understanding of the functionalities of IT systems and how they can support performance improvement efforts.

The divisional levels indicate that many of the comments placed into the system by plant level data gatherers are unclear, and thus lead to a lot of extra work enquiring and clarifying comments which takes time from them to improve the sustainability performance. Not only the comments haven been mentioned as an aspect which

requires a lot of attention from divisional level, but in general data quality checks (e.g. typographical errors, wrong unit) and plausibility checks (e.g. a sudden rise in a plant's consumption) do as well.This lost time could otherwise have been used to work towards improvement hence the following barrier;

Barrier 19: Divisions do not have enough time to focus on performance improvement efforts, because they spend most of their time collecting and verifying performance data.

6.2.5 Key requirement 5: The SPMS must enable complete and accurate reporting on the contribution of the company to reaching the SDGs

Data quality is essential to be able to report on the contribution of the case company towards the SDGs. It is required that the data gatherers understand the full function of the system to ensure high quality data; therefore, we can identify barrier 18 also as a barrier towards achieving key requirement 5. One of the causes of this lack of understanding of the system seems to be the reporting frequency, which is only once or twice per year. This means the IT system is not a living system which the data collectors use frequently and thus get familiar with. This can be identified as a barrier:

Barrier 20: The reporting system is not frequently used by data collectors.

Mentioned before is the time it takes to collect all the required data; however, as the data collectors are mostly ESH managers, which are not only responsible for environmental protection but also for the safety and health aspects in their plants, there is a lack of prioritisation of the environmental topic in the plants. It has been mentioned several times in the interviews that people are rushing the reporting in the SOFI-system as they have many more topics to take care off on local level. This indicates that the lack of prioritisation by plant data collectors is leading to lower data quality. This is amplified by the fact that the collectors are not using the data collection system for their own daily work.

Barrier 21: Lack of prioritisation of reporting by local data collectors.

Both barriers 20 and 21 as described before can be understood as the lack of incentive to use the SPMS. The interviewees indicate that the data gatherers do not have any other reason to use the system than a inquiry from divisional level. This lack of incentive to use the system is identified by Searcy (2011) as one of the aspects which can lead to lower performance of the SPMS.

Barrier 22: Lack of incentives for local data collectors to use the system.

The reporting is currently done manually by the plants; information is gathered, sometimes through local IT systems and based on this data a certain KPI is manually calculated and afterwards reported in the SOFI-system. Due to this manual process, mistakes are bound to happen due to typing mistakes, wrongly selected units or a misunderstanding of what a certain KPI means, which leads to wrong calculations, and thus inaccurate data entries. Searcy et al. (2006) and Kennerley and Neely (2003) observed that the measurement system should use data which is automatically collected as part of a process whenever possible. For the case company this could mean directly linking the energy management system on plant level with SOFI system. Currently the manual work needed to transfer data between systems which leads to data quality issues and an increase in workload which makes accurate reporting more difficult. Hence we identify a next barrier:

Barrier 23: SPMS requires manual data transfer, which leads to data entry mistakes.

In order to avoid misunderstanding of the definition of a KPI, explanations are present in the data reporting system about the exact definition of each KPI. From interviews it became apparent that despite these explanations, it still occurs that data gatherers do not read them and calculate the KPI in the wrong way. This problem seems to be linked to the lack of prioritisation as was identified before as well as with a lack of skills and understanding. As this problem was raised by multiple interviewees on multiple occasions, it raises the question if the KPIs are clear and easy enough to understand, as is described as a requirements for KPIs in literature (Searcy et al., 2004; Bourne et al., 2000; Maskell, 1991; Kennerley and Neely, 2003; Braz et al., 2011) Hence, the following barrier can be identified:

Barrier 24: KPIs are not easily to understood.

A suggested solution to the above mentioned problem is to provide extra training; however the interviewees make clear that training each local person takes a lot of time and resources, even though it would help the quality to improve. Ensuring that the people working with the SPMS are sufficiently trained is mentioned by several authors in literature (Bititci et al., 2005; Tung et al., 2011; Nudurupati et al., 2011). The trade off between extra costs and an increase in data quality might have to be evaluated.

Not all the KPIs that are required are measured directly, thus the plants make use of invoices and estimates to be able to report on their complete impact. From the interviews it becomes clear that the estimation process is standardised in some parts of the organisation, but not across the entire organisation. This leads to plants using different methods to estimate certain KPIs, which can result in two exactly similar plants reaching different conclusions as a result of different estimation methods. As there is no standard estimation method everywhere, problems occur when a person changes jobs as their knowledge about the method is lost. Two key requirements for the KPI set is that they are measurable (Searcy et al., 2005; Veleva et al.,

2001) and verifiable (Veleva et al., 2001; Keeble et al., 2003).

Barrier 25: Estimation methods for KPIs are not standardized everywhere.

6.2.6 Key requirement 6: The SPMS must be aligned and integrated with other performance management tools and vice versa

One of the things that became clear is that the case company currently has a parallel sustainability strategy next to their normal business strategy and its' processes. When decisions have to be made, sustainability is not automatically considered as a decision parameter. For now, the environmental department works as a parallel organisation and tries to minimise the impact which the rest of the organisation has. This way of organising sustainability can be recognised from the models by Willard (2005) and Nidumolu et al. (2009). They identify different stages which a company goes through when integrating sustainability into their organisational strategy. Based on the model presented by Nidumolu et al. (2009), the case company can be seen as using compliance as a method to enhance business performance (e.g. lowering energy usage and thus saving costs.). The next step that the company could take, according to Nidumolu et al. (2009), is to start making their value chains sustainable. The case company has started these efforts but it seems to be in the first steps in this process. The other option identified by these authors is the offering eco-friendly products and services. The case company has not yet fully embraced this as one of the main sources for competitive advantage. In the model that Willard (2005) presents, the case company seems to be operating in the *'beyond compliance'* stage; the company sees the operational efficiencies as a money saving aspect, and see the brand value of doing so (as seen by the sustainability vision: "*the case company is seen as a sustainable company*"). The next stage is indicated to be *'integrated strategy'* where sustainability in encapsulated in the strategy and value adding process; sustainability is seen as a competitive advantage. Globerson (1985); Maskell (1991); Searcy et al. (2008, 2006) and Kennerley and Neely (2003) all emphasise that the KPIs should be chosen from and linked to clear business goals and targets. This does not seem to be the case, as the environmental strategy is separated from the business strategy. Schaltegger et al. (2006) emphasises that there should be a clear link between business strategy and sustainability performance measurement and management. The SPMS needs to be aligned and integrated into other management tools and processes, and since strategy is one of the main tools it seems like a clear barrier towards implementing a good SPMS:

Barrier 26: The environmental strategy is not integrated in the overall business strategy and business processes.

This lack of integration can also be found when looking at the result of the strat-

egy and the KPIs that are measured. No negative consequences are present when the targets are not reached. Bourne et al. (2002) indicates that the lack of a responsible is a barrier which is often observed when implementing an SPMS. Many other authors highlight the link between the reward system and the measurement system as an important requirement for an SPMS (Tung et al., 2011; Folan and Browne, 2005; Kennerley and Neely, 2002; Neely et al., 1995; Searcy et al., 2006). It seems that without anyone being the owner of the KPI and its improvement (not the management, not the department, nor the ESH manager) the prioritisation for environmental topics is low. This seems to be one of the causes of many of the other barriers described before: it leads to less effort being put into the collection of data and even to not being focused on these topics as much at perhaps is needed in global perspective. As the benefits of sustainability are most often corporation wide, but the costs for it are to be carried by certain cost centres, the lack of integration in strategy and business process, and incentive system seems to allow for a collective action problem, where no one acts towards something that would benefit the whole organisation. Yet, most interviewees are not in favour of linking rewards to environmental performance, as it would for example lead data collectors to report wrong data for their personal benefit. Due to the importance towards implementing sustainability strategies a link should be made between performance measurement and the incentive systems so that efforts are started to increase the sustainability of the case company. However this link can only be made while ensuring the data quality is not compromised. Hence, the barrier is formulated as follows:

Barrier 27: No person held responsible for achieving sustainability targets.

It seems that even though sustainability is deemed to be important by the people in the environmental department when it comes to making a decision, the sustainability aspect is considered less important when making decisions in other parts of the organisation. It has been emphasized by many of the interviewees that financial aspects are still considered as the most important factor in decision making. Searcy et al. (2008); Searcy (2016); Braz et al. (2011) and Nudurupati et al. (2011) all highlight that the measurement system should be linked to the decision-making across all managerial levels. It seems that sustainability aspects are currently taken into account when making certain decisions, but only after financial aspects are considered. The emphasis on having employees consider these sustainability aspects as a part of the business process in general seems leading. Searcy et al. (2005) identify the lack of the use of existing indicators in the decision making process as a barrier towards having an effective SPMS. If the case company aims to align with the SDGs, the KPIs should be further integrated into decision making processes. As this currently does not seem to be the case, we can identify another barrier:

Barrier 28: The current KPIs are not sufficiently used in the decision making process.

