2016

Environmental management systems in medium-sized enterprises

A case study of the Dutch metal industry

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Word count: 20.175
Date: 12-8-2016

Abstract

Environmental management systems (EMS) are used by companies to systematically deal with environmental aspects in their organisation. The approaches that are developed to help companies with setting up an EMS currently do not fit the characteristics of medium-sized enterprises (MEs). This study constructs a conceptual framework of an EMS based on a literature review of corporate sustainability literature, and organisation theory. Based on the elements of the framework, a case study of environmental management in MEs in the Dutch metal industry is conducted, as well as an analysis of existing EMS approaches. Results are combined to identify how an EMS should be designed to suit the characteristics of MEs.

The conceptual framework includes a self- and stakeholder assessment, strategy development, implementation, and corrective action. It is a dynamic system subject to continuous improvement cycles and aimed at organisational learning. It includes the organisation's social and physical dynamics, as well as its formal and informal aspects. It is found that the informal nature of MEs, and their focus on short-term survival strongly affect their organisation and EMS. These companies are reacting to current demands originating from customers and legislation, and adapting their organisation accordingly. Due to the flat structure and small size of MEs, and because of the short lines of communication, informal control mechanisms are effectively used to maintain the EMS. Existing EMS approaches offer various tools and methods that MEs can use, but also impose a variety of requirements that are a burden to MEs.

Keywords: *Environmental management system (EMS); Medium-sized enterprises (ME); Organisation theory; Social and physical dynamics; Formal and informal aspects*

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1. Introduction

Small and medium-sized enterprises (SMEs) contribute a significant part of countries' economic output worldwide (Eurostat, 2014; OECD, 2005). However, their activities also result in an estimated 70% of all environmental impact of businesses globally (Hillary, 2000; M. P. Johnson & Schaltegger, 2015; Revell, Stokes, & Chen, 2010). Under pressure from various groups of stakeholders such as customers, governments, and local communities, SMEs are increasingly acknowledging the responsibility they have in terms of improving their environmental performance (Aragon-Correa, Hurtado-Torres, Sharma, & Garcia-Morales, 2008; Murillo-Luna, Garcés-Ayerbe, & Rivera-Torres, 2011; Revell et al., 2010).

In order to truly improve environmental performance in their business, companies are required to integrate environmental sustainability into all of their activities (Azapagic, 2003). This means they need a systems approach, where the environmental vision of the company is adopted in all parts of the organisation. Environmental management systems (EMSs) are the approach that companies take to deal with the environmental aspects of their organisation (Hillary, 2004; Iraldo, Testa, & Frey, 2009; Zorpas, 2010). The EMS of a company is the way in which it processes any demands it encounters related to environmental aspects, and how it embeds these demands into its organisation. Just as organisations differ in their structure, goal, culture etc., so too do they differ in the way they can most effectively handle their environmental aspects.

Numerous approaches[1] have been developed that aim to improve the environmental performance of companies, and to help them in setting up an EMS. While some of these approaches provide guidelines that cover all aspects of an EMS, others focus on a specific part of this system, or provide a different angle that may suit a different kind of company. The ISO 14001 standard and EMAS are approaches that aim to include all facets of the EMS, and are meant to be applicable for companies of any size, and regardless of the sector they operate in (European Commission, 2016; International Organization for Standardization, 2016). However, both of these were designed for large companies, making their applicability to SMEs questionable at best (Ammenberg & Hjelm, 2003; Gleckman & Krut, 1996; M. P. Johnson & Schaltegger, 2015). Research even shows that when SMEs do decide to adopt the guidelines in these approaches, they encounter numerous barriers (Aragon-Correa et al., 2008; Hillary, 2000, 2004; McKeiver, 2005; Murillo-Luna et al., 2011; Santos, Mendes, & Barbosa, 2011). These barriers include, amongst others, a lack of human- and economic resources, or a lack of knowledge regarding environmental aspects. Other approaches such as the Acorn Scheme and EMAS Easy offer tools for companies to achieve the level of the ISO 14001 standard or EMAS in a different way. They offer a step-wise approach to constructing an EMS (Acorn), or propose a different way to go about certain elements of an EMS (EMAS Easy, e.g. by drawing a map of the company and filling in environmental aspects belonging to certain locations). Even other approaches only include one (or a few) specific element(s) of the EMS. For instance, the Green Key prescribes the areas in which a company should improve, but does not mention how implementation and control in the organisation has to be organised.

[1] The term 'approaches' is used in this thesis to include all standards, tools, instruments etc. that aim to improve the environmental performance of companies.

Several scholars have studied the uptake and effectiveness for SMEs, of EMS approaches such as the ISO 14001 standard (e.g. Heras & Arana, 2010; Hillary, 2004; Massoud, Fayad, El-Fadel, & Kamleh, 2010). However, their studies focus on the adoption of existing approaches, rather than the way an EMS should be designed in the first place, from an organisation's (and specifically a SME's) point of view. This study fills this gap by using organisation theory to construct a conceptual framework of an EMS through a literature review. Subsequently, it addresses how the characteristics of SMEs define their organisation, and how these influence their EMS. This is done by means of literature review and a case study, which focuses on a specific group of medium-sized enterprises (MEs), finding out how they address the elements of the conceptual framework in practice. As the case study includes only medium-sized enterprises, the results of this study apply only to this group of companies. The remainder of this thesis speaks solely of MEs. Finally, existing approaches are assessed based on the conceptual framework, to find out how they address the elements covered therein, and how these fit the characteristics of MEs. This is done by means of desk study, and by speaking to experts involved with these approaches. Findings from all steps in this study are combined to provide an answer to the research question:

"What design of an environmental management system fits the characteristics of medium-sized enterprises?"

The case study in this research focuses on the metal industry which produces significant amounts of waste and emissions (Moors, Mulder, & Vergragt, 2005). Changing processes and activities of MEs in this industry is required to improve their environmental performance, making it a topical case study for this research. The scope of the case study is limited to the Netherlands. Choosing this scope ensures that the (environmental) regulations as well as the institutions are similar for all companies examined. Furthermore, the scope of the study is limited to medium-sized enterprises.
The study is conducted in cooperation with LBP|SIGHT, a consultancy firm that assists companies in, among others, the metal industry with construction-, spatial-, and environmental issues. The consultancy work conducted by LBP|SIGHT ranges from regulations concerning construction and fire prevention to helping companies remain compliant with environmental regulations. It also involves assisting in the development of the EMS of clients in such a way that it meets the requirements of a standard such as ISO 14001. LBP|SIGHT regularly works with MEs, and recognises the fact that this group of companies may struggle with adoption of EMS approaches. They also indicate that MEs find it hard to maintain their EMS afterwards. The results of this study enable LBP|SIGHT to provide their clients with new insights with regards to EMS adoption.

2. Theory

No conclusive definition of an EMS or what it has to include has been given in literature to date. However, many scholars have discussed what they believe are the general requirements or components to embed sustainability (or corporate social responsibility (CSR)) into an organisation (Asif, Searcy, Zutshi, & Fisscher, 2013; Azapagic, 2003; Cramer, 2005; Jørgensen, Remmen, & Mellado, 2006; Maon, Lindgreen, & Swaen, 2009; Pojasek, 2012a, 2012b, 2012c). Although these authors often speak of embedding CSR, including social (and sometimes financial) aspects in addition to environmental ones, the elements included are also applicable to an EMS. According to these authors, an EMS needs to be embedded in the organisation and its employees. The goal being to create a system of continuous improvement whereby the organisation learns as it goes along.

The system is based on a set of preliminary conditions including the vision a company has in relation to the environment (based on a self-assessment of the current state of the organisation), and the demands and wishes that originate from all its stakeholders. The vision of the company is the long-term goal that is set, it is the ideal direction in which the company wants to develop (Azapagic, 2003; Cramer, 2005; Maon et al., 2009). This vision is based around the demands and wishes from the company's stakeholders, and the compliance needs that originate from them (Asif et al., 2013; Cramer, 2005; Maon et al., 2009; Pojasek, 2012c). Every company has different stakeholders to adhere to. Since stakeholders may have conflicting demands, analysing them and deciding on the consequences of these demands for the company is an important factor as well (Azapagic & Perdan, 2005). In addition to stakeholder demands, a company's vision and strategy also build on an assessment of the current state of the organisation. Starting with the competencies, technologies, products, processes etc. that a company houses, it identifies all its environmental aspects and impacts. Both the internal state of the company, and the demands from its stakeholders are constantly changing and have to be monitored carefully.

After analysing the aforementioned factors, a company can develop an environmental policy. This policy is then incorporated into the company's short- and long-term strategies, determining how the objectives will actually be reached (Cramer, 2005; Jørgensen et al., 2006). Subsequently, these strategies are implemented into the operational part of the organisation, and embedded in day-to-day activities of employees (Asif et al., 2013; Azapagic, 2003; Cramer, 2005; Maon et al., 2009; Pojasek, 2012b). To control whether implementation is successful, the EMS is monitored through indicators that are related to the goals the company wishes to achieve (Azapagic, 2003; Cramer, 2005; Maon et al., 2009; Pojasek, 2012a). The observed results are then evaluated and corrective action takes place if necessary (Azapagic, 2003; Jørgensen et al., 2006; Pojasek, 2012a). Although some external factors influence the EMS of a company, its functionality is mostly based on the way the organisation works. Organisation theory covers the different facets that make up an organisation, and therefore serves as the basis for the conceptual framework of an EMS that is developed in this study.

2.1 The organisation

As a starting point to uncover how organisations function and how they are structured, a comprehensive definition of the organisation is provided by Hall (1999): "*An organization is a collectivity with a relatively identifiable boundary, a normative order (rules), ranks of authority (hierarchy), communications systems, and membership coordinating systems (procedures); this collectivity exists on a relatively continuous basis exists, in an environment, and engages in activities that are usually related to a set of goals; the activities have outcomes for organizational members, for the organization itself, and for society* (Hall, 1999, p. 30)." To describe the way these elements work together requires a systems approach that incorporates the parts of the organisation as well as the interrelations between them, and with their environment (Azapagic, 2003; Kast & Reosenzweig, 1972). To include all parts and interrelations in an organisation requires a researcher to examine both the physical and social dynamics, with an internal as well as an external focus (Epstein, Buhovac, & Yuthas, 2010; Vermeulen & Witjes, 2016). Physical dynamics are those parts of the organisation that are tangible, and include, among others, the machines and products that are used, and the building the organisations houses in (Epstein et al., 2010; Hatch & Cunliffe, 2013; Vermeulen & Witjes, 2016). Social dynamics are the people that are involved in the organisation, as well as their behaviour and interrelations (Vermeulen & Witjes, 2016). The way people interact and behave is determined by an underlying culture, which may differ between individuals, groups, and organisations (Denison & Mishra, 2012; Griffin & Moorhead, 2007; Linnenluecke & Griffiths, 2010; McShane & Von Glinow, 2011; Rollinson, 2002; Schein, 2010). The social dynamics of a company can be broken down further into formal and informal aspects. Formal aspects include rules and regulations, guidelines and work instructions, emergency procedures and safeguards, the organisational structure, and the division of responsibilities (Carenys, 2012; Pojasek, 2012b; Raps, 2004). The informal aspects of the company are related to the organisational culture; the system of shared beliefs within the company (Carenys, 2012). Although they can be studied and described separately, physical and social dynamics are constantly affecting each other (Hatch & Cunliffe, 2013). Together they determine how an organisation functions. For instance, when an employee operates a machine in such a way that it delivers a certain product or service.