One of the requirements for a successful SPMS most commonly named in litera-

ture is top-management support (Folan and Browne, 2005; Searcy et al., 2006, 2005; Neely et al., 1995; Tung et al., 2011; Kennerley and Neely, 2002; Bourne et al., 2002). Within the case company the top management supports the sustainability efforts, with board members present in the CSR council and their support in the start of a CSR strategy project. Most interviewees seemed to agree that the top management of the case company is given sufficient priority to sustainability topics although the reasons were debated. The CEO change has had a positive effect on the importance that sustainability is given in the organisation even though more action seems to be needed.

Most of the interviewees acknowledge that sustainability has become more important in the company and according to them sustainability thinking is more and more integrated in the company culture; therefore the barrier: "*a culture that is inappropriate to the use of the PMS*" as identified by Kennerley and Neely (2002), does not seem to apply in this situation; however, it is interesting to note that several statements made by the interviewees seem to be conflicting with this notion, such as one of the interviewee who stated: *"We (the case company) are not a green company, we are a money saving company"*. Other interviewees mentioned that environmental sustainability is viewed as something that is nice to have, not as something essential to company success. One of the interviewees explained that managers state that they do not see the need to perform better than they already do, as their competitors also do not perform any better. It seems conflicting that people state that sustainability is part of the company culture is present, but also mention that there is a lack of urgency and that they do not view the company as a green company. This indicates that sustainability might not be integrated in the company culture as much as people may think or are willing to express.

The case company operates in ever changing market that are highly competitive. Quality is one of the case company's main focus areas for gaining competitive advantage (illustrated by their motto) (*specific motto deleted due to confidentiality issues*) and as a tier one automotive supplier, customer requirements are a driving factor for their business. From this study it has become apparent that quality and customer requirements can be conflicting with sustainability targets, for example, when it comes to using recycled materials or reducing packaging. Furthermore, in today's quickly developing markets, the case company's customers are demanding products that are more and more technologically advanced and complex, which often requires more advanced production processes, more process steps, more materials and more energy. The above mentioned requirements are often conflicting with environmental targets and interviewees have stressed that the case company is a business that needs to make a profit, hence quality and customer requirements will often be prioritised over environmental considerations.

Barrier 29: Quality and customer requirements can be conflicting with sustainability targets.

Several interviewees have mentioned that the case company is a very finance-driven

company, which is exemplified by the amortisation time for energy and environmental projects that is strictly two years. This has been most often mentioned as a key barrier to improving environmental performance. The issue is that projects related to energy and environmental often have a much longer amortisation time and do not directly save money at all. In such cases, the problem arises that a proposed project might not directly lead to cost savings while the project could be highly beneficial for the environment. It seems that the trade-off between financial performance and sustainability efforts is essentially non existent as the sustainability efforts are always measured based on their financial benefit. This challenge is closely linked to Barrier 3, which emphasises the need for a clear positive cost-benefit relationship; however, this problem of the short amortisation time has been mentioned and stressed by interviews on so many occasions in this interview that it is identified as a separate barrier:

Barrier 30: The requirement for a short amortisation time hinders the implementation of sustainability projects.

6.3 Comparing with social responsibility measurement

It seems that many of the issues faced by the environmental department are also present in the social responsibility organisation. An important difference seems to be that in the environmental organisation there are clear roles and responsibilities when it comes to gathering information while in the social responsibility organisation these seem to be lacking. However this can be partially explained by the recent increase in prioritisation which suddenly put these topics on the agenda, and requires the organisation to adjust to these changes. A thing that the two different parts of the organisation have in common is the high variation in IT infrastructure. In both parts of the organisation this seems to cause problems with data accuracy and availability of data. Another difference is that the environmental reporting seems to be more comprehensive and contains more of the required information which can again be linked to the difference in levels of maturity between the two parts of the measurement system. A clear similarity seems to be that there are not always clear cost-benefits to each data point and that this lack of benefit leads to non-measurement. Furthermore the definitions of KPIs can lead to difficulties in measurement and data collection.

These identified differences and similarities are not conclusive, and are just illustrative for the diverse requirements that a comprehensive SPMS needs to fulfill. As this study is aimed at the environmental part of the organisation, these insights can be used to put the found barriers into context. What becomes clear from the two interviews is that barriers similar to the ones identified may be present, but that there seem to be more difficulties in the organisational side of reporting and measuring in the social sustainability part of the organisation. Hence, it would to be interesting to conduct a gap-analysis and dive into the specific barriers towards

alignment with the SDGs in this part of the organisation as well.

6.4 Contribution to research

This study is one of the first exploratory studies that is specifically focused on how businesses can engage with the SDGs. Several researchers have addressed the need and willingness of companies to engage with the SDGs, but so far none have studied the feasibility and practical implications of engaging with the SDGs in a business environment through an in-depth case study. The outcomes of this study provide a first insight in how businesses can engage with the SDGs and what challenges they can possibly face in the process. More specifically, this study has demonstrated that the SDGs can be used as a framework to identify gaps in a corporate SPMS and therefore provide direction for the development of a measurement system. In addition, this study presents a set of barriers to SPMS alignment with the SDGs based on the specific context of the case study. This information can be used in future research to develop general principles that are applicable in a broader context. Furthermore, this study has demonstrated the value of the procedural framework for SPMS evaluation that was presented by Searcy (2011), which had not been empirically tested before.

6.5 Reflections on the study

In hindsight, the researchers believe the methods used in this study were really well chosen. The literature review, review of archival document and the gap analysis provided a large amount of background knowledge which have enabled the researchers to design a good interview guide and ask the right follow-up questions. The interviews were designed in such a way that the interviewees could openly express the problems they experience without being steered too much by the interview questions. This turned out to be a very good way to structure the interviews and it enabled the identification of a wider spectrum of barriers then would have been possible purely based on literature. The strategy workshop, where many of our interviewees were present, took place towards the end of the thesis writing process and was a good way to verify the outcomes from our gap analysis and interviews. Observing the discussions did not only provide confirmation of the outcomes of the study, but also also provided new insights that strengthened our analysis.

The researchers have chosen for an explorative research approach, hence they have chosen to acquire data from a broad range of people with different expertise, perspectives and positions in the organisation. The chosen methods have been very effective for the purpose of this study; however, as a result of this approach some of the outcomes presented were based on the opinion or perspective of a small number of stakeholders and could not be verified among a representative amount of stakeholders. For example, the researchers would have liked to talk to more energy- and ESH-managers to get a better view of the plant level perspective and verify the acquired data. It is important that the readers of this study consider this limitation

and treat the outcomes of this study with care, especially because the researchers cannot entirely rule out that the responses from interviewees have been influenced by their personal agenda or that interviewees have deliberately withheld or provided false information in order to push their personal agenda or protect their position.

Due to the limited time frame of the study and their specific position in the organisation, the researchers were forced to limit the study to environmental aspects. One could argue that this limitation is conflicting with the idea of creating a balanced SPMS that addresses all three areas of sustainability equally. The same conflict occurs in relations to the SDGs, as these are seen as a holistic and interconnected framework and should therefore also be addressed as a whole. The researchers have tried to address this conflict by conducting a couple of broadening interviews in the HR area and by keeping in mind the bigger picture when looking upon the data. It would have been beneficial to be able to explore the economic and social areas in more detail, and it would have been specifically interesting to address the balance between these different areas.

Despite of the scope of the research already being rather broad, the researchers would have liked to be able to be able to talk to an even broader range of internal and external stakeholders, such as plant managers, industrial engineers, product development engineers. People in these positions do not have sustainability topics as their main focus, but due to the nature of their work they have a big influence on the sustainability performance of the organisation. In line with this, the researchers would have liked to interview representatives of suppliers and customers, because they potentially have a significant influence on the SPMS;this was not feasible within the time frame of the study. Another consequence of the limited time frame of the study and the limited duration of the interviews is that it was not possible to address all relevant aspects that were identified in literature in each interview. For example, the balance between short-term and long-term targets was not addressed in the study and could have been interesting to explore.

Over the course of this study, the researchers have tried to be as objective as possible. However, as the researchers been actively present within the organisation for 5 months it is impossible to rule out all possible biases. Also, due to the limited time frame of the study, the researchers have had to make choices in terms of what was focused on, which were partly based on subjective opinions and personal interests. Inevitably, this has also influenced the outcomes of the research.

6.6 Future research

The SDGs are rather new, so research on how the private sector can engage with the SDGs is practically non-existent. As the SDGs are of global significance and the contribution of the private sector is regarded to be critical to their achievement, more specific research should focus on how businesses can incorporate the SDGs in their strategies and SPMSs. This study provides a good basis for future research in this area to build on, and the identified barriers can provide guidance for future

research directions. In addition, this study has shown that the SDGs have the potential to be applied as a tool to focus the sustainability strategy of a company by prioritising the different goals and targets. Further research is needed to determine if the SDG framework is actually useful in this respect. Another aspect in regards of the SDGs that is critical to study in more detail is the practical feasibility of linking corporate targets to the SDGs according to the '*reasonable share*' principle.

Performance measurement is a well-established research area, but more research should focus on how sustainability topics can really be integrated in the overall performance measurement of an organisation in a balanced way. A related topic that deserves additional attention in future research is how companies can better balance social, environmental and economic aspects in their overall business strategies. Furthermore, this study has also shown that linking sustainability performance to incentive systems can potentially compromise data quality. Further research is needed to identify ways of providing effective incentives for improving sustainability performance while ensuring a high data quality.

7

Conclusions

This study had the purpose to explore how the case company can align its sustainability performance measurement system (SPMS) with the UN Sustainable Development Goals (SDGs) and to identify possible barriers that obstruct alignment. With the following conclusions this thesis aims to contribute to the understanding of SPMSs in multinational corporations. These final conclusions are drawn up by answering the research questions.

1. How does the case company's current sustainability performance measurement system overlap with the Sustainable Development Goals and what are the gaps?

The gap analysis performed in this study showed that the SPMS of the case company, which is largely based on the GRI G4 indicator framework, overlaps significantly with the SDGs. In line with the scope of this study, this analysis was limited to the environmental aspects described by the SDGs and focussed on the goals and targets that are deemed relevant in the case of the case company. The outcome of the analysis has shown that the corporate SPMS covers the vast majority of the environmental aspects of SDGs that are deemed relevant for the case company.

Multiple gaps have been discovered between the current SPMS of the case company and the SDGs. A couple of gaps are highlighted here, as they deserve extra attention and represent the different types of gaps that have been identified. These are related to renewable energy, water scarcity and value chain impacts. Renewable energy is one of the key aspects of SDG 7 (Clean and Affordable Energy), and even though the case company has a renewable energy target incorporated in their strategy, they do not have sufficient KPIs to track progress towards this goal. Water scarcity, which is addressed by SDG 6 (Clean Water and Sanitation), is covered by the case company's corporation-wide water efficiency targets and KPIs; however, as water scarcity is predominantly a local issue, the targets and KPIs should better reflect the local nature of this problem. Finally, it was emphasised that companies are expected to take into account the entire value chain of their products and services when assessing their impact on the SDGs. The case company is progressing in their ability to measure and address impacts in the value chain, but this topic still deserves a lot of attention in the further development of the SPMS. This includes impacts in the upstream supply chain, such as the impact of the natural rubber supply chain of the deforestation of tropical rain forests (SDG Target 15.2), as well as impacts in the downstream supply chain, such as the contribution of the case

company's products to decreasing the environmental impact of cars and trucks in the use phase. In addition to the gaps, several points of improvements have been pointed out in this study. These indicate areas where the SPMS provides insufficient information and can clearly be improved to better cover the topics addressed by the SDGs.

In order to fully align its SPMS with the SDGs, the case company should expand its measurement framework to cover the identified gaps and improve its KPI framework according to the identified points of improvement. This is addressed in more detail by the second research question.

2. How can the case company improve their sustainability performance measurement system in order to align with the SDGs, and what are the main barriers that should be overcome?

The case company can align its SPMS with the SDGs by fulfilling six key requirements which were identified based on literature. This study has identified 30 barriers that need to be overcome for the case company to fulfill all six key requirements. The barriers that obstruct the case company from alignment with the SDGs are diverse in nature, intertwined with each other and at some points conflicting.

The first key requirement states that the case company's SPMS must cover all material aspects of the SDGs, which can be achieved by installing KPIs and targets that relate to each of these important aspects. This was initially obstructed by the lack of internal understanding of the SDGs, their scope and importance for business. The internal stakeholders need to understand that it is important to measure progress towards the SDGs for their successful implementation. Even if the measures are accepted by the organisation, the data might not be available or be hard and costly to measure due to their complex or intangible nature. Sometimes it is also not obvious which KPIs should be used on the different levels within the organisation. For the case company to start measuring all SDG aspects, additional investments in measurement infrastructure might be required. As the cost-benefit relationship for these additional measures is not always clear, this investment might be difficult to sell to decision makers. A risk is that such trade-offs can lead to 'cherry picking' which means that the company only focuses on the SDGs where the organisation is already performing reasonably well, and already has measurement capabilities, while the areas where the organisation has a significant impact are ignored.

The second key requirement describes that the case company's target portfolio needs to include targets specifically linked to the SDGs. However, the SDGs are very broad and complex by nature and are poorly quantified. This makes it difficult for the case company to set targets which would make them deliver their reasonable share towards sustainable development. Even if the company is able to set corporate targets linked to the SDGs, it turns out to be difficult to break these targets down to achievable targets for each level in the organisation.

According to the third key requirement, a prerequisite for setting adequate goals and being able to work towards their achievements is having sufficient monitoring capacity. Performance monitoring capabilities allow the case company to assess their current performance and the development of said performance over time. This can be achieved by having timely access to detailed information, which requires linked data collection- and reporting-systems with clear standards, so that data has a high quality and can be obtained automatically. Currently, the case company seems to have a heterogeneous set of IT systems implemented which seem to be limiting the monitoring capability, especially on divisional and plant level. In addition, as the case company's operations are very dynamic, with new products and processes being implemented on a yearly basis, the comparison of data from year to year seems to be difficult and thus it can be hard to monitor progress in a meaningful way.

In order for the case company to contribute to the SDGs, concrete actions that lead to performance improvement need to be taken; therefore, the fifth key requirement prescribes that the SPMS must provide adequate support for decision making that enables this action. It appears that the case company's current measurement system lacks the detailed monitoring capabilities needed to adequately identify improvement areas. As a result, the production plants experience difficulties in reaching their targets and require more support and feedback than the supporting system currently provides. The divisional departments would like to support the plants more, but they are predominantly occupied with checking data quality and managing the environmental management systems. Other options to enable plants to reach their targets, like sharing knowledge between plants, seem to be difficult to implement as the case company's plants are so diverse.

The fifth key requirement depicts that the SPMS must enable external reporting on the case company's performance in regards of the SDGs. This function requires high data quality, but currently many mistakes occurs due to the data collectors being unfamiliar with the system or by them not prioritising this reporting. The case company does not incentivise the data collectors to use the system which keeps these problems in place. As the IT systems are not linked the data has to be manually transferred between them which again leaves room for errors. Other issues which lead to lower data quality are the lack of understanding of the KPis and non-standardised methods for estimations of performance. The case company currently seems to be able to mitigate these issues through extra work by their divisional environment departments.

The sixth and final key requirement characterises the importance of aligning an SPMS with surrounding management systems. It is clear that for the measurement system to be successful, other management tools need to be aligned to ensure they are working towards achieving the same goals. One of the main management system is the corporate strategy, which in the case company's case is separated from the sustainability strategy. This seems to be a barrier as the corporate strategy and its (financial) targets are prioritised over sustainability targets and environmental benefits are not sufficiently taken into consideration in the decision making processes.

One of the reasons for lack of consideration of sustainability issues seems to be the lack of integration of sustainability targets in performance evaluation systems; no person is held responsible for environmental performance. Another critical barrier is that environmentally beneficial projects are often not executed as their amortisation time is longer than the corporate maximum, which makes performance improvement difficult. The parallel set-up of the environmental department next to the normal business processes seems to be limiting progress, because significant impact can only be achieved when sustainability considerations have a clear and prioritised in all departments; the focus on efficiency measures by the environmental department is regarded as insufficient to reach sustainability targets in the long run.

Throughout the case study it has become clear that integrating sustainability in business is an inherently complex issue which, combined with the complexity of the case company's context, makes it hard to create an effective SPMS. The identification of 30 interconnected barriers illustrates the complexity of aligning an SPMS with the SDGs. Most of the identified barriers for creating and effective SPMS that allows the case company to align with the SDGs seem to be related to the supporting infrastructure, and in particular the allocation of human resources, IT systems and the standardisation of processes. The role of IT systems seems to be critical, as many of the identified problems can potentially be solved by IT system improvements. Such improvement would make the SPMS more efficient to use, which would allow employees to spend more time to focus on performance improvement. Ultimately, all identified challenges come down to trade-offs that have to be made between environmental benefits and the use of different kinds of resources. It is essential that these trade-offs are fully understood by decision makers, as these trade-offs largely depict how and to what extent the case company's SPMS can be aligned with the SDGs.