2.2 Management levels in organisations

Besides the physical and social dynamics, studying an organisation also involves different management levels. Baumgartner (2014) describes the normative-, strategic-, and operational management level. On the normative management level decisions are made regarding the company's vision, mission, strategies, and goals. These are based on the company's culture, on where it wants to go, and on what it wants to be. Strategic management involves long-term objectives, designing policy, and planning how objectives can be reached through specific strategies, rules, and targets. It results in a company-wide strategy, which can be implemented into the organisation. Finally, on the organisational management level, strategy is implemented and its effect is controlled and evaluated (Baumgartner, 2014). In this thesis, the normative management level is included in the strategic management level to create a clear distinction between one level where strategy is developed, and another level where it is carried out. Thus, on the strategic level, a general vision is established first and subsequently distilled into a strategy that will help the company meet its goals. This level now includes all aspects of the system that are based around determining strategy.

This is in contrast to the operational management level, where strategy is brought into practice, and its effectiveness is monitored and corrected. The following sections describe a conceptual framework of an EMS, which has a strategic- and operational management level. The initial framework is depicted in figure 1. The numbers in the figure indicate the section in which the element is discussed in detail, further elaborating on the framework.

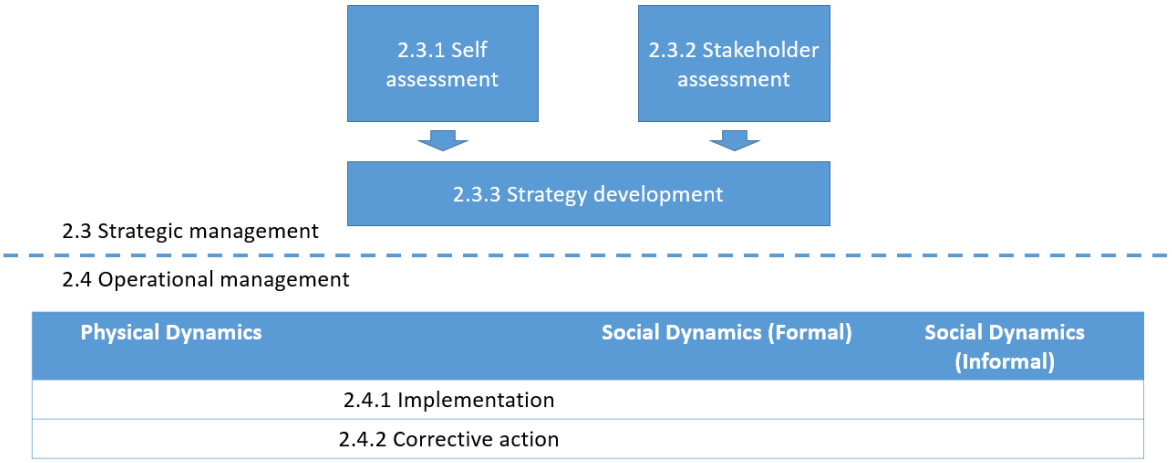


Figure 1: Conceptual framework of an EMS

2.3 Strategic management

On the strategic management level, the environmental threats and opportunities are identified and used as a basis to develop an environmental policy and strategy. This section describes the self-assessment and stakeholder assessment, and the strategy development that translates these assessments into a strategy that can be implemented into the operational level of the organisation.

2.3.1 Strategic management: Self-assessment

A self-assessment serves to analyse the existing strengths and weaknesses of the company in relation to the environment. In combination with the stakeholder assessment, it forms the environment within which a company operates, and the basis for its environmental strategy. To gain a complete overview of the company's internal strengths and weaknesses, all of its resources, capabilities, and impacts have to be identified. This can be done by conducting an analysis of all of the company's processes, as suggested by Duncan, Ginter, and Swayne (1998). The assessment includes both primary processes such as operations, and support processes such as procurement (Duncan, Ginter, & Swayne, 1998). Each of these processes requires certain resources and capabilities, including technology, know-how of employees, labour, capital, and machines (Teece, Gary, & Shuen, 1997; Wernerfelt, 1984). Additionally, they result in certain environmental impacts, which can be identified by conducting an analysis such as the Life-Cycle Assessment (LCA) (Zobel, Almroth, Bresky, & Burman, 2002). Identifying each of the company's processes in this way results in an overview of the company's physical and human strengths and weaknesses, which have to be included in its environmental strategy.

2.3.2 Strategic management: Stakeholder assessment

To analyse a company's external environment requires identification of its stakeholders, and the (environmental) demands and wishes they have towards the company. Building on the definition by Freeman and Reed (1983), stakeholders are defined (in relation to the EMS) as all those who can affect, or are affected by, the achievement of environmental objectives. Governments, customers, competitors, communities, interest groups, and industries are among the actors, or groups of actors, who can influence companies' EMS (Delmas & Toffel, 2004). Stakeholders include external parties, but also internal parties such as employees and employees councils. Within the group of stakeholders a company identifies, it can distinguish between those who directly influence the company's survival (e.g. customers, legislators) and those who indirectly influence them, such as communities who affect companies through governmental bodies. A company's stakeholders also include parties that don't influence the organisation themselves, but may offer some indirect threat or opportunity. For instance, a company that introduces a new technology that may be useful to improve the environmental performance in a particular process provides an opportunity to other companies. Using a decision-support framework, risk analysis, or similar system, a company can identify the demands they have to adhere to (Azapagic & Perdan, 2005; Dyson, 2004; Hill & Westbrook, 1997). This means that compliance management includes more than environmental legislation, and also involves demands from other stakeholders that are found to be salient. Additionally, the stakeholder assessment identifies the (environmental) opportunities that originate from its stakeholders.

2.3.3 Strategic management: Strategy development

Based on its self-assessment and stakeholders assessment, a company can develop an environmental policy, and determine targets and strategies to implement into the organisation (Cramer, 2005). The company determines how it wants to move forward, establishes an environmental policy based on that, as well as the objectives that are associated with this policy. During the process of strategy development, integration of environmental aspects with other elements of the organisation is needed to ensure a successful implementation (Engert, Rauter, & Baumgartner, 2015; Ferrón Vílchez & Darnall, 2014; Gianni & Gotzamani, 2015; Jørgensen et al., 2006; Labodová, 2004). Top management or company leaders are directly involved in determining these policies and objectives. Additionally, their continuous involvement is required to implement and maintain the EMS on an operational level (Burke & Gaughran, 2007; Hui et al., 2002; Raps, 2004). Long-term objectives are translated into short-term targets and strategies that can be implemented into the operational level of the organisation. Based on a changing self- and stakeholder assessment, and observations that are communicated from the operational management level, strategies have to be continuously improved and changed over time (Pojasek, 2012c). Assessment of input from the operational management level happens through management reviews, where top management is periodically involved in evaluating whether strategies are implemented effectively.

During strategy development, companies can use consultants to provide knowledge that the company does not have in-house. They assist in various ways including making inventory of environmental aspects, developing policies and strategies, and helping to devise a plan to implement and maintain strategies within the organisation (Darnall & Edwards, 2006; Eggers, Villani, & Andrews, 2000; Ferenhof, Vignochi, Selig, Lezana, & Campos, 2014). In addition to tailor-made advice or support, several tools and standards exist that can help companies to deal with environmental aspects. They

include analytical tools such as environmental audits or life-cycle assessments, and management tools such as EMS standards (M. P. Johnson & Schaltegger, 2015).

2.4 Operational management

The environmental strategy is executed within the company on the operational management level (Baumgartner, 2014). This involves implementation into the physical and social dynamics of the organisation, and corrective action based on observation of results. All these aspects are included in management control systems (MCS) (Carenys, 2012; Henri, 2006; Kloot, 1997). A certain strategy is implemented into the organisation and its effect is monitored. Based on the observed results corrective action is taken, and results are communicated to the strategic management level to serve as input for planning (Henri, 2006; Simons, 1990).

Implementation and evaluation of policy into an organisation requires knowledge of how organisations operate. This is determined by the organisational structure that exists between the people that work in a company. The organisational structure of a company has a horizontal as well as a vertical component (Hall, 1999). The horizontal structure includes the different tasks that are executed within a company. For instance, one unit may be assembling a product, while another unit is shipping the product, and another is involved in selling the product. By altering the tasks of individuals or groups, the horizontal structure is changed. The vertical structure of a company is determined by the responsibilities and privileges that people have, it determines the hierarchy within the organisation. Redistributing responsibilities is a way to change the vertical structure.

The variables that determine whether a company is flexible (organic) or rigid (mechanistic) are its complexity, formalisation, and centralisation (Hall, 1999). The complexity of an organisation is a result of three things: Horizontal differentiation, vertical differentiation, and geographical dispersion (Hatch & Cunliffe, 2013; Sine, Mitsuhashi, & Kirsch, 2006). Horizontal differentiation is the amount of differentiation that exists in tasks throughout the company. It includes, for instance, the different occupations or schoolings that employees have had. Vertical differentiation involves the different hierarchical levels in the organisation. Geographical dispersion is about the different locations an organisation covers. Formalisation is a form of organisational control. When formalisation is high, employees are provided with detailed descriptions of their tasks and how to perform them in order to prevent mistakes and to make sure that the same rules apply to all parts of the company. When formalisation is low, employees are given room to give substance to their job themselves. Finally, centralisation describes the way that power is distributed within the company. When a small amount of people has a lot of power, centralisation is high. When individual employees have more freedom to make their own choices, or leadership is divided among a larger number of people, centralisation is low. In general, mechanistic structures experience greater complexity, formalisation, and centralisation, while organic structures are characterised by lower levels of these variables (Hall, 1999; McShane & Von Glinow, 2011; Rollinson, 2002; Sine et al., 2006). Companies with a mechanistic structure have a clearly defined hierarchy, and specialist roles. This type of structure is assumed to be more suitable to static environments (Sine et al., 2006). Companies with an organic structure have workers operating in a more loosely tied network, reportedly allowing them to react better to dynamic environments (Sine et al., 2006).

2.4.1 Operational management: Implementation

When implementing strategies into an organisation, companies need to take into account both the physical and social dynamics of the organisation (Lozano, 2013; Raps, 2005), with the latter having formal and informal aspects (Carenys, 2012). Physical dynamics are the tangible parts of the company; its products, machines, building etc. To implement changes into the physical dynamics, the rules that the company operates by have to be altered, a formal process. For example, to reduce fuel consumption of an oven, the process can be altered to shut down the oven at certain times. This also involves social dynamics, because changing a certain process requires that the person that is carrying out that process, does this in a different way. Changing formal social dynamics means adapting the company's rules and regulations, guidelines and work instructions, emergency procedures and safeguards, the organisational structure, and the division of responsibilities (Carenys, 2012; Pojasek, 2012b; Raps, 2004). Altering informal social dynamics of the company is related to the organisational culture; the system of shared beliefs within the company (Carenys, 2012). Changing it requires close involvement of top management to explain the urgency and necessity of changes, and the reasoning behind them, to create awareness and understanding (Raps, 2004). Schein (2010) provides a series of mechanisms that leaders can use to influence the organisational culture, including a certain allocation of rewards, or the way they react to incidents. Additionally, involving people in decision- and strategy making is essential to keep them on-board. This is done by maintaining open communication from the bottom-up, providing employees with a sense of involvement (Raps, 2004). It is paramount to implement changes in steps of a size that overcomes cognitive inertia of employees, while preventing change from seeming unattainable or undesirable. These steps should not be too small as to make no difference, and not too large as to distress employees (Nanda, 1996; Reger, Gustafson, Demarie, & Mullane, 1994). Implementing a strategy into an organisation also involves developing certain indicators that keep track of the functionality of the EMS (Asif et al., 2013; Azapagic, 2003; Cramer, 2005). These indicators depend on the targets that have been set. Environmental targets are often quantifiable, for instance when a company aims to reduce its CO2-emissions. Indicators for such targets are also quantitative, e.g. fuel consumption. However, qualitative targets also exist, for instance through the safe storage of hazardous substances. An indicator for this target may be to check whether substances are always stored safely.