8

Managerial Implications

Based on the outcomes of this study, the researchers have identified several areas of action which deserve specific management attention. These are outlined below.

This study has shown that the SDGs can be used as a framework to identify gaps in the current sustainability performance measurement system. A gap analysis has been performed and several gaps and improvement points have been identified. All gaps and points of improvement are explained in detail in Chapter 6.1, and a complete overview is given in Table 6.1 on Page 97. The researchers specifically emphasise the need for a stronger value chain perspective, as it appears that the biggest environmental impacts result from the upstream and downstream value chain; however, the researchers acknowledge that the case company's primary responsibility and influence lies within its own organisation, so the prioritisation is logical.

Based on interviews and observations within the environmental organisation, the researchers have identified 30 barriers that should be overcome in order to improve the case company's performance measurement system for better alignment with the SDGs. Each barrier is described in Chapter 6.2, starting on Page 97. This chapter provides a comprehensive overview of identified challenges, which signify potential areas of improvement and areas that might be worth investigating further. The researchers believe that many of the identified barriers can be overcome by IT system improvements, mainly focused on making the use of IT systems more effective and integrating or linking different IT systems that are used across the different levels of the organisation. One particular solution that is worth investigating is linking performance monitoring systems on plant level with the reporting systems used on divisional level. This has the potential to solve many human-caused data quality issues as well as save a lot of time on the divisional level, which is now spent verifying the data while it could be spent to provide adequate feedback and support to the plants. Hence, IT systems deserve specific management attention.

Academic literature and experiences from this study indicate that corporate sustainability can not be effectively addressed without having sustainability integrated in the business process and the corporate strategy. The case company's sustainability organisation is focused on efficiency measures which, although essential, will deliver diminishing progress that is limited in the long run. To keep up an acceptable level of improvement, the case company will have to consider how sustainability can be further integrated into the organisation. This study has brought to light several limitations to the current approach. For example, ESH managers are responsible

for ensuring the improvement of environmental performance on a plant level, but ultimately ESH managers do not have the power to make decisions over processes and projects. Their plant managers and business unit managers do have decision making power, but they are not incentivised nor do they face any consequences if the targets are not achieved. These managers are even incentivised to work against the sustainability targets if this improves their profit margin. In order to ensure a company wide alignment with the sustainability goals, it would be advised to undertake an investigation of how the sustainability strategy can be further integrated in the overall business strategy and processes. This argument is supported by the 'Five stages of sustainability' model by Willard (2005). The researchers argue that the case company can be characterised as being in the 'beyond compliance' stage, and is ready to move towards the next stage; the 'integrated strategy' stage. This would entail the integration of sustainability in more of the business processes, keeping sustainability in mind from the conception phase of new products, and viewing sustainability as a source of competitive advantage. To achieve this, the buy-in of all management layers needs to be achieved by creating awareness, but perhaps also by holding them responsible for the achievements of set goals. More information about this specific model is given in Chapter 2.3.3 on Page 14.

Finally, considering its limited time-frame, this study was limited to the environmental aspects of the SDGs. However, several interviews have also focused or touched upon social and economic aspects, which have indicated that gaps in the measurement framework exist in these areas. The researchers believe it would be of interest to perform an additional gap analysis covering the economic and social aspects of the SDGs. Together, these gap analyses could form a basis for the creation of a more holistic CSR approach and provide valuable input to the CSR project.

Bibliography

3BL Blogs, Sep 2016. GRI and UN Global Compact partner to shape the future of SDG-reporting. [Online: accessed 2017-02-05].
URL `http://proxy.lib.chalmers.se/login?url=http://search.proquest.com.proxy.lib.chalmers.se/docview/1820616863?accountid=10041`

Accenture and Global Compact, 2016. The United Nations Global Compact-Accenture Strategy CEO Study 2016, Agenda 2030: A Window of Opportunity.

Amin, S., 2006. The Millennium Development Goals: A Critique from the South. Monthly Review 57 (10), 1–15.

Atkinson, A., 1998. Strategic performance measurement and incentive compensation. European Management Journal 16 (5), 552–561.

Azapagic, A., 2004. Developing a framework for sustainable development indicators for the mining and minerals industry. Journal of cleaner production 12 (6), 639–662.

Azapagic, A., Perdan, S., 2000. Indicators of sustainable development for industry: a general framework. Process Safety and Environmental Protection 78 (4), 243–261.

Barrows, E., Neely, A., 2011. Managing performance in turbulent times: analytics and insight. John Wiley & Sons.

Bassey, M., 1981. Pedagogic research: On the relative merits of search for generalisation and study of single events. Oxford review of education 7 (1), 73–94.

Bell, E., Bryman, A., 2007. The ethics of management research: an exploratory content analysis. British Journal of Management 18 (1), 63–77.

Bell, S., Morse, S., 2008. Sustainability indicators: measuring the immeasurable? Earthscan.

Bititci, U. S., Carrie, A. S., McDevitt, L., 1997. Integrated performance measurement systems: a development guide. International journal of operations & production management 17 (5), 522–534.

Bititci, U. S., Mendibil, K., Martinez, V., Albores, P., 2005. Measuring and managing performance in extended enterprises. International Journal of Operations & Production Management 25 (6), 333–353.

Blowfield, M., Murray, A., 2014. Corporate responsibility. Oxford University Press.

Bourne, M., Mills, J., Wilcox, M., Neely, A., Platts, K., 2000. Designing, implementing and updating performance measurement systems. International Journal of Operations & Production Management 20 (7), 754–771.

Bourne, M., Neely, A., Mills, J., Platts, K., 2003. Implementing performance measurement systems: a literature review. International Journal of Business Performance Management 5 (1), 1–24.

Bourne, M., Neely, A., Platts, K., Mills, J., 2002. The success and failure of performance measurement initiatives - Perceptions of participating managers. International Journal of Operations & Production Management 22 (11), 1288–1310.

Branco, M. C., Rodrigues, L. L., 2006. Corporate social responsibility and resource-based perspectives. Journal of Business Ethics.

Braz, R. G. F., Scavarda, L. F., Martins, R. A., 2011. Reviewing and improving performance measurement systems: An action research. International Journal of Production Economics 133 (2), 751–760.

Brown, R. B., 2006. Doing your dissertation in business and management: the reality of researching and writing. Sage.

Brundtland, G. H., 1987. Report of the World Commission on Environment and Development:"Our Common Future.".

Bryman, A., Bell, E., 2011. Business Research Methods 3e. OUP Oxford.

Chee Tahir, A., Darton, R. C., 2010. The Process Analysis Method of selecting indicators to quantify the sustainability performance of a business operation. Journal of Cleaner Production.

Commission of the European Communities, 2001. Promoting a European framework for Corporate Social Responsibility.

Corporate Citizenship, 2015. From My World to Our World: What the Sustainable Development Goals Mean for Business. Tech. rep.

Corporate Citizenship, 2016. Advancing the Sustainable Development Goals:Business action and Millennials' views. Tech. rep.

Doyle, T., 1998. Sustainable development and agenda 21: the secular bible of global free markets and pluralist democracy. Third World Quarterly 19 (4), 771–786.

Drucker, P. F., 1954. The practice of management: A study of the most important function in America society. Harper & Brothers.

Dubois, A., Gadde, L.-E., 2002. The construction industry as a loosely coupled system: implications for productivity and innovation. Construction Management & Economics 20 (7), 621–631.

Dunphy, D., 2003. Corporate sustainability: challenge to managerial orthodoxies. Journal of Management and Organization 9 (1), 2.

Dyllick, T., Hockerts, K., 2002. Beyond the business case for corporate sustainability. Business strategy and the environment 11 (2), 130–141.

Easterby-Smith, M., Thorpe, R., Jackson, P., 2015. Management and Business Research. SAGE Publications.

Eccles, R. G., 1991. The performance measurement manifesto. Harvard Business Review.

Elkington, J., 1994. Towards the sustainable corporation: Win-win-win business strategies for sustainable development. California Management Review Winter 36 (2).

Elkington, J., 1997. Cannibals with forks. The triple bottom line of 21st century.

Engfeldt, L.-G., 2002. The Road from Stockholm to Johannesburg. UN Chronicle 39.

Escobar, A., 1992. Reflections on 'development'. Grassroots approaches and alternative politics in the Third World. Futures 24 (5).

Estreva, C., 1992. Development. The Development Dictionary: A guide to Knowledge and Power.

EY, 2016. Sustainable Development Goals: What you need to know about the Sustainable Development Goals and how EY can help. Tech. rep.

Fehling, M., Nelson, B. D., Venkatapuram, S., 2013. Limitations of the millennium development goals: a literature review. Global Public Health 8 (10), 1109–1122.

Ferreira, A., Otley, D., 2009. The design and use of performance management systems: An extended framework for analysis. Management Accounting Research.

Folan, P., Browne, J., 2005. A review of performance measurement: Towards performance management. Computers in Industry 56 (7), 663–680.

Fombrun, C., Shanley, M., 1990. What's in a name? Reputation building and corporate strategy. Academy of management Journal 33 (2), 233–258.

Fombrun, C. J., Gardberg, N. A., Barnett, M. L., 2000. Opportunity platforms and safety nets: Corporate citizenship and reputational risk. Business and society review 105 (1), 85–106.

Forza, C., Salvador, F., 2000. Assessing some distinctive dimensions of performance feedback information in high performing plants. International Journal of Operations & Production Management 20 (3), 359–385.

Franco-Santos, M., Kennerley, M., Micheli, P., Martinez, V., Mason, S., Marr, B., Gray, D., Neely, A., 2007. Towards a definition of a business performance measurement system. International Journal of Operations & Production Management 27 (8), 784–801.

Fukuda-Parr, S., 2006. Millennium development goal 8: Indicators for international human rights obligations? Human Rights Quarterly, 966–997.

Gimenez, C., Sierra, V., Rodon, J., 2012. Sustainable operations: Their impact on the triple bottom line. International Journal of Production Economics 140 (1), 149–159.

Globerson, 1985. Issues in developing a performance criteria system for an organization.

Goldstein, D., 2002. Theoretical perspectives on strategic environmental management. Journal of evolutionary economics 12 (5), 495–524.

GRI, 2013. GRI G4 Guidelines. [Online: accessed 2017-03-19].
URL https://www.globalreporting.org/resourcelibrary/G4-Package.zip

GRI, Business Call to Action, 2016. MEASURING IMPACT: How Business Accelerates the sustainable Development Goals. Tech. rep.

GRI, UNGC, WBCSD, 2016. SDG Compass: The guide for business action on the SDGs. Tech. rep.

Haines, A., Cassels, A., 2004. Can the millennium development goals be attained? BMJ: British medical journal 329 (7462), 394.

Hart, S. L., 1995. A natural-resource-based view of the firm. Academy of management review 20 (4), 986–1014.

Hibbard, M., Lurie, S., 2000. Saving land but losing ground challenges to community planning in the era of participation. Journal of Planning Education and Research 20 (2), 187–195.

Hubbard, G., 2009. Measuring organizational performance: Beyond the triple bottom line. Business Strategy and the Environment.

Ittner, C. D., Larcker, D. F., Randall, T., 2003. Performance implications of strategic performance measurement in financial services firms. Accounting, Organizations and Society 28 (7), 715–741.

Kabeer, N., 2005. Gender equality and women's empowerment: A critical analysis of the third millennium development goal 1. Gender & Development 13 (1), 13–24.

Kaplan, R. S., Norton, D. P., 1992. The Balanced Scorecard – Measures that Drive Performance The Balanced Scorecard—Measures that Drive Performance.

Kashmanian, R. M., Wells, R. P., Keenan, C., 2011. Corporate environmental sustainability strategy. The Journal of Corporate Citizenship (44), 107.

Keeble, J. J., Topiol, S., Berkeley, S., 2003. Using Indicators to Measure Sustainability Performance at a Corporate and Project Level. Journal of Business Ethics 44 (2), 149–158.

Kennerley, M., Neely, A., 2002. A framework of the factors affecting the evolution of performance measurement systems. International Journal of Operations & Production Management 22 (11), 1222–1245.

Kennerley, M., Neely, A., 2003. Measuring performance in a changing business environment. International Journal of Operations & Production Management 23 (2), 213–229.

Klassen, R. D., McLaughlin, C. P., 1996. The impact of environmental management on firm performance. Management science 42 (8), 1199–1214.

Konar, S., Cohen, M. A., 2001. Does the market value environmental performance? Review of economics and statistics 83 (2), 281–289.

Krajnc, D., Glavič, P., 2003. Indicators of sustainable production. Clean Technologies and Environmental Policy 5 (3-4), 279–288.

Krajnc, D., Glavič, P., 2005. A model for integrated assessment of sustainable development. Resources, Conservation and Recycling 43 (2), 189–208.

Lancker, E., Nijkamp, P., 2000. A policy scenario analysis of sustainable agricultural development options: a case study for nepal. Impact Assessment and Project Appraisal 18 (2), 111–124.

Lantos, G. P., 2001. The boundaries of strategic corporate social responsibility. Journal of consumer marketing 18 (7), 595–632.

Lebas, M. J., 1995. Performance measurement and performance management. International journal of production economics 41 (1-3), 23–35.

Lele, S. M., 1991. Sustainable development: a critical review. World development 19 (6), 607–621.

Maisel, L. S., 2001. Performance measurement practices: A long way from strategy management. Balanced Scorecard Report, 3–4.

Margolis, J. D., Walsh, J. P., 2003. Misery loves companies: Rethinking social initiatives by business. Administrative science quarterly 48 (2), 268–305.

Marshall, C., Rossman, G. B., 2014. Designing qualitative research. Sage publications.

Maskell, B. H., 1991. Performance measurement for world class manufacturing: a model for American companies. CRC press.

McGee, J., 1992. What is strategic performance measurement. Ernst & Young Center for Business Innovation.

Miles, M., Huberman, A., 2013. Qualitative Data Analysis: A Methods Sourcebook. SAGE Publications.
URL `https://books.google.de/books?id=p0wXBAAAQBAJ`

Miles, M. B., Huberman, A. M., 1994. Qualitative data analysis: An expanded sourcebook. Sage.

Milman, A., Short, A., 2008. Incorporating resilience into sustainability indicators: An example for the urban water sector. Global Environmental Change 18 (4), 758–767.

Neely, A., 1999. The performance measurement revolution: why now and what next? International Journal of Operations & Production Management 19 (2), 205–228.

Neely, A., 2002. Business performance measurement: theory and practice. Cambridge University Press.

Neely, A., 2005. The evolution of performance measurement research - Developments in the last decade and a research agenda for the next. International Journal of Operations & Production Management 25 (12), 1264–1277.

Neely, A., Gregory, M., Platts, K., 1995. Performance measurement system design: A literature review and research agenda. International Journal of Operations & Production Management 15 (2), 80–116.

Neely, A., Mills, J., Platts, K., Gregory, M., Richards, H., 1996. Performance measurement system design: Should process based approaches be adopted? International journal of production economics 46, 423–431.

Neely, A., et al., 1998. Measuring business performance. The Economist London.

Nidumolu, R., Prahalad, C. K., Rangaswami, M. R., 2009. Why sustainability is now the key driver of innovation. Harvard business review 87 (9), 56–64.

Norman, W., MacDonald, C., 2004. Getting to the bottom of triple bottom line. Business Ethics Quarterly 14 (2).

Nudurupati, S. S., Bititci, U. S., Kumar, V., Chan, F. T. S., 2011. State of the art literature review on performance measurement. Computers & Industrial Engineering 60 (2), 279–290.

OECD, 2016. Development Co-operation Report 2016: The SDGs as business opportunities. Tech. rep.

Orlitzky, M., Schmidt, F. L., Rynes, S. L., 2003. Corporate social and financial performance: A meta-analysis. Organization studies 24 (3), 403–441.

Otley, D., 1999. Performance management: a framework for management control systems research. Management accounting research 10 (4), 363–382.

Patton, M. Q., 1990. Qualitative evaluation and research methods. SAGE Publications, inc.

128

Pieterse, J. N., 2000. After post-development. Third world quarterly 21 (2), 175–191.

Pingeot, L., 2014. Corporate influence in the Post-2015 process. Bischöfliches Hilfswerk Misereor.

Porter, M. E., Kramer, M. R., 2011. Creating shared value. Harvard business review 89 (1/2), 62–77.

PwC, 2015. Make it your business: Engaging with the Sustainable Development Goals. Tech. rep.

PwC, 2016. Navigating the SDGs: a business guide to engaging with the UN Global Goals. Tech. rep.

Ramos, T. B., Caeiro, S., 2010. Meta-performance evaluation of sustainability indicators. Ecological Indicators 10 (2), 157 – 166.