2.4.2 Operational management: Corrective action

To ensure the functionality of a strategy after it has been implemented, it has to be monitored and corrected, including both the physical and social dynamics (Carenys, 2012; Michie & West, 2004). Due to their quantifiable and measurable nature, physical dynamics can be monitored by means of output control, using quantitative indicators (Ouchi, 1978). Monitoring social dynamics is more complicated, since these cannot be quantified or easily measured (Michie & West, 2004). Formal aspects of social dynamics can be monitored by means of internal audits that control whether the organisation is compliant to the rules that were established. Monitoring informal social dynamics takes place through the observable expressions of culture and behaviour that are known as artefacts (Ouchi, 1978; Schein, 2010). Artefacts are driven by values, which are the ideals, goals, and ideologies of people. Basic assumptions are those unconscious, or taken-for-granted beliefs that in turn determine which values someone may uphold. Values and basic assumptions cannot be actively changed or monitored directly (Schein, 2010).

However, artefacts are a direct result of the underlying values and basic assumptions of people. They are an expression of the informal aspects of the organisation. Because artefacts can be both quantitative (e.g. sales or energy use) and qualitative (e.g. displayed behaviour or emotions), both can be observed to give an impression of the organisational culture. Evaluating informal aspects of the organisation requires linking what is observed both qualitatively and quantitatively, to the underlying values that have caused them. By evaluating the observed indicators in light of the company's targets, it can be determined whether corrective action is needed (Gianni & Gotzamani, 2015; Henri, 2006; Kloot, 1997; Pojasek, 2012a). This involves bridging the gap between the objectives (desired state) of the organisation and what is monitored (observed state). If the observations exceed the targets of the company, these targets can be adjusted to suit the capabilities of the organisation. Conversely, when observations do not meet the company's targets, corrections can take place in the organisation to make sure targets are met, or targets can be adjusted to be more realistic. Corrective action can take place directly and indirectly. During observations (e.g. an internal audit), feedback can be given directly when a deficiency is observed. Observations can also be passed on to team leaders, or further up the hierarchy of the company. If these observations are used as a reason to change certain rules, corrective action is taking place indirectly. Companies often also conduct periodic management reviews, whereby owners or top managers evaluate certain observations and indicators, and decide whether corrective action is necessary. Observations are used as input for the strategy development process. Based on the effectiveness of implemented strategies, policy can be adjusted, or strategies can be adapted. By evaluating results and undertaking corrective action on an operational and strategic level, the organisation learns, and is able to continuously improve (Deming, 1986; Feng, Zhao, & Su, 2014; Ouchi, 1978; Pojasek, 2012a).

2.5 Constructing a conceptual framework

The EMS of an organisation is the way in which it systematically processes any environmental aspects, and how these are embedded into the organisation. Within this literature review, a conceptual framework of the EMS is constructed that aims to achieve organisational learning and continuous improvement in regards to environmental aspects.

The organisation is a combination of social- (people, and their interrelations and behaviour) and physical dynamics (e.g. machines and products), as discussed by Vermeulen and Witjes (2016). Additionally, the social dynamics consist of formal aspects and informal aspects, as discussed by Carenys (2012). Within the EMS, a distinction is made between the strategic management level and the operational management level, derived from the definitions by Baumgartner (2014). On the strategic management level, a self-assessment serves as a basis for an environmental vision for the company. The self-assessment analyses the company's processes, identifying the strengths and weaknesses based on the existing resources (as introduced by Wernerfelt (1984)), and the environmental impacts these processes have (see Zobel *et al.* (2002)). A stakeholder assessment identifies all relevant stakeholders that can affect or are affected by the achievement of the company's environmental objectives (based on the definition by Freeman and Reed (1983)). The assessment results in an overview of the demands the company has to comply to, and the opportunities that originate from its stakeholders. During strategy development, the company determines its environmental targets and –strategy that can be implemented into the operational level of the organisation (as discussed by Cramer (2005)).

On the operational management level, the management control system serves to ensure that the strategy is executed and the targets are met (as discussed by e.g. Henri (2006) and Kloot (1997)). The strategy is implemented into the physical dynamics of the organisation by changing tangible aspects such as processes, products or resources used. Implementation into formal social dynamics is achieved by changing the structure and rules of the organisation, and into informal social dynamics by raising awareness and involving employees (as explained by Raps (2004)). Indicators are implemented into the organisation to control the effectiveness and uptake of environmental strategies. Monitoring the effectiveness of the chosen strategy is done by measuring quantitative and qualitative aspects and indicators (as discussed by e.g. Ouchi (1978)). Based on the resulting observations, managers can decide which physical and social dynamics underlie certain measurements. This includes the informal side of the social dynamics, such as the organisational culture. By evaluating quantitative and qualitative indicators of the EMS by means of e.g. output control and internal audits, performance can be compared to the environmental targets. Corrective action can take place (if necessary) both directly during observations or indirectly by communicating observations through the organisation, and acting on them later. Management reviews are conducted periodically to review the functionality of the EMS as a whole, and take corrective action if necessary. This way, the organisation goes through continuous improvement cycles, and achieves organisational learning. The resulting conceptual framework of an EMS is presented in figure 2.

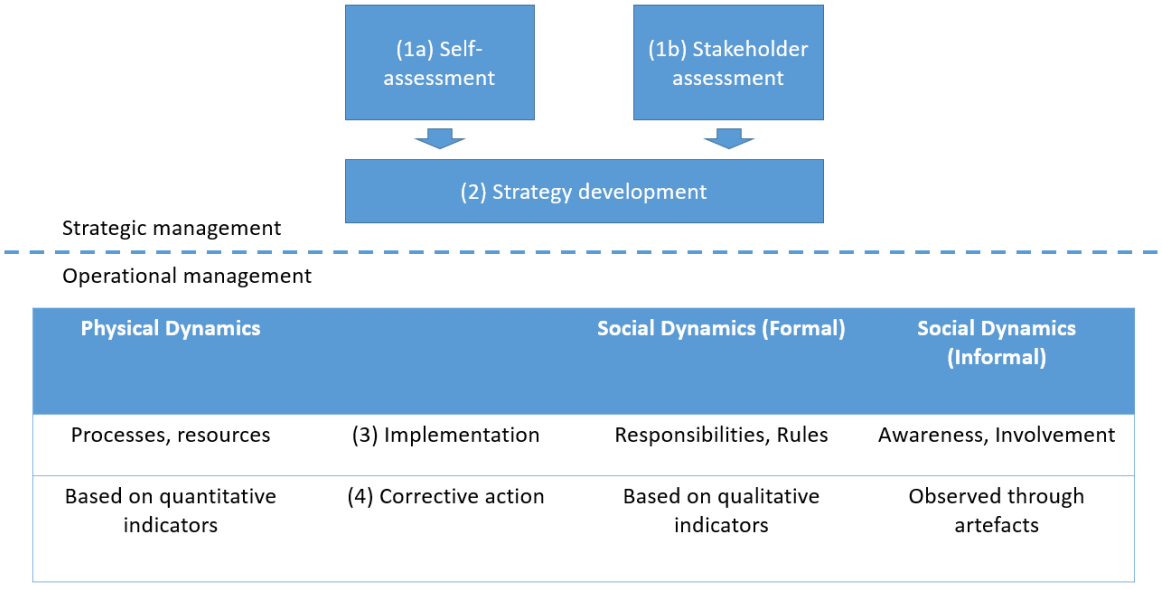


Figure 2: Conceptual framework of an EMS

2.6 Environmental management systems in MEs

The size of a ME affects the way the organisation functions (Spence, 1999), and therefore it affects the way the EMS functions. Throughout literature, the definition used for MEs changes frequently (Ferenhof et al., 2014; Hillary, 2000). In this study, the most recent definition of medium-sized enterprises provided by the European Commission is used. In this definition, "an enterprise is considered to be an entity engaged in economic activity, irrespective of its legal form" (The European Commission, 2003, p. 39). Whether an enterprise is subsequently defined as micro, small or medium-sized depends on its staff headcount and financial ceilings. Medium-sized enterprises employ between 50 and 250 full-time employees (fte's) and have an annual turnover not exceeding 50 million euros or an annual balance sheet total equal to or below 43 million euros (The European Commission, 2003).
A literature review conducted by Supyuenyong, Islam, and Kulkarni in 2009 summarizes the key characteristics of SMEs, thereby including MEs. These characteristics are described here, and the effect they have on the company's EMS is specified. During this study, the effect of MEs' characteristics on their EMS is examined in practice, as well as the way existing EMS approaches cater to these characteristics.

Ownership and management structure

ME owners and owner-managers often combine the responsibility over several functions (Ferenhof et al., 2014). Due to the day-to-day focus of MEs, owners have little time to invest into long-term analyses and strategies. For the EMS this means that environmental strategies are often aimed at short-term threats and opportunities. Additionally, these owners also make most of the company's strategic decisions (Supyuenyong, Islam, & Kulkarni, 2009). They are the ones that have to invest the company's resources, and set up the necessary organisational structure to operate the EMS. As MEs are strongly influenced by one owner, the commitment of that person to the EMS is vital. The organisational hierarchy in MEs is flatter, resulting in greater flexibility within the company (Supyuenyong et al., 2009). On the plus side, the communication lines are shorter within the organisation, allowing for easier and more direct communication, and higher levels of cooperation. However, the flat hierarchy also leads to a lower levels of specialisation, more generalists, and a limited division of responsibilities.

Customers and markets

MEs have a smaller amount of customers with which they have close relations, and they usually focus on local or regional markets. Additionally, they usually have a limited amount of products, or cater to a niche market (Supyuenyong et al., 2009). For these reasons, demands from customers (also in relation to environmental aspects) are quickly responded to, and are deemed very important during stakeholder assessments.

Systems, processes and procedures

MEs have simple planning and control systems, informal rules and procedures, and less standardisation of work processes (Supyuenyong et al., 2009). In terms of social dynamics of EMSs, this implies that these companies rely heavily on informal practices rather than formalisation. The operational management level is less rigid than in larger companies, making MEs more flexible. MEs also focus more on the operational processes rather than strategic ones, paying more attention to the day-to-day business and survival of the company rather than strategic considerations.

Human capital management

Because MEs have a limited number of specialised personnel such as environmental managers, human capital is an essential resource for the EMS to function. This also partly explains the frequent use of consultants to provide knowledge or expertise that the ME simply does not have.

Culture and behaviour

The organisational culture in MEs is characterised by its informal and unified nature (Supyuenyong et al., 2009). The size of the company makes it so that the company is seen as one whole instead of the sum of its departments. Additionally, the behaviour of employees is influenced more easily by the owner's philosophy or believes, as the owner is more directly involved and employees feel more connected to the company.

3. Methods

The research question used for this study was *"What design of an environmental management system fits the characteristics of medium-sized enterprises?"* In order to answer this question, the characteristics of MEs that influence their EMS were identified by conducting a case study. Furthermore, existing EMS approaches were studied to find out how they suit the characteristics of MEs. The conceptual framework formed the basis for these analyses. It is the elements that were described in this framework which are studied in detail. Additionally, expert interviews were conducted with professionals associated with the development of EMS approaches and the adoption of these approaches in companies. Information was gathered from them regarding the way existing approaches are developed, how they suit the characteristics of MEs, and how the design of these approaches could be improved for MEs. By combining knowledge regarding the way MEs go about managing their organisation, and how EMS approaches try to accommodate these companies, this study identified the design of an EMS that fits MEs.

Based on a predefined conceptual framework, a qualitative inductive research approach was used to answer the research question. The conceptual framework was based on existing literature, but as the study did not aim to test any existing hypotheses or theories, it is not qualified as deductive (P. Johnson, 2004; Saunders, Lewis, & Thornhill, 2008; Thomas, 2006). The conceptual framework was used as a basis to analyse existing EMS standards and to conduct a case study into Dutch medium-sized companies operating in the metal industry. The researcher's experiences from the field were combined with data from interview transcriptions to generate theory from practice (Thomas, 2006). Although this method was inspired by grounded theory, it has a strong basis in the theoretical background that formed the conceptual framework. Therefore, the research was not classified as developing grounded theory (Länsisalmi, Peiró, & Kivimäki, 2004).

3.1 Data collection

In this multi-method qualitative study, different data collection and –analysis techniques were used, but all were of a qualitative nature. The following sections discuss the different research techniques that were used to collect data.

3.1.1 Data collection: Existing EMS approaches

Using the conceptual framework outlined in the previous chapter, existing EMS approaches were assessed to identify how they address the elements of an EMS, and how these suit the characteristics of MEs. The selection of approaches to be scrutinised included approaches that are used in several countries, as well as approaches with a smaller scope that use a different method and/or were specifically designed for (S)MEs. A total of 24 EMS approaches were considered for analysis. The approaches were derived from the 'Step up to EMAS' study by the European Commission (European Commission, 2009), and supplemented by consultants from LBP|SIGHT. The 'Step up to EMAS' study was launched to analyse the differences between other EMS approaches, and the EMAS programme. It identified the twenty most relevant local, regional, and sector-specific EMS approaches in Europe (European Commission, 2009). This list was supplemented by consultants of LBP|SIGHT with EMS approaches that are frequently used by MEs in the Dutch metal industry, which were not already included in the Step up to EMAS programme.

The 24 EMS approaches are shown in table 1. The table provides a quick description of each of the EMS approaches. It describes the language in which information regarding the approach can be found. Whenever information was not available in English or Dutch, the approach was not included in the analysis. Furthermore, it describes the sectorial-, organisational- and geographical scope of the approaches. As the analysis aimed to discover suitable EMS approaches for MEs regardless of their current availability to companies in the Netherlands, all sectors and countries were included. Finally, the table shows the year in which the EMS approach was launched, and the main purpose of its existence. The final selection of EMS approaches to be analysed included 15 schemes. Group certification for companies is not assessed as a unique approach. This method saves companies resources because, for example, they can hire consultants together, or combine audits. However, this only relates to the set-up of the EMS, and to the certification process, rather than to the functionality of the EMS itself.

The 15 EMS approaches were researched through means of desk study. Information was gathered from the 'Step up to EMAS' study, from the websites of the EMS approaches, and from manuals and certification criteria if they were applicable and available.

Table 1: Descriptions of existing EMS approaches

General		Scope					
Name	Language availability	Sectoral Scope	Organisational Scope	Geopgraphical Scope	Available since	Main purpose	Information sources
1.2.3 Environment	FR	All	SME	France	2007	Focus on environmental impact of working methods. Gradual development of EMS to ISO 14001 or EMAS standard	(European Commission, 2016b) (AFICC, 2016)
Bayerisches Umweltsiegel	DE	Hotels and Restaurants	All	Bavaria, Germany	1997	Raising awareness regarding environmental measures and providing incentives to work environmentally-friendly	(European Commission, 2016b) (Umweltpakt Bayern, 2016)
CO2-Performance Ladder 3.0	EN and NL	All	All	Netherlands	2015	Focus on transparancy and reduction of CO2-emissions, incentive is providing a bonus on tenders	(Stichting Klimaatvriendelijk Aanbesteden & Ondernemen, 2015)
IEMA Acorn Scheme	EN	All	SME	United Kingdom	2003	Improving environmental performance and reducing environmental impact of company activities	(European Commission, 2016b) (Institute of Environmental Management & Assessment, 2016)
e+5	SP	All	All	Spain	1999	Provides suppliers with way to develop EMS that is recognized by customers. Customers gain insight into supply chain	(European Commission, 2016b)
Eco-Lighthouse Programme	Majority in EN	All	SME	Norway	1996	To document environmental efforts and demonstrate social responsibility. Also leaves room for sector-specific criteria by government	(European Commission, 2016b) (Eco-Lighthouse Foundation, 2016)
Ecocamping	EN	Campsites	All	Austria, Germany, Italy, Switzerland	1999	Harmonise quality, economic, and environmental aspects of campsites	(European Commission, 2016b) (ECOCAMPING e.V., 2015)
EcoCompass	EN	All	SME	Finland	2009	Incentivice action to improve environmental performance through easy tools and customized support for SMEs	(European Commission, 2016b) (EkoKompassi, 2016)
Ecodynamic enterprise	None	All	All	Brussels	1999	Encourage companies to increase environmental performance through a gradual approach	(European Commission, 2016b)
Ecoprofit	None	All	All	Mostly Austria, Germany	1991	To gain cost-savings by improving environmental performance	(European Commission, 2016b)
EcoStart	EN	Manufacturing and Services	SMEs	Finland	2006	Meant to kickstart SMEs' environmental management through a 4-10 day programme	(European Commission, 2016b) (Lehtonen, n.d.)
EcoStep	DE	All	<500 fte	Germany	2002	Introduced to integrate different management systems such as ISO 9001, 14001	(European Commission, 2016b)
EMAS	EN and NL	All	All	EU	1993	A tool to evaluate, report and improve environmental performance. Requirements for the	(European Commission, 2016a)
EMAS Easy	EN	All	SME	EU	2012	To provide a practical tool that SMEs can use to conform their EMS to EMAS requirements	(EMAS, 2012)
Environmental Diploma Göteborg	SE	All	SME	Sweden	1995	Criteria correspond mostly to ISO 14001	(European Commission, 2016b)
Green Dragon	EN	All private companies	All	United Kingdom and Ireland	2000	Stepwise programme that shows that the company is abiding by environmental legislation	(European Commission, 2016b) (Griffiths & Jones, 2016)
Green Key	EN and NL	Tourism	All	53 countries in the world	1994	Represents a commitment to strict environmental criteria	(European Commission, 2016b) (The Green Key, 2016)
Green Network	EN	All	All	Denmark and Czech Republic	1994	Organisation provides tools that allow environmental improvement, companies commit to achieving continuous improvement in certain areas	(Green Network, 2016)
Green Office	EN	Offices	All	FInland	2003	Certified offices have an EMS in place that continuously reduces energy use and attempts other	(European Commission, 2016b) (WWF Green Office, 2016)
Grüner Gockel	DE	Churches	All	Germany	2002	Protect environment while lowering costs, churches are seen as examples so others will follow	(European Commission, 2016b)
ISO 14001:2015	EN and NL	All	All	Global	2015	Guidelines for EMS implementation and operation	(International Organization for Standardization, 2015)
MVO-Monitor	NL	Metal	SME	Netherlands	2015	Meant to provide insight into efforts in all areas of CSR, and improve on them	(Stichting Keurmerk Branches, 2015)
QuB	DE	All	SME	Parts of Germany	1997	Guidelines for EMS and quality, health and safety, and organisational development	(European Commission, 2016b)
VCA	EN and NL	Construction, technical services, electrotechnical services etc.	All	NL and Belgium	2008	Checklists for (among others) environmental aspects, different levels	(Centraal College van deskundigen VCA, 2008)

3.1.2 Data collection: Case study

In order to assess how the characteristics of MEs relate to the key elements of an EMS, a case study was conducted studying medium-sized enterprises in the Dutch metal industry. The case study approach was used to be able to analyse a small set of cases in a detailed fashion (Gomm, Hammersley, & Foster, 2000; Saunders et al., 2008). This provided insight into how MEs manage their environmental aspects in practice. Through participant observation during visits to MEs in the case study and during an internship at LBP|SIGHT, the researcher gained practical insight into environmental management in Dutch MEs in the metal industry. This enabled him to put findings from the interviews in the correct context. For instance, when only one (or a few) interviewees would mention a certain characteristic feature of MEs, the researcher would be able to identify whether this was applicable to all MEs.

Case study: Scope and sample

Conducting a case study requires a representative sample that can be generalised to explain phenomena within a certain group (Gomm et al., 2000; Seawright & Gerring, 2008). As the size of a company influences its characteristics, one category of companies (MEs) was chosen to conduct a case study of. The scope of this study was limited to medium-sized enterprises with 50 to 250 fte's, operating in the Dutch metal industry. This ensured that the results from a small sample are still representative (Seawright & Gerring, 2008). Ten companies were scrutinised during the case study of this research. To identify how these companies managed their environmental aspects, interviews were conducted with managers or owners who were responsible for, or involved with, the EMS of the company. Interviewees were asked about how their organisation handles certain elements of the EMS, providing the researcher with information regarding the characteristics of MEs in regards to their EMS. The sample of companies to be interviewed was selected in collaboration with LBP|SIGHT. All of these companies are involved in manufacturing operations, but this is limited mostly to the assembly of parts. Their operations also include processes such as welding, dying, and heating, but the companies have a relatively small environmental impact. Processes such as the production of base metal or the extraction of resources, take place within their supply chain, but are not carried out by these companies. All interviewees are familiar with environmental management, as they are all clients of an external consultant who advises on this subject. However, while some companies have been incorporating environmental considerations into their business for years, and even consider the environment during product development, others have barely started setting environmental objectives for themselves. Using such a diverse sample provides more representative results than a sample of typical cases might have (Seawright & Gerring, 2008).

Table 2 provides an overview of the companies that were studied. Specific details are omitted to ensure the confidentiality of information given by interviewees. The table provides an indication of the company size in fte's, an overview of the EMS approaches the company is certified to, and the function of the person who was interviewed. The VCA* and VCA** are different levels of the same EMS approach. QHSE stands for Quality, Health and Safety, and Environment. Although the title for this type of function changed between every company, all these interviewees were related to the quality and environmental team. Some of them combined this with health and safety issues. The operations manager was responsible for all processes on the operational level.

Table 2 Overview of case study sample

	Size	Certification	Function
1.	+/- 50	ISO 14001	Operations Manager
2.	101-250	ISO 14001/Product specific certificate	QHSE
3.	101-250	ISO 14001/Product specific certificate	QHSE
4.	51-100	ISO 14001/VCA*	Technical director
5.	51-100	None	Owner
6.	51-100	None	QHSE
7.	101-250	ISO 14001/Product specific certificate	QHSE
8.	51-100	ISO 14001	QHSE
9.	101-250	ISO 14001/CO2-Performance Ladder/VCA**	QHSE
10.	+/- 50	ISO 14001/VCA*/Product specific certificate	Director

Case Study: Interview Design

The interviews contained semi-structured questions, allowing the researcher to follow up on answers given by the respondent (Bryman, 2012). The interviews commenced with establishing the general activities of the company, the role of the interviewee, and how his or her function related to environmental affairs. Subsequently, the different elements contained within the conceptual framework were used as the themes along which the interview was structured (similar to e.g. Burke & Gaughran, 2007). The interview was designed to uncover if and how the elements of an EMS are incorporated into the companies. The semi-structured nature of the interviews allowed the researcher to ask follow-up questions. It also allowed the interviewee to raise issues that were not included in the interview structure (Bryman, 2012; Silverman, 2006). The remaining questions allowed the interviewee to comment on existing EMS approaches, and give suggestions regarding the role of these approaches for their organisation. Finally, the interviewee's opinions regarding the role of external parties (e.g. government, sector organisation, advisors) were identified to uncover how these parties might help them deal with environmental issues. The interview questions are presented in appendix A. They are given in Dutch, the language in which the interviews were conducted.