Rauch, J. N., Newman, J., 2009. Defining sustainability metric targets in an institutional setting. International Journal of Sustainability in Higher Education 10 (2), 107–117.

Russo, M. V., Fouts, P. A., 1997. A resource-based perspective on corporate environmental performance and profitability. Academy of management Journal 40 (3), 534–559.

Sachs, J. D., 2012. From millennium development goals to sustainable development goals. The Lancet 379 (9832), 2206–2211.

Sachs, J. D., 2015. The age of sustainable development. Columbia University Press.

Schaltegger, S., Wagner, M., Schöller, T., Schaltegger, S., Wagner, M., 2006. Integrative management of sustainability performance, measurement and reporting. Int. J. Accounting, Auditing and Performance Evaluation 3 (1), 1–19.

Scheyvens, R., Banks, G., Hughes, E., 2016. The private sector and the SDGs: The need to move beyond 'business as usual'. Sustainable Development 24 (6), 371–382.

Science Based Targets Initiative, 2016. Science based targets. [Online: accessed 2017-05-16].
    URL http://sciencebasedtargets.org

Searcy, C., 2009. Setting a course in corporate sustainability performance measurement. Measuring Business Excellence 13 (3), 49–57.

Searcy, C., 2011. Updating corporate sustainability performance measurement systems. Measuring Business Excellence Measuring Business Excellence Iss Social Responsibility Journal 15 (3), 44–56.

Searcy, C., 2012. Corporate Sustainability Performance Measurement Systems: A Review and Research Agenda. Journal of Business Ethics 107 (3), 239–253.

Searcy, C., 2016. Measuring enterprise sustainability. Business Strategy and the Environment 25 (2), 120–133, bSE-14-0033.R1.

Searcy, C., Dixon, S. M., Neumann, W. P., 2016. The use of work environment performance indicators in corporate social responsibility reporting. Journal of Cleaner Production 112, 2907–2921.

Searcy, C., Karapetrovic, S., McCartney, D., 2005. Designing sustainable development indicators: analysis for a case utility.

Searcy, C., Karapetrovic, S., Mccartney, D., 2006. Integrating sustainable development indicators with existing business infrastructure. Int. J. Innovation and Sustainable Development 1 (4), 389–411.

Searcy, C., McCartney, D., Karapetrovic, S., 2007. Sustainable development indicators for the transmission system of an electric utility. Corporate Social Responsibility and Environmental Management.

Searcy, C., McCartney, D., Karapetrovic, S., 2008. Identifying priorities for action in corporate sustainable development indicator programs. Business Strategy and the Environment.

Searcy, C., McCartney, D., Piotrowski, C., Karapetrovic, S., 2004. Developing sustainable development indicators for the electric utility industry. In: 24th Annual Conference of the IAIA (CD-ROM), April, Vancouver.

Senge, P. M., Smith, B., Kruschwitz, N., Laur, J., Schley, S., 2008. The necessary revolution: How individuals and organizations are working together to create a sustainable world. Crown Business.

Shenton, A. K., 2004. Strategies for ensuring trustworthiness in qualitative research projects. Education for information 22 (2), 63–75.

Singh, R. K., Murty, H. R., Gupta, S. K., Dikshit, A. K., 2009. An overview of sustainability assessment methodologies. Ecological indicators 9 (2), 189–212.

Smith, N. C., 2003. Corporate social responsibility: Whether or how? California management review 45 (4), 52–76.

Stake, R., 2006. Qualitative case studies. SAGE handbook of Qualitative Research, 443–66.

Staniškis, J. K., Arbačiauskas, V., 2009. Sustainability performance indicators for industrial enterprise management. Environmental Research, Engineering and Management 48 (2), 42–50.

Suchanek, A., Brook, M., 2015. Die Sustainable Development Goals: Einordnung und Bewertung aus Sicht der Ökonomischen Ethik.

Sustainable Development Solutions Network, 2015. Getting Started with the Sustainable Development Goals: A Guide for Stakeholders. Tech. rep.

Trexler, M., Schendler, A., 2015. Science-Based Carbon Targets for the Corporate World: The Ultimate Sustainability Commitment, or a Costly Distraction? Journal of Industrial Ecology 19 (6), 931–933.

Trochim, W. M., Donnelly, J. P., 2001. Research methods knowledge base.

Truman, H. S., 1949. Truman's inaugural address. [Online: accessed 2017-04-02].
URL https://www.trumanlibrary.org/whistlestop/50yr_archive/inagural20jan1949.htm

Tung, A., Baird, K., Schoch, H. P., 2011. Factors influencing the effectiveness of performance measurement systems. International Journal of Operations & Production Management 31 (11), 1287–1310.

UNGC, WBCSD & GRI, 2013. Architects of a Better World: Building the Post-2015 Business Engagement Architecture.

United Nations, 2001. Road map towards the implementation of the United Nations Millennium Declaration.

United Nations, 2015a. Transforming our world: The 2030 agenda for sustainable development.

United Nations, 2015b. UN adopts new Global Goals, charting sustainable development for people and planet by 2030. [Online: accessed 2017-05-17].
URL http://www.un.org/apps/news/story.asp?NewsID=51968#.WRv6M-uGOUk

Veleva, V., Hart, M., Greiner, T., Crumbley, C., 2001. Indicators of sustainable production. Journal of Cleaner Production 9, 447–452.

Voss, C., Tsikriktsis, N., Frohlich, M., 2002. Case research in operations management. International journal of operations & production management 22 (2), 195–219.

Waage, J., Banerji, R., Campbell, O., Chirwa, E., Collender, G., Dieltiens, V., Dorward, A., Godfrey-Faussett, P., Hanvoravongchai, P., Kingdon, G., et al., 2010. The Millennium Development Goals: a cross-sectoral analysis and principles for goal setting after 2015. The lancet 376 (9745), 991–1023.

Wackernagel, M., Rees, W., 1998. Our ecological footprint: reducing human impact on the earth. No. 9. New Society Publishers.

Wheeler, D., Elkington, J., 2001. The end of the corporate environmental report? or the advent of cybernetic sustainability reporting and communication. Business strategy and the environment 10 (1), 1.

Willard, B., 2005. The next sustainability wave: Building boardroom buy-in. New Society Pub.

Williams, A., 2015. Aligning with the Sustainable Development Goals. In: Proceedings of the first WBCSD and EMAN joint international sustainability accounting symposium. World Business Council for Sustainable Development, Geneva, pp. 116–117.

World Bank, 1992. World Development Report.

Yin, R., 2003. Case study research: design and methods. Sage Publications, Inc ISBN 0 761 (92553), 8.

Appendices

A

Millennium Development Goals and targets

Goal 1: Eradicate extreme poverty and hunger

1A	Halve, between 1990 and 2015, the proportion of people living on less than $1.25 a day
1B	Achieve Decent Employment for Women, Men, and Young People
1C	Halve, between 1990 and 2015, the proportion of people who suffer from hunger

Goal 2: Achieve universal primary education

2A	By 2015, all children can complete a full course of primary schooling, girls and boys

Goal 3: Promote gender equality and empower women

3A	Eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

Goal 4: Reduce child mortality rates

4A	Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

Goal 5: Improve maternal health

5A	Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio
5B	Achieve, by 2015, universal access to reproductive health

Goal 6: Combat HIV/AIDS, malaria, and other diseases

6A	Have halted by 2015 and begun to reverse the spread of HIV/AIDS
6B	Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it

Appendix A: Millenium Development Goals and targets (Continues on the next page)

(Appendix A continued)

6C	Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Goal 7: Ensure environmental sustainability

7A	Integrate the principles of sustainable development into country policies
7B	Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss
7C	Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation
7D	By 2020, to have achieved a significant improvement in the lives of at least 100 million slum-dwellers

Goal 8: Develop a global partnership for development

8A	Develop further an open, rule-based, predictable, non-discriminatory trading and financial system
8B	Address the Special Needs of the Least Developed Countries (LDCs)
8C	Address the special needs of landlocked developing countries and small island developing States
8D	Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term
8E	In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries
8F	In co-operation with the private sector, make available the benefits of new technologies, especially information and communications

Appendix A: Millenium Development Goals and targets (United Nations, 2001)

B

Sustainable Development Goals and targets

Goal 1: End poverty in all its forms everywhere

1.1	By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day
1.2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
1.3	Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable
1.4	By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance
1.5	By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters
1.a	Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions
1.b	Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1	By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round
2.2	By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons
2.3	By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment
2.4	By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
2.5	By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed
2.a	Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries
2.b	Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round
2.c	Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

Goal 3: Ensure healthy lives and promote well-being for all at all ages

3.1	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births
3.2	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births
3.3	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
3.4	By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being
3.5	Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol
3.6	By 2020, halve the number of global deaths and injuries from road traffic accidents
3.7	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes
3.8	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all
3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
3.a	Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate
3.b	Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