Case Study: Ethnography and participant observation

Ethnography encompasses different research styles and techniques that help the researcher study people in a certain field to come to a better understanding of the field (Brewer, 2004). In this case, that field is environmental management in MEs operating in the Dutch metal industry. Besides conducting in-depth interviews with people involved in the subject matter, the researcher collected data through observations in the field and by talking to people over the course of the research. Participant observation took place in the form of an internship at LBP|SIGHT, a consultancy- and engineering firm that, among others, specialises in supporting MEs to implement and maintain their EMS. Over the course of six months, the researcher was able to speak to experts with experience working with EMSs. The consultants at this firm work closely with MEs and help these companies manage their environmental aspects. Therefore, they have an understanding of the characteristics of this group of companies, and how this affects their EMS.

Over the course of the internship, the researcher was involved in conversations regarding the characteristics of LBP|SIGHT's clients, and the challenges they face in relation to environmental aspects. Furthermore, the researcher was involved in some practical projects such as compliance- and internal audits at MEs. These projects provided an understanding of the environmental aspects that Dutch MEs in the metal industry deal with. In summary, the internship led the researcher to a better understanding of the challenges that MEs face in relation to the environment, and how their characteristics affect the way environmental aspects are managed.
The interviews that were conducted at the MEs included in the case study, were preceded by a desk study, a tour of the company's facility, and by conversations about the daily work of interviewees. This gave the researcher a better understanding of the environmental aspects of the companies, and the way the organisations function. These insights were used to analyse the transcripts of the interviews.

3.1.3 Data collection: Expert interviews

Expert interviews were conducted to provide insight from the point of view of professionals who work in the field. Information was gathered from them regarding the way existing approaches are developed, how they suit the characteristics of MEs, and how the design of these approaches could be improved for MEs. This knowledge was retrieved through open interviews with only predefined topics. This method allowed the interviewer and interviewee to engage in open conversation regarding the expert's field of interest (Meuser & Nagel, 2009; Pfadenhauer, 2009). The first of these interviews was held with Dick Hortensius, standardisation consultant for management systems at the Dutch institute for normalisation (NEN). The second interviewee was Frans Stuyt, director of the Stichting Coördinatie Cerrtificatie Milieu- en Arbomanagementsystemen (SCCM). His organisation works together with all relevant stakeholders in the Netherlands to improve and explain different international certificates. Both are directly involved with the development and evaluation of EMS standards. The interviews were used to gain insight into the development process of EMS standards, what their role is in companies, and the role of MEs in this context. A third expert interview was held with Gerard Wyfker, policy secretary of environment at the Koninklijke Metaalunie, the largest sector organisation for SMEs in the Dutch metal industry. In this case, the interview was used to get a better understanding of the environmental aspects that MEs in the metal industry deal with, and the trends that are visible in this regard.

3.2 Data analysis

To provide an answer to the research question, different types of analyses were used to assess the collected data.

3.2.1 Data analysis: Existing EMS approaches

To identify how existing EMS approaches suit the characteristics of MEs, the information gathered from the 'Step up to EMAS' programme, and the approaches' own websites and manuals were analysed. Each approach was studied to find out how it addressed the elements of an EMS that were discussed in the conceptual framework. Parts of the approach that are not covered in the framework (e.g. reporting) were excluded from the analysis as these are not part of the EMS. Appendix B shows the complete analyses of all EMS approaches, while the findings include the most important results.

The analyses provide a general introduction to the EMS approach first. Subsequently, the entire approach was reviewed, linking every requirement, criteria, or tool to an element of the conceptual framework. For instance, the EMAS Easy approach requires the company to make an Ecomap, drawing out the environmental aspects of the company. This is a specific way to conduct a self-assessment, and due to its practical nature, suits the characteristics of MEs. Corrective action was divided into monitoring and feedback sections, as these are often separated in EMS approaches. After reviewing the EMS approaches in this way, general comments are given regarding the elements of the approach that are particularly suitable (or not suitable) for MEs. In the findings section, the approaches that suit MEs are discussed per element of the EMS.

3.2.2 Data analysis: Case study

All interviews were recorded, and subsequently transcribed and coded using the software programme Nvivo 11. An edited transcription method was used, excluding grammatical mistakes or fillers from the transcript. After the transcriptions were completed, they were sent back to the interviewees, allowing them to make changes or additions to the text, in order to validate the results (Burke & Gaughran, 2007).

To organise the textual data, segments of relevant text were given labels (nodes) that indicate the theme of that piece of text. This thematic analysis technique is described by Bazeley and Jackson (2013), and King (2004). It allowed the transcript to be divided between the different subjects that were discussed in the interview. The coding scheme that was used is shown in figure 3. First, the data was divided between general themes: The characteristics of the interviewee and his or her company, or elements of the EMS. Subsequently, categories were identified within each theme to specify the subject of each of the segments. Only the data that could be related to elements of the EMS was finally used to answer the research question.

All of the categories are based on concepts that were identified during the literature review. The exception to this rule is the stakeholder assessment, where categories represent different external stakeholders. Segments coded as self-assessment were related to the way companies analysed their processes, including their resources and competencies, and/or their environmental impact. Stakeholder assessment was divided between threats and opportunities originating from certificates, conglomerates (e.g. parent organisations), consultants, customers, governmental institutions, the market, sector organisations, and society. Strategy development was divided into segments relating to the development of general environmental strategies, development of specific targets, the importance of environment (as opposed to e.g. quality) in strategy development, and the role of top-management or owners in strategy development. Within the implementation theme, a distinction was made between informal implementation (mostly related to creating awareness), and formal implementation (e.g. manuals or the division of responsibilities). Within the corrective action theme, categories were created for monitoring and feedback. Within the feedback category, another subcategory was created for text segments related to management review. Informal social characteristics were included as a separate theme, segments in this theme related to the specific informal characteristics in these companies, such as a culture that is hostile to change.

Nodes

Name	Sources	References
Characteristics interviewee and organisation	10	100
Elements of the EMS	10	345
Operational management	9	61
(3) Implementation	8	38
(4) Corrective action	0	0
Feedback	8	22
Management Review	5	6
Monitoring	8	13
Informal social characteristics	7	23
Strategic management	10	284
(1a) Self-assessment	8	22
(1b) Stakeholder assessment	10	149
Certificates	2	2
Conglomerate	2	6
Consultants	10	50
Customers	9	34
Governmental institutions	9	22
Market (Trends from e.g. competitors)	1	2
Sector organisation	9	19
Society	2	5
(2) Strategy development	10	113
Developing strategies	9	30
Developing targets	9	29
Importance of environment in strategy development	7	25
Role top-management in strategy development	7	12

Figure 3 Coding in Nvivo

After the text segments were assigned a specific code that binds them to a certain element of the EMS, each element was analysed separately. Based on the comments made by the interviewees, an analysis was made of the way the characteristics of these companies influence their management. During the analysis of the case study, participant observation helped the researcher to place certain findings in the correct context, and provided an additional means to the analyse results. For instance, a few interviewees mentioned inspections rounds as an important means of corrective action. Experience during the internship learnt that this method is widely used, and characteristic to this group of companies.

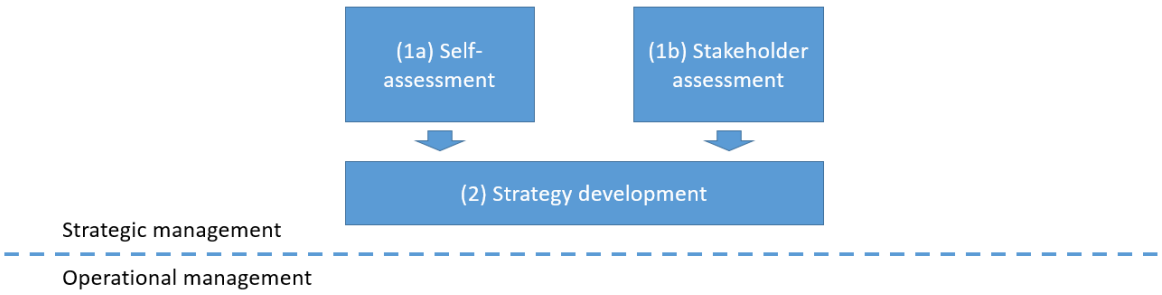
3.2.3 Data analysis: Expert interviews

The expert interviews were recorded and summarised, and are included in appendix C. The interview with Gerard Wyfker took place at the start of the study, to provide the researcher with a basis of knowledge regarding the role that the environment plays in the Dutch metal industry. Findings from the interview were used to design the interviews for the case study, and to give the researcher an early impression of the characteristics of the industry. The interviews with Dick Hortensius and Frans Stuyt served to gain insight into the characteristics of MEs in regards to their EMS. As the interviewees are also involved in the development of EMS approaches, they offered suggestions for the way these approaches could be designed to fit the characteristics of MES. Results from these interviews were partially used as a basis for the case study, but were also analysed in the same way as interviews from the case studies and the existing EMS approaches, relating certain pieces of information to elements of the conceptual framework.

To answer the research question, findings from the three types of analyses are synthesised. The case study results show the way MEs address environmental management in practice. The findings also show the areas in which these companies are currently experiencing problems for which EMS approaches could provide an answer. The analysis of existing EMS approaches provides different takes on how each element should be addressed. These are linked to results from the case study to provide answers to the problems MEs are having.

4. Findings

In this section, the findings from all three analyses are described and interpreted. The structure of the section is the same as the conceptual framework, and describes each of the elements separately (see Figure 4). At the end of each paragraph, findings from all analyses are combined into one synthesis. Whenever the quantity of respondents that brought up a similar point is important for the analysis, the number between brackets shows how many of the 10 interviewees made a similar statement (e.g. n=5). For instance, this shows which types of stakeholders are included most in the stakeholder assessment. Findings that apply to the entire case study are not accompanied by a number of respondents.



Physical Dynamics		Social Dynamics (Formal)	Social Dynamics (Informal)
Processes, resources	(3) Implementation	Responsibilities, Rules	Awareness, Involvement
Based on quantitative indicators	(4) Corrective action	Based on qualitative indicators	Observed through artefacts

Figure 4: The findings sub- sections according to the conceptual framework of an EMS

Self-assessment

Results from the interviews show that the self-assessment that companies conduct is primarily a response to demands from stakeholders. As customers demand insight into the environmental impact of their products, companies start looking into it. Similarly, as customers ask for an ISO 14001 certification, and this requires continuous improvement of environmental performance, companies start to look for areas in which they can improve. An interviewee explains: “Because you have to keep improving, you have to look where your possibilities lie. … We also have lease cars, maybe we can achieve something there to make steps forward in relation to our environmental aspects.” The interviewees do not indicate conducting a self-assessment that identifies their resources or competencies. The environmental vision or policy is often based on trends in the industry, or demands from customers, rather than originating from the strengths of the company. Only after this policy is determined are the environmental aspects identified on which this policy might have an effect. The studied MEs do not use any particular method to conduct their analysis of environmental aspects, and indicate that they have a hard time identifying areas in which they can improve their environmental performance. One interviewee states: “At some point you’ve reached the top, but you have to come

up with something to keep improving. Now we're just fighting to keep coming up with things we can improve."