3.c	Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States
3.d	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.1	By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes
4.2	By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education
4.3	By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
4.4	By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
4.5	By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
4.6	By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy
4.7	By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
4.a	Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

4.b	By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries
4.c	By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States

Goal 5: Achieve gender equality and empower all women and girls

5.1	End all forms of discrimination against all women and girls everywhere
5.2	Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
5.3	Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation
5.4	Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate
5.5	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life
5.6	Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences
5.a	Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws
5.b	Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women
5.c	Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

Goal 6: Ensure availability and sustainable management of water and sanitation for all

6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all
6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
6.b	Support and strengthen the participation of local communities in improving water and sanitation management

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

7.1	By 2030, ensure universal access to affordable, reliable and modern energy services
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix
7.3	By 2030, double the global rate of improvement in energy efficiency
7.a	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

7.b	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

8.1	Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries
8.2	Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors
8.3	Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services
8.4	Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead
8.5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value
8.6	By 2020, substantially reduce the proportion of youth not in employment, education or training
8.7	Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms
8.8	Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
8.9	By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products
8.10	Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

8.a	Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-related Technical Assistance to Least Developed Countries
8.b	By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1	Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
9.2	Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries
9.3	Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets
9.4	By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
9.5	Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending
9.a	Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States
9.b	Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities
9.c	Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

144

(Appendix B continued)

Goal 10: Reduce inequality within and among countries

10.1	By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average
10.2	By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status
10.3	Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard
10.4	Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality
10.5	Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations
10.6	Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions
10.7	Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies
10.a	Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements
10.b	Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes
10.c	By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

11.1	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

11.2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons
11.3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries
11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage
11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management
11.7	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities
11.a	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
11.b	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels
11.c	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials

Goal 12: Ensure sustainable consumption and production patterns

12.1	Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries
12.2	By 2030, achieve the sustainable management and efficient use of natural resources

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

12.3	By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses
12.4	By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
12.5	By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse
12.6	Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle
12.7	Promote public procurement practices that are sustainable, in accordance with national policies and priorities
12.8	By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
12.a	Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production
12.b	Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products
12.c	Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities

Goal 13: Take urgent action to combat climate change and its impacts[1]

13.1	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
13.2	Integrate climate change measures into national policies, strategies and planning

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

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[1]Acknowledging that the United Nations Framework Convention on Climate Change (UN-FCCC) is the primary international, intergovernmental forum for negotiating the global response to climate change.

(Appendix B continued)

13.3	Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
13.a	Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible
13.b	Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities

Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

14.1	By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution
14.2	By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
14.3	Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels
14.4	By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics
14.5	By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

14.6   By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation[2]

14.7   By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

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14.a   Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

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14.b   Provide access for small-scale artisanal fishers to marine resources and markets

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14.c   Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The future we want"

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

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15.1   By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

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15.2   By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

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15.3   By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

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Appendix B: Sustainable Development Goals and targets (Continues on the next page)

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[2]Taking into account ongoing World Trade Organization negotiations, the Doha Development Agenda and the Hong Kong ministerial mandate.

(Appendix B continued)

15.4	By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development
15.5	Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
15.6	Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed
15.7	Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products
15.8	By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species
15.9	By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts
15.a	Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems
15.b	Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation
15.c	Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities

Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

16.1	Significantly reduce all forms of violence and related death rates everywhere
16.2	End abuse, exploitation, trafficking and all forms of violence against and torture of children
16.3	Promote the rule of law at the national and international levels and ensure equal access to justice for all
16.4	By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime
16.5	Substantially reduce corruption and bribery in all their forms

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

16.6	Develop effective, accountable and transparent institutions at all levels
16.7	Ensure responsive, inclusive, participatory and representative decision-making at all levels
16.8	Broaden and strengthen the participation of developing countries in the institutions of global governance
16.9	By 2030, provide legal identity for all, including birth registration
16.10	Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements
16.a	Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime
16.b	Promote and enforce non-discriminatory laws and policies for sustainable development

Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Finance

17.1	Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection
17.2	Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent of gross national income for official development assistance (ODA/GNI) to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries
17.3	Mobilize additional financial resources for developing countries from multiple sources
17.4	Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress
17.5	Adopt and implement investment promotion regimes for least developed countries

Technology

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

17.6	Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism
17.7	Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed
17.8	Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

Capacity-building

17.9	Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the Sustainable Development Goals, including through North-South, South-South and triangular cooperation

Trade

17.10	Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda
17.11	Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020
17.12	Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access

Systemic issues

Policy and institutional coherence

17.13	Enhance global macroeconomic stability, including through policy coordination and policy coherence
17.14	Enhance policy coherence for sustainable development
17.15	Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development

Appendix B: Sustainable Development Goals and targets (Continues on the next page)

(Appendix B continued)

Multi-stakeholder partnerships

17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries

17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Data, monitoring and accountability

17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts

17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries

Appendix B: Sustainable Development Goals and targets (United Nations, 2015a)

C

Example of an interview guide

Introduction of the interview
- Introduction of ourselves
- Introduction of our thesis topic
- Explanation of the purpose and structure of our study
- Explanation of the purpose, structure, length and language of the interview
- Explanation of privacy considerations
- Interviewee was asked if he/she had any questions or comments before starting the interview.

Starting questions
- Could you describe in short what your function is at the case company and what your responsibilities are?
- For how long have you been working for the case company and what is your expertise?

Overall questions about the measurement system (MS)
- Can you describe to us how the measurement system works, from data collection to performance improvement, and how you work with the system?
- What function(s) does the MS have for you?
- Are there any other functions that the MS should fulfill for you (but does not fulfill)?
- What are the main problems / challenges that you experience with the current MS?
- How do you think these problems / challenges should be overcome?
- What do you think are the main barriers to overcome these problems / challenges?

Questions about the SDGs
- Are you familiar with the SDGs?
- Have you thought about how the case company could use them?

Questions based on the six key requirements of an SPMS

Key Requirement 1 - MS must cover all material aspects of the SDGs (measure all important things on environment level)

- What are the things that you want to know from the plants? / Which KPIs do you use?
- Do you believe that you measure everything you should measure on environmental issues?
- Can you identify any gaps in the current measurement framework?
- Also in the supply chain?

Key Requirement 2 - MS must enable performance measurement and continuous monitoring

- How do you monitor the performance?
- What system/data do you use and how does it work?
- Does the MS allow for good monitoring of performance (e.g. "Realtime data")?
- Should anything be changed to allow for better performance measurement and monitoring?
- Are the supporting systems (IT system, human resources, processes for data collection and analysis etc.) working properly to allow good measurement and monitoring?

Key Requirement 3 - MS must enable complete and accurate reporting on SDG impact

- How do you feel about how the case company is currently reporting on environmental issues in the sustainability report?
- Is everything reported in the right way?
- Are things missing?
- What could be improved?
- Does the reporting process work well? (Data gathering from plants, i.e. SOFI system)
- What are the main challenges in the GRI reporting process?

Key Requirement 4 - MS must include targets connected to the SDGs

- Do you believe that the case company has set appropriate corporate targets for environmental issues?
- Do you have any other targets on the division/business unit level?
- Will you be able to keep reaching these targets on the long-run?
- Does the MS provide insight in this? I.e. Does the MS include KPIs with a predictive function? (leading/input indicators)
- Do you think the current targets are set in a good way?
- Do you think targets should be specific per location?
- Is there a good balance between short-term and long-term objectives?

Key Requirement 5 - MS must enable timely and effective decision making for performance improvement
- Is the MS used as a basis for decision making / steering on division level?
- Does the data from the MS sufficiently supporting performance improvement?
- Also in supply chain? (E.g. use in supplier selection and recycler selection)
- Does the data help you to provide specific support to plants?
- Do you think you are able to support them sufficiently?

Key Requirement 6 - MS must be aligned and integrated with other management systems and tools and vice versa.
- How do you feel about the general sustainability strategy of the case company?
- Do you feel supported by top management? (i.e. is sustainability given enough priority?)
- Do you believe sustainability is integrated sufficiently into the reward system/linked with targets all across the organisation?
- Do you believe sustainability is integrated into the company culture?
- Are there any other aspects that you believe are prohibiting the case company from or are conflicting with the case company improving its sustainability performance? (e.g. trade-offs)

Closing questions
- If you would be able to change anything in regards to the MS and the way the case company deals with sustainability, what would it be?
- Is there anything else you would like to mention that you think may be of importance?

Closing remarks
- Explanation of what will happen next, and what happens with the data.
- Repetition of privacy considerations.
- Interviewee is asked if they can be contacted through email or phone for further questions.
- Interviewee is asked if he/she wants to review the thesis before it is published.
- Interviewee is thanked for his/her participation.

D
Organisational structure

Appendix D: The case company's organisational structure. *This figure has been removed to ensure confidentiality*

E
List of corporate environmental KPIs and GRI disclosures, linked to the SDGs

GRI no.	Disclosure Title	Description of KPI used	SDG
G4-EN1	Materials used by weight or volume	Input: Amount of Water (Volume)	6.4
		Input: Amount of Energy (GJ)	7.3
		Input: Amount of Ferrous Metals / Steel (Weight)	12.2
		Input: Amount of Non-Ferrous Metals (Weight)	12.2
		Input: Amount of Auxiliary Metals/-Precious Metals (Weight)	12.2
		Input: Amount of Plastics (Weight)	12.2
		Input: Amount of Non-Ferrous Metals (Weight)	12.2
		Input: Amount of Chemicals (Weight)	12.2, 12.4
		Input: Amount of Miscellaneous Additive raw material (Weight)	12.2
		Output: Amount of Tires, Rubber and Automotive products (Weight)	12.2
		Output: Amount of Waste for recycling (Weight)	12.5
		Output: Amount of Waste to Disposal (Weight)	12.4, 12.5

Appendix E: Corporate environmental KPIs and GRI disclosures (Continues on the next page)

(Appendix E continued)

G4-EN2	Recycled input materials used	Percentage of recycled material	12.5
		Percentage of recycled rubber in rubber composition	12.5
		Percentage of recycled steel and aluminium	12.5
		Percentage of recycled plastics	12.5
G4-EN3	Energy consumption within the organization	Overall Energy use in GJ	7.3
		Relative increase/decrease in Overall Energy use in GJ	7.3
		Energy use: Electricity	7.3
		Energy use: Fossil fuels	7.3
		Energy use: Fossil fuels, share of purchased steam	7.3
		Energy use: Fossil fuels, share of district heating	7.3
		Energy use: Self-generated Renewable energy	7.3
G4-EN4	Energy consumption outside of the organization	n/a	7.3
G4-EN5	Energy intensity	Scope 1 Energy intensity (in GJ per adjusted sales in millions)	7.3
		Scope 2 Energy intensity (in GJ per adjusted sales in millions)	7.3
G4-EN6	Reduction of energy consumption	Reduction in Energy intensity compared to the same number last year	7.3
G4-EN7	Reductions in energy requirements of products and services	Amount of sales of products that save energy	7.3
G4-EN8	Water withdrawal by source	Total absolute water consumption	6.4
		Water withdrawn in m^3 from: The net	6.4
		Water withdrawn in m^3 from: Wells	6.4

Appendix E: Corporate environmental KPIs and GRI disclosures (Continues on the next page)

(Appendix E continued)

		Water withdrawn in m^3 from: Rivers	6.4
		Relative decrease/increase in percentage: Absolute water consumption	6.4
		Relative decrease/increase in percentage: Water consumption relative to sales	6.4
G4-EN9	Water sources significantly affected by withdrawal of water	n/a	6.4
G4-EN10	Water recycled and reused	n/a	6.4
G4-EN11	Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas	n/a	14.1, 15.1
G4-EN12	Significant impacts of activities, products, and services on biodiversity	n/a	14, 15
G4-EN13	Habitats protected or restored	n/a	14, 15
G4-EN14	IUCN Red List species and national conservation list species with habitats in areas affected by operations	n/a	14, 15
G4-EN15	Direct (Scope 1) GHG emissions	CO_2 emissions in tonnes	13.2
		Relative change in absolute CO_2 emissions in tonnes compared to previous years	13.2
		CO_2 emissions in tonnes per million sales	13.2
		Relative change in CO_2 emissions in tonnes per million sales compared to previous years	13.2

Appendix E: Corporate environmental KPIs and GRI disclosures (Continues on the next page)

(Appendix E continued)

G4-EN16	Energy indirect (Scope 2) GHG emissions	CO_2 emissions in tonnes	13.2
		CO_2 emissions in tonnes per million sales	13.2
G4-EN17	Other indirect (Scope 3) GHG emissions	Scope 3 emissions: Inbound logistics	13.2
		Scope 3 emissions: Outbound logistics	13.2
		Scope 3 emissions: Materials	13.2
		Scope 3 emissions: Waste	13.2
		Scope 3 emissions: Fuels	13.2
		Scope 2 emissions: Electricity	13.2
		Scope 2 emissions: Heat and Steam	13.2
G4-EN18	GHG emissions intensity	Specific CO_2 emissions in 100kg/€ million in adjusted sales	13.2
G4-EN19	Reduction of GHG emissions	Number of projects to reduce CO_2: To be implemented	13.2
		Number of projects to reduce CO_2: - Implementation commenced	13.2
		Number of projects to reduce CO_2: - Implemented	13.2
		Total amount invested in CO_2 reduction projects	13.2
G4-EN20	Emissions of ozone-depleting substances (ODS)	n/a	12.4
G4-EN21	Nitrogen oxides (NO_X), sulfur oxides (SO_X), and other significant air emissions	n/a	12.4
G4-EN22	Water discharge by quality and destination	n/a	6.3
G4-EN23	Waste by type and disposal method	Total waste in metric tons	12.5

Appendix E: Corporate environmental KPIs and GRI disclosures (Continues on the next page)

(Appendix E continued)

		Specific waste generation in 100kg/€ million adjusted sales	
		Total waste for disposal	12.5
		Total waste for recycling	12.5
		Percentage of hazardous waste	12.4
G4-EN24	Significant spills	Amount of times release of hazardous substances reported	6.3, 12.4, 14.1, 15.1
G4-EN25	Transport of hazardous waste	Amount of hazardous substances imported/exported	12.4
G4-EN26	Water bodies affected by water discharges and/or runoff	n/a	6.3, 14.1, 15.1
G4-EN28	Reclaimed products and their packaging materials	Average recycling rates for old tires (Industry average)	12.5
G4-EN29	Non-compliance with environmental laws and regulations	Number of fines	6.3, 12.4, 14.1, 15.1
		Total height of significant fines	6.3, 12.4, 14.1, 15.1
G4-EN32	New suppliers that were screened using environmental criteria	Percentage of suppliers that signed code of conduct	12.7
		Percentage of suppliers that are ISO 14001 certified	12.7
G4-EN33	Negative environmental impacts in the supply chain and actions taken	n/a	Relevant to most SDGs
G4-EN34	The management approach and its components	Number of grievances send directly to the plants	6.3, 12.4, 14.1, 15.1
		Number of grievances send directly to the Authorities	6.3, 12.4, 14.1, 15.1

Appendix E: Corporate environmental KPIs and GRI disclosures

F

List of corporate environmental targets, linked to the SDGs

Topic	Goal	Deadline	SDG
Compliance & Supply Chain	Proof of acknowledgement of the Code of Conduct has been provided for 100 percent of suppliers	2020	12.7
	Regular implementation of e-learning programs	Ongoing	12.8
	Regular implementation of classroom training	Ongoing	12.8
Climate protection / air	Reduction of the specific energy consumption by 20% (basis: 2013)	2020	7.3
	Reduction of the specific CO_2 emissions by 20% (basis: 2013)	2020	13.2
	Gradual acquisition of Scope 3 emissions	2020	13.2
	Coverage of 5% of total energy consumption via renewable energy	2025	7.2
	Reduction of absolute solvent emissions by 20% by 2025 (basis: 2013)	2025	12.4
Waste	Increase the waste recycling rate to 95% (basis: 2013)	2020	12.5
	Reduction of specific waste production by 20% (basis: 2013)	2020	12.5
Water	Reduction of specific water consumption by 20% (basis: 2013)	2020	6.4
	Creation of an atlas of water risk regions for Continental	2020	6.4
	Acquisition of water consumption by use (production-specific/sanitary)	2020	6.4

Appendix F: Corporate environmental targets (Continues on the next page)

(Appendix F continued)

Raw materials	Develop sustainable materials: use of natural rubber made from dandelions in production	>= 2021	12.2
Sustainable Products	LCAs are available for all defined core product segments	2020	
	Share of raw material requirements in tire production covered by recycled materials: 10%	2025	12.5
	Contribution to the EU target of reducing CO_2 emissions by 20 percent compared to 1990	2020	13.2
	Provision of technologies for reaching the target of 85 g CO_2/km with gasoline vehicles (mild hybrid, 'Best Car' as reference vehicle)	2020	13.2
	Contribution to the improvement of air quality through the prevention of particles and nitrogen oxides in gasoline and diesel vehicles	2020	12.4

Appendix F: Corporate environmental targets