The EMS approaches that were analysed provide some tools and methods to analyse the environmental aspects and impacts of a company. However, many approaches only indicate that companies are to assess the environmental aspects of their operations, but lack a method to do so. EMAS Easy prescribes the use of Ecomapping, where companies draw maps of their company and fill in their environmental aspects. First, a map is drawn of the company's location and immediate surroundings. On this picture, the relation to neighbours is specified, as well as the traffic generated by the company's cars, what kind of sewage system is used, etc. Second, the input (fuel, resources, packaging), and output (waste, emissions) are identified. Then, employees are involved through a survey in which they can specify for certain topics (e.g. use of raw materials, motivation of employees), whether they are a strong or weak spot in the company's EMS. A few other approaches also involve employees in the self-assessment, mostly through brainstorm sessions in which they can point out environmental aspects. In the EMAS Easy approach, the final step is to draw maps of the actual shop floor. On each map, hotspots for different topics are identified (e.g. water consumption, or air, odours, noise). By using maps of the location, this self-assessment becomes a practical and comprehensible exercise for MEs. The Ecocamping and Ecostart approaches use an external consultant to take a fresh look at the company's environmental aspects. However, due to the cost implications of hiring an external consultant, a self-assessment is more applicable to MEs, provided that they know where to look. Multiple approaches (including EMAS Easy, Green Dragon, and MVO-monitor) indicate some key areas that companies should keep in mind when conducting their self-assessment. The Green Network even provides its members with tools to calculate specific impacts, such as a Chemistry wizard for hazardous materials, and a CO2 calculator. The tools and reminders give MEs the possibility to conduct a self-assessment without having much prior knowledge or experience with environmental issues.

Interpretation

The studied companies often conduct a self-assessment to determine the areas in which they can improve their environmental performance. This is done in response to demands from customers and to stay certified to certain standards, and does not focus on the companies' resources and capabilities. Currently, the studied MEs lack an effective method to identify their environmental aspects and impacts. Existing EMS approaches offer some ways for companies to overcome this problem. The Ecomapping process is a practical, informal exercise that quickly identifies companies' environmental impacts, identifying areas in which companies can improve. Using this method removes the need for a thorough strategic analysis. According to Dick Hortensius this benefits MEs, because the owners of these companies simply lack the time to conduct extensive analyses. Companies can also hire an external consultant to take a look at their processes and identify areas of improvement. When these consultants are subsidised, this method can prove useful for MEs, if not, it is a costly alternative.

Stakeholder assessment

The stakeholders upon which the studied companies base their environmental strategy can be placed into several categories: Customers (n=9), governmental institutions (n=9), sector organisations (n=9), parent organisations (n=2), certificates (n=2), society (n=2), and the trends in the market (n=1). Consultants are mentioned by every interviewee (n=10), as LBP|SIGHT is involved with all the studied companies. Their involvement is mostly through conducting audits and performing measurements, or by informing companies of the legislation that is relevant for them. LBP|SIGHT is also involved in setting up the EMS as a whole, making sure it adheres to any standard a company wants to certify to. In all these ways, consultants are influencing the achievement of environmental objectives, making them an important stakeholder. Sector organisations are mostly involved by providing tools, workshops, or other advice to their members. However, both of these stakeholders have little influence on the companies' environmental policies. These are mostly developed in response to demands from stakeholders who could otherwise threaten the profitability and survival of the company. Customers and governmental institutions are the most prominent stakeholders in this regard. Customer demands and legislation play an important role in determining the compliance frame for the studied companies. Although consultants and sector organisations are often included to provide knowledge, tools etc. to companies, demands from customers and legislation form the basis for the environmental policy and strategy in this case study. One interviewee states: "Legislation is always the starting point". And another indicates: "If you take the CO2-performance ladder certificate we have, that did not start from a wish to be green. It started because customers are asking for it, and if we don't comply, we're going to lose those customers". While legislation is important to MEs, interviewees indicate that keeping track of changing environmental laws and regulations is difficult for them. Those companies that have a parent organisation often have environmental requirements imposed on them, which they have to adapt to their particular situation. Societal demands, and trends in the market play a small role in the stakeholder assessments of these companies.

The findings show that the studied companies are mostly reacting to the current demands from customers and legislation (and in some cases parent organisations and society), rather than conducting a stakeholder assessment. Rather than identifying their stakeholders' demands and wishes pre-emptively, and anticipating on them, MEs have a reactive attitude towards their stakeholders' environmental concerns. This is line with the observation by Dick Hortensius that owners of MEs lack the time to conduct strategic analyses, and rather react to current events.

Most EMS approaches require some sort of stakeholder assessment to be conducted. These are mainly related to identifying the relevant legislation, and sometimes include a wider definition of compliance that includes other stakeholder demands. However, these approaches do not specify a certain method or tool that can be used to conduct the assessment. The ISO 14001:2015 standard prescribes the most thorough stakeholder assessment out of the scrutinised EMS approaches. It includes compliance to a wide range of stakeholders. It also requires companies to be aware of future developments, including technological changes, and how these may affect the EMS. Although this approach includes a more complete assessment, a method is not given, and the requirements demand even more pre-emptive effort from MEs.

Interpretation

The scrutinised companies do not conduct an exploratory stakeholder assessment, but rather react to acute demands from (primarily) customers and legislation. This reactive, short-term attitude is endorsed by Dick Hortensius, who indicates that a lack of time of owners is part of the reason why strategic analyses are absent. However, he does believe that a successful owner of an ME should be able to keep track of the most important (environmental) trends in his environment. The way that existing EMS approaches require stakeholder assessments to be conducted does not fit the reality of MEs. They prescribe a time-consuming assessment and documentation of all stakeholders and their demands, while MEs simply seek to react to any demands that they are confronted by. Although interviewees indicate that they are mostly aware of relevant demands from customers, they do indicate that changes in legislative demands can be hard to keep track of. Neither the studied MEs, nor the existing EMS approaches have an effective method to keep track of relevant environmental legislation.

Strategy development

During strategy development, the self- and stakeholder assessment are processed to construct an environmental strategy for the company. Within the group of studied MEs, this means that an environmental policy and strategy are developed in response to demands from customers and legislation. An environmental policy is developed first, by owners or top managers in the company. When these policies have to be translated into concrete targets, responsibility is often transferred to a (QHS)Environmental team or –manager. Employees from the factory floor are also involved in determining environmental targets, as interviewees state that they can provide valuable input. One interviewee explains: “That man at the machine, what he thought of, I could never have thought of that, because I don’t know how the machine works, that is how you can improve.” The environmental strategies and targets that are developed are for the short term, and aim to improve the environmental performance through concrete changes (e.g. changing light bulbs). In some cases, interviewees indicate that the environmental policy and targets are developed alongside other areas such as product development, in order to integrate the EMS into the organisation. However, in most cases, environmental aspects remain inferior to factors such as quality and price. One interviewee states: “The environment is one thing, but you also have a business to run. It can’t be the case that the company goes bankrupt by benefitting the environment. That’s not healthy. I don’t think that’s acceptable.”

Most existing EMS approaches require companies to develop an environmental policy based on the demands from its stakeholders. This policy needs to be translated into environmental targets, which are preferably quantifiable. Although the approaches describe the general requirements of an environmental strategy, they fail to specify how companies should go about developing such a strategy. Some EMS approaches do indicate certain areas (e.g. waste or energy) in which the company must develop, while still others provide the company with a fully developed checklist of environmental objectives. By doing so, they respond to the need for companies to find areas in which to improve, and reduce the effort MEs have to put into coming up with targets. The Green Network even provides its members with some tools to use during strategy development: A guide to green procurement, energy conservation guides, and a chemistry wizard to control hazardous substances. To come up with

practical environmental targets, some EMS approaches also suggest involving employees in strategy development, for instance through brainstorm sessions.

Interpretation

Because MEs are mainly developing their environmental strategy in response to acute demands from customers and legislation, they have a short-term focus. Owners or a few top managers set up a general environmental policy, which is subsequently translated into targets that aim to improve the environmental performance of the company. Employees are involved in the development of targets, as they can offer practical ideas. Existing EMS approaches do not offer a method for companies to develop strategies, but the studied MEs also do not seem to need help with this. However, MEs are struggling to come up with new ideas for continuous improvement. EMS approaches can offer help by providing tools or ideas in this regard. Some approaches do this, providing the necessary input for MEs to construct their environmental targets. Frans Stuyt indicates that these checklists or guidelines are valuable to MEs, who often lack the time to come up with strategies themselves. Several interviewees indicate that they see the value and necessity in integrating environmental aspects into policy regarding their core business (e.g. product development). Existing EMS approaches do not offer the tools or methods to support this integration.

Implementation

As far as the implementation of environmental strategies into the organisation is discussed, the emphasis does not lie specifically on either formal or informal aspects. In terms of implementing strategies into the organisation, the scrutinised companies are including physical dynamics, as well as both the formal and informal aspects of social dynamics. The attention to both physical and social dynamics is emphasised by one interviewee who says: “I think you have to create a certain awareness to realise quantitative goals.” Strategy is implemented formally through the division of responsibilities (n=9) and the transfer of targets and specific projects to employees (n=7). Informal implementation of strategies takes place by creating awareness through presentations and explanations (n=9). Awareness is further improved by involving employees in decision-making processes (n=7).

When assigning responsibilities, these are often placed as low as possible in the organisation’s hierarchy. Leaders of small teams are given the responsibility over the environmental aspects that relate to the activities covered in their team. The same principle is used when determining projects. These projects are derived from the environmental strategy, but broken down into pieces that can be realised in a short period of time. They are made concrete and manageable, and one or a few employees are assigned to each project. Awareness is created in several ways: Periodic presentations about environmental policy, newsletters, and manuals are among the tools that are used most often. In addition to this top-down method to create involvement, employees are often invited to join the decision-making process. This is sometimes done by placing suggestion boxes, but mostly by organising meetings where long-term policies are translated into short-term targets and projects using input from lower levels in the organisation’s hierarchy. Many interviewees indicate that to monitor their quantitative targets, indicators are designed to be able to check whether these targets are being met. Whenever targets are of a more practical kind (e.g. replacing light bulbs), monitoring them does not require such indicators.

The way that strategies can be implemented into the organisations is hardly specified in the analysed EMS approaches. Some approaches indicate that policies, rules, and targets must be implemented and communicated to the appropriate employees in the company. In addition, the company is sometimes required to identify if the necessary competencies exist among employees. If this is not the case, they are required to provide training. To create awareness, EMS approaches suggest to give presentations and explanations regarding the environmental policy. The informal aspects of companies is almost completely left out in these approaches. The Acorn scheme briefly mentions the need to create a process of cultural change, but it does not specify how. The EMAS Easy approach mentions behavioural changes as part of implementing change, but does not emphasise the need, or provide a method to do so. Several EMS approaches do require the company to implement indicators to keep track of their environmental targets, as they assume that environmental targets are often measurable.

Interpretation

The studied companies use a variety of ways to implement their environmental strategies into both the physical and social dynamics of their organisation. Formally, responsibilities are divided and placed as low as possible in the organisation, and practical, short-term projects are assigned to specific employees. These projects are derived from the targets that were developed together with the employees, already increasing their involvement with the EMS. To further increase awareness, presentations are given, and newsletters and manuals are distributed. Existing EMS approaches take a far more formal approach to implementation, requiring a lot of documentation, rules, and indicators to be developed and implemented. The implementation methods that existing EMS approaches prescribe are too formal for MEs. However, the studied MEs show that they already know how to implement strategies in their organisation. They are even going one step further, and including the informal aspects of the organisation when implementing strategies. Both Dick Hortensius and Frans Stuyt indicate that implementing the environmental strategy into the organisational culture of the company is important. However, they also stipulate that because culture is not formalised, EMS approaches struggle to find a way to incorporate this aspect. Luckily, findings from the case study show that MEs are already aware of the necessity to involve the organisational culture when implementing strategies. Affecting this culture may even be easier for these companies, as Dick Hortensius indicates that due to the short lines of communication between owners or managers, and employees, culture is affected more easily. In his eyes, this removes the need to formalise the implementation into informal social dynamics.

Corrective action

Most interviewees indicate that they use KPIs and quantifiable targets to keep track of the effectiveness of their environmental strategy. These indicators are evaluated by owners or managers. Corrective action based on this evaluation takes place in different ways. Some interviewees indicate that they are constantly reviewing their indicators, and correcting their EMS on that basis. However, several others state that these results are only reviewed during management reviews which take place periodically, once or twice a year. Management reviews serves as input for strategy development, as companies learn from their experiences with environmental management, and adapt their policy and strategies to it. All companies certified to the ISO 14001 standard also conduct internal audits as a way to monitor the effectiveness of their EMS. It is expected that feedback on the observations during these audits is given directly, although this was not derived from the interviews. It was found that observations from internal audits serve as additional input for management reviews, and result in indirect feedback that way. Finally, monitoring also takes place through inspection rounds on the factory floor. During these rounds, the daily goings in the company are observed, and feedback is given directly, as an interviewee explains: "When I make my round through the factory I look at working conditions, safety, the quality of the products, but also at the process, at environmental impacts, if the escape routes are clear, if the forklift truck is placed correctly." Contrary to indicators and internal audits, findings from inspection rounds also lead to corrective action on an informal level. When behaviour is observed that is undesirable, a dialogue is started to explain why this behaviour is unwanted. In this way, the organisational culture is influenced by conveying the reasons behind certain environmental strategies.

The existing EMS approaches mostly prescribe two techniques for corrective action in the EMS. Firstly, quantitative indicators are used to measure whether environmental targets are being met. For instance, when energy usage has to be reduced by a certain percentage, performance indicators (PI) are used to keep track of the company's energy use. Secondly, internal audits are used to monitor the effectiveness of the EMS as a whole. They are to take place periodically, either once or twice a year. This is a formal method that follows predetermined patterns, and checks whether the system is functioning as it is supposed to. Findings from both monitoring techniques are to be evaluated and discussed during management reviews, to serve as input for the strategy making process. The approaches also require companies to have a system of corrective action and emergency response in place, but do not specify how this should take form. The VCA** requires companies to have an observation programme in place to help improve environmental conduct, thereby touching upon corrective action regarding informal aspects. However, the system is not specified further.

Interpretation

The studied MEs monitor quantitative indicators, use internal audits, and conduct informal inspection rounds. Quantitative results and findings from internal audits are evaluated on a strategic management level. In some companies this takes place constantly, while others only conduct periodic management reviews. Either way, findings are used as input for strategy development, indirectly causing feedback to take place by altering the EMS. All these processes are also described in existing EMS approaches. As a result, companies have been involving their management in the evaluation of the EMS. The inspection rounds that are also being conducted at the studied MEs are not covered in existing EMS approaches. These rounds are not formalised, and do not monitor specific aspects of the

company. Rather, they aim to observe any behaviour that is unwanted, and corrective action takes place directly. By conducting these rounds, MEs are also correcting their informal aspects. If unwanted behaviour is observed, a dialogue is started, explaining why things are not wanted, affecting the organisational culture directly. These informal aspects are not covered in EMS approaches. In general, the take of existing EMS approaches on corrective action is seen as too rigid by Dick Hortensius. He also indicates that EMS approaches are struggling to internalise the monitoring of informal aspects. However, findings show that EMS approaches are not required to address this subject, as MEs already have it covered.

Synthesis

Findings show that the environmental strategy of MEs has a short-term focus, and is based on their reactions to demands from customers and legislation. Owners and managers of these companies lack the time to conduct strategic analyses, but rather choose to react to certain demands from their environment when these seem urgent to them. The stakeholder assessment as described in EMS approaches does not suit this mentality, as it is focuses on the longer-term, and involves groups of stakeholder that are less important to MEs. Based on demands from their environment, MEs develop a strategy that aims to improve their environmental performance. The findings show that these companies can use help in assessing their own environmental aspects, and to determine which improvements they can make as a result. Mapping the company and its aspects is an informal, practical method of self-assessment that suits MEs. External consultants who carry out these assessments are also valuable, but costs have to be low. By appointing specific areas and methods to improve on environmental performance, EMS approaches or sector organisations can also provide a valuable contribution to the strategy development. MEs already show that they are able to involve their employees in such a way to come up with practical targets and projects, when they have found areas to improve in. Strategies are implemented by dividing responsibilities to employees as low as possible in the hierarchy, and by giving short-term projects to employees which suits their day-to-day work. Awareness is created by giving presentations, handing out newsletters and manuals, and by allowing employees to get involved in strategy development. Current EMS approaches do not suit this way of implementation, as they are more formalised, and require more documentation and procedures. In terms of corrective action, existing approaches have made MEs aware of the need to involve top management in the evaluation of the effectiveness of the EMS. Evaluation of quantitative indicators and results from internal audits are used as input for strategy development, allowing the organisation to learn from experiences with environmental management. Although corrective action regarding the informal aspects of the organisation are not covered in existing EMS approaches, these are included in the studied MEs. During inspection rounds, any unwanted behaviour is directly commented upon, and a dialogue serves to explain why certain behaviour is not desired. By doing so, the organisational culture can be monitored and even affected, due to the short lines of communication in MEs.

5. Discussion

In this section, the main theories and bodies of literature that relate to the subject of this research are discussed in light of the findings described above. Subsequently, methodological implications are discussed, including the generalizability, reliability, and validity of the study.

5.1 Relating findings to existing literature

Self-assessment

Within the sample of studied MEs, self-assessments take place in response to demands from stakeholders. During these internal assessments, the companies focus primarily on identifying the environmental impacts of their operations, in order to find areas in which they can improve their environmental performance. The general approach is in line with Azapagic (2003), Asif *et al.* (2013), and Maon *et al.* (2009). These authors indicate that determining an environmental vision and strategy has to be preceded by an identification of stakeholders' demands and wishes. When these demands have been established, the company should conduct a self-assessment, to identify how the stakeholders' demands relate to the company's current operations. However, these authors also suggest to take into account the company's strengths to construct its environmental strategy upon. Findings show that MEs only assess their environmental impacts in order to find room to improve their environmental performance. Vermeulen and Witjes (2016) suggest a slightly different approach, in which companies conduct a self-reflective analysis to identify room for innovation. The results from this analysis should provide the company with a basis for their longer-term strategy. In order to conduct this analysis, the company would need search directions, which can best be identified in consultation with societal actors. Due to the need to consult with societal stakeholders, the latter approach does not differ as much from the former, but it uses a different basic principle.

By including an identification of the company's strengths, rather than solely looking at the environmental impacts of operations, companies may be able to develop an environmental strategy that makes use of their specific characteristics. This can result in an environmental strategy that yields benefits for the company. For instance, a company can base its environmental strategy around developing a certain 'green' technology that is closely related to its current technology. In addition to improving its environmental performance, the company can then market this green technology, appealing to a new market and increasing its revenues. As stated by Dick Hortensius, owners of MEs lack the time to make long-term strategic analyses. This explains the lack of long-term strategies and analyses in the studied MEs. As companies are only responding to acute demands from their external environment, thorough self-assessments as suggested in literature, which map the companies' resources and capabilities, do not suit the EMS of these MEs.

In this study it was found that an informal, practical method to conduct a self-assessment through Ecomapping, is suitable to MEs. Suggestions by Duncan *et al.* (1998) to conduct a self-assessment based on the different processes in the company provide a more inclusive view of the company, including resources and capabilities. However, this approach also requires more time, knowledge and effort, and the results exceed the MEs' needs, making it less suitable for these companies. The LCA methodology proposed by Zobel *et al.* (2002) could serve as a helpful tool for companies who are struggling to identify their environmental impacts. The method requires thorough knowledge of the different impacts in the lifecycle of products, and may exceed the knowledge of MEs. All in all, the method may be too extensive and formal to suit the characteristics of MEs.

To summarise, the approach to self-assessments that is used by MEs is generally in line with literature. Companies react to demands from stakeholders, and assess their internal situation in light of these demands. As demands for MEs primarily originate from customers and legislation, and relate to the environmental impact of companies, self-assessments in these companies aim to identify environmental aspects and impacts. Practical methods such as Ecomapping are most suitable in this regard.

Stakeholder assessment

The studied MEs do not conduct an actual stakeholder assessment, but rather react to demands from customers or legislation as they arise. They lack a view on their long-term risks, and rarely focus on the opportunities that arise from their external environment. These observations are in line with literature regarding the survivalist nature of MEs. Darnall and Edwards (2006), Ferrón Vílchez and Darnall (2014), and McKeiver (2005) all stipulate that MEs tend to focus on the survival of their company on the short term, rather than looking very far ahead. Findings are also supported by Supyuenyong *et al.* (2009) who identified that due to their limited amount of products and customers, MEs feel the need to respond quickly to demands from customers.

To ensure a thorough identification of threats and opportunities, Baumgartner (2014) and Pojasek (2012b) suggest taking into account all internal and external stakeholders, as well as political, legal, economic, societal and technological factors. In addition, Pojasek (2012b) suggests involving employees in the identification of opportunities and threats. Besides providing more insight into the company's risks, this also enhance the sense of involvement and awareness among employees. Existing EMS approaches also lean towards this elaborate method of stakeholder assessment. However, findings show that MEs are more reactive in terms of their stakeholder assessment. As owners or top managers of MEs lack the time to conduct extensive stakeholder assessments, the assessments proposed in literature do not suit the characteristics of MEs.

To summarise, the current method to identify threats and opportunities that is used by MEs is characteristic to MEs in general. These companies focus primarily on threats that compromise their short-term survival, mostly ignoring the long term and the chance to seize opportunities in their external environment. Extensive assessments proposed in literature and existing EMS approaches do not suit the short-term, reactive nature of MEs.

Strategy development

In the studied companies, long-term policy development is the domain of owners or a few top managers in the company. Based primarily on demands from customers and legislation, they decide which (environmental) objectives to pursue. They stay involved by conducting management reviews and sometimes by explaining policies during periodic presentations. The on-going involvement of top management is viewed by Azapagic (2003), Schein (2010), and Zutshi and Sohal (2004) as essential to the successful implementation of an EMS. According to them, leaders should show commitment to (environmental) sustainability and lead by example in this regard to get employees on board. Supyuenyong *et al.* (2009) further emphasise the importance of the commitment of owners or top managers in MEs, since in these companies they make all strategic decisions, and divide the available resources. The role of top managers in explaining environmental policy and the urgency behind it is emphasised by Raps (2004), who states that this is one of the requirements to implement policy into the organisational culture. The findings from the present study are in line with these authors, as interviewees indicate that owners and top managers play an important and continuous role in the EMS.

The task of translating long-term policies to environmental targets and strategies is transferred down to (environmental) managers, who involve employees from lower levels of the company's hierarchy. This involvement creates awareness among employees while simultaneously providing practical input to managers. Involving employees in the decision-making process leads to practical solutions, but is also an important factor of implementing strategy into the social dynamics of the organisation. This is in line with suggestions made by Raps (2004) who states that maintaining open communication from the bottom-up creates a sense of involvement with employees, thereby including the organisational culture in the EMS.

The entire process of strategy development is characterised by a short-term focus. Strategies are developed to respond to pressing demands, and the duration of strategies is short. Again, this is in line with Darnall and Edwards (2006), Ferrón Vílchez and Darnall (2014), and McKeiver (2005) who discuss that MEs focus on survival on the short term. Additionally, Biondi *et al.* (2000) indicate that MEs lack experience with defining their environmental objectives and activities in detail. This is supported by Supyuenyong *et al.* (2009) who note that generally, MEs have less formalised rules and procedures. Both practice and literature show that MEs do not make use of formalised, long-term environmental strategies. However, this opposes trends in existing EMS approaches which require a documented long-term policy and associated targets.

To summarise, the way planning takes place in the companies studied here is largely in line with the way existing literature describes. Top management is involved in determining the long-term environmental policy, and in explaining it to employees. Long-term policies are translated into short-term strategies and targets by managers and other employees. This creates awareness and practical input. Involving employees in this way is not often included in literature, but takes a prominent position in the case study. This can be due to the size and structure of MEs, making open communication between hierarchical layers easier. Either way it improves the attitude of employees in relation to the EMS, as they can contribute with concrete solutions. The way that environmental strategies should actually be designed is not specified in literature or existing EMS approaches. In practice,

environmental strategies in MEs are pragmatic in nature, and simply aim to improve the performance of the company in certain areas.

Implementation

The results from the case study show that implementation of environmental strategies happens through division of responsibilities and tasks (formal), and by creating awareness and involvement (informal). By doing so, companies implement their strategies into the physical and social dynamics of the organisation. This means that within these MEs, the dual focus on social and physical dynamics that Vermeulen and Witjes (2016) emphasise as being essential in corporate sustainability, is included. This dual focus exists throughout the EMS, including the implementation, monitoring, and feedback mechanisms that the companies use. Furthermore, both formal and informal aspects of the organisation are incorporated in the management control systems of these companies. These systems comply with recommendations from Carenys (2012), Lozano (2013), and Raps (2005) that state that a properly functioning MCS should include both.

In terms of implementation, the informal mechanisms that the studied companies use are in line with suggestions by Raps (2004), who indicates that open communication from the bottom up, as well as thorough explanations from the top-down are required to keep employees on-board. Due to the flat vertical structure of MEs compared to larger companies, lines of communication are shorter, and implementing policy into social dynamics is found to be easier, as is discussed by Supyuenyong *et al.* (2009). These authors also state that because the organisational culture in MEs is more unified in nature, and because the owner is more directly involved with his employees, behaviour is affected more easily. Additionally, because there are less people employed in MEs, employees are more likely to be aware of projects that are initialised to increase environmental performance, improving awareness. All of these characteristics of MEs contribute to the fact that implementation of environmental strategies can be more informal in these companies. This explains why existing EMS approaches to strategy development do not suit MEs: Their formalised implementation methods do not fit the informal nature of MEs.

The formal implementation methods used in the sample of MEs include changing the organisational structure of the companies by distributing responsibilities (vertical) and dividing targets and projects among employees and departments (horizontal). These methods mostly correspond to literature regarding implementation of policy into organisations by Carenys (2012), Pojasek (2012b), and Raps (2004). Control mechanisms such as emergency procedures or other safeguards that are included into the process of implementation by these authors, are not identified in the case study. As they were not specifically included in the interview design, it is possible that they are included into the companies' organisations anyway. This is especially likely because the ISO 14001:2004 standard to which most companies are certified requires such procedures to be present. Whether MEs require formalised emergency response procedures to operate their EMS was not identified in this research, and can be studied in future. Identifying this can provide additional insight into the control mechanisms of MEs.

To summarise, the studied companies use both formal and informal means to implement policy and strategies into their organisation, thereby influencing both their social and physical dynamics. The techniques used here are in line with existing literature. The formal mechanisms include the distribution of responsibilities, projects, and tasks, and the drafting of formalised rules and procedures.

Informal implementation happens through explanations of policy by company leaders, and the involvement of employees in the decision-making process on a strategic level. The short lines of communication in MEs, and the number of employees make it easier to use these informal implementation techniques. Because informal implementation methods are considered easier in MEs, existing EMS approaches are not only unsuitable to these companies, but also burden them with additional procedures and documentation.

Corrective action

Inclusion of both the social and physical dynamics in controlling the EMS is in line with recommendations by Michie and West (2004) who state that both are required to maintain the EMS. In practice, this means that corrective action takes place formally and informally, and observations are required from quantitative and qualitative sources in the company. Ouchi (1978) mentions output- and behaviour control for this purpose, two techniques that are identified within the sample of MEs in the case study.

Several indicators are implemented and evaluated to assess the quantitative aspects of the EMS. These include, amongst others, measurements of energy and fuel use. Internal audits are conducted to monitor the functionality of the EMS overall: Whether rules are being followed and if tasks are carried out correctly. It is expected that corrective action takes place directly during these internal audits, but this is not concluded from the interviewees. Future research can focus on corrective action in MEs to get an even better view of the methods that are used in these companies, and whether they are successful in maintaining the EMS. It was established that corrective action takes place through management reviews. In these reviews, results from quantitative indicators and internal audits are evaluated on a strategic management level, and findings serve as input for future strategy development. Authors discussing the key components of management systems (e.g. Burns, 1999; Ferrón Vílchez & Darnall, 2014; Pojasek, 2012a) all include the management review as a reliable way to control the functionality of the EMS. However, this formalised corrective action relies on the fact that someone knows what has to be monitored, and can provide feedback if the observed state differs from the desired state. For instance, when the company wishes to reduce energy consumption, and observations indicate that the energy use is still too high. Also, these methods do not include the informal aspects of the organisation, such as its culture. Carenys (2012) points out the need for informal corrective mechanisms and the fact that they are becoming more prominent in MCSs. Not only are they necessary to monitor organisational culture and individual behaviour, they also give the person who is monitoring the possibility to observe without knowing beforehand what it is exactly he is looking for. As a result, informal monitoring allows the control of unexpected problems. Although this justifies the need for informal corrective action mechanisms, none are specified in literature. The studied companies use inspection rounds, in which an owner or manager goes around the factory, observing any undesired behaviour that might be taking place. During these rounds, feedback is given directly, and a dialogue is started with employees to explain the reason why certain behaviour is unwanted. The small size of MEs allows these inspections to be performed regularly, without taking too much time. Additionally, top managers may conduct inspection rounds themselves in these organisations, giving them a sense of the informal aspects of their organisation and serving as input for the management review.

The fact that the studied companies also incorporate informal and behavioural control in their EMS is clarified by Ouchi (1978), who states that larger companies are simply more reliant on output control. According to him, behavioural peculiarities vary too much within the same organisation due to the vertical and horizontal differentiation. Because this makes it difficult to compare groups to each other, and because output control is unambiguous, large organisations are better off relying on formal methods.

To summarise, the studied companies use a wide array of corrective mechanisms that include their social and physical dynamics, as well as their formal and informal aspects. Evaluation of quantitative indicators and results from internal audits are used to control the formal aspects of the EMS, with feedback on these results taking place through management reviews. The case study also shows that inspection rounds are an effective way for MEs to correct the informal aspects of the organisation. They allow monitoring of the organisational culture and of the behaviour of its employees, and direct feedback on unwanted behaviour. The formal mechanisms for corrective action that were identified in this study are in line with existing literature. Although literature also identifies corrective action on informal aspects as an important aspect of the EMS, no methods are specified in literature or existing EMS approaches. However, the case study findings show that in MEs, this feedback takes place through informal inspection rounds. Due to the flat structure of MEs and short lines of communication, these rounds are particularly effective in MEs.

Synthesis

This study shows that studying environmental management requires a holistic view of organisations. It includes internal and external factors, social and physical dynamics, and formal and informal aspects. Different bodies of literature describe relevant parts of the EMS, including the organisational structure, -control, -behaviour, and –culture, and corporate sustainability. By combining knowledge from these bodies of literature into a holistic framework, this study has attempted to fill the literature gap that exists between organisation theory, and studies regarding practical environmental management in SMEs. The conceptual framework developed here combines relevant aspects from organisation theory, providing a holistic view of those factors that are relevant when managing environmental aspects in an organisation.

Existing EMS approaches have yet to include mechanisms to implement environmental strategies into the informal aspects of the organisation. Neither have they specified the way in which corrective action of informal aspects should be organised. However, MEs have already started to realise their importance, and starting incorporating informal aspects in their MCS. Suggestions by Vermeulen and Witjes (2016) that social and physical dynamics should both be included, as well as the notion by Carenys (2012) that an MCS should also incorporate informal aspects, are adhered to by MEs in practice. Whether the informal mechanisms identified in this study are also being applied in other companies besides MEs or whether they are suitable for companies of a different size, is a subject for future research. It is expected that due to the smaller amount of employees in MEs, and the flatter structure of the organisations, informal aspects are more suitable in these companies. For instance, informal inspection rounds by an owner in a multinational is not realistic, and bottom-up communication of concrete targets related to policy is easier with a flat organisational structure. This implies that companies with even fewer fte's than MEs, or flatter structures, are also suitable for these informal practices.

Environmental management systems are dynamic, and have to be organised in such a way that they respond to changes in the company's environment. The studied companies are aware of this requirement, and incorporate a system of continuous improvement. This is line with suggestions by Azapagic (2003), Darnall and Edwards (2006), and Pojasek (2012b) who indicate that this is an elementary part of environmental management. However, the continuous improvement mechanisms included by the studied companies lack a strategic component. The companies are continuously looking for areas to improve their environmental performance, such as lighting, energy consumption, or waste separation. Because of this practical approach, some companies are struggling to come up with new areas to improve in. Incorporating environmental aspects into long-term strategic processes such as product development may alleviate this problem. This change is also mentioned by Engert, Rauter, and Baumgartner (2015) who indicate that integration of corporate sustainability on a strategic level is still absent in many companies (including MEs and larger companies). Whether long-term environmental policies and strategies can be used in MEs, and how these influence their EMS, is a topic that can be studied in future.

5.2 Generalizability, reliability, and validity

The methods that were chosen to carry out this research have certain implications for the findings that result from it. These implications can be divided into the generalizability, reliability, and validity of the research (Saunders et al., 2008). Generalizability describes the extent to which findings from the study can be applied to other situations. Reliability describes the extent to which the techniques that were used to collect and analyse data will yield the same results for other researchers. Finally, the validity of the study is the extent to which the methods accurately measure what they are intended to measure (Saunders et al., 2008).

Generalizability

As the research focused on medium-sized enterprises in the Dutch metal industry, generalizability of the findings from the case study are limited. Micro- and small-sized enterprises differ from medium-sized enterprises in terms of their environmental aspects, and organisational structures. Conducting a case study including either of these types of companies is therefore likely to result in different findings throughout the research. Furthermore, the sample of companies only included companies in the metal industry which are not involved in processes with a large environmental impact. Case studies that include other sectors, or different processes, may yield other findings. In addition, the scrutinised companies indicate that they mostly operate business-to-business, meaning that they are less visible to the public and therefore receive less public attention. Companies that sell their products directly to consumers may have to adapt their EMS to this situation. Conducting the case study in the Netherlands results in specific regulatory- and cultural conditions that may have affected the findings. Finally, the sample of companies included in the case study is based on clients of LBP|SIGHT, an external advisor. Because of this, findings may not reflect the reality of MEs in the Dutch metal industry that are not currently receiving advice, or companies that are less involved with their EMS. Studying companies with less knowledge of environmental management can result in alternate results. Future research that changes one or several of the conditions discussed above may result in new, additional insights. Comparing these to results from the current research can provide a look into the way that specific characteristics of companies influence their EMS. Finally, the heterogeneity of companies is an important characteristic of (S)MEs in general. As the sample of companies in this study is fairly homogeneous, studies with a heterogeneous sample may yield other findings.

Reliability

There are several factors that may have influenced the reliability of the research findings, these are participant error or -bias, and observer error or –bias (Saunders et al., 2008). Participant error refers to subconscious factors that may have affected the way participants answered interview questions. In this case, the different functions that interviewees have within their organisation may have affected their knowledge of their EMS. However, all interviewees are expected to have a clear view of how environmental aspects are dealt with in their organisation as they are either owners, or involved in managing the EMS. The position of interviewees within the organisation may also have led to a certain bias in their answers. For instance, a QHSE-manager focuses completely on these aspects of the organisation and may feel that more resources should be made available to him, while an owner focuses more on the continuity of the company as a whole.

Additionally, the fact that all scrutinised companies are a client of LBP|SIGHT, may have influenced their answers as they have received professional advice in regards to their EMS. Furthermore, as all companies are familiar with the ISO 14001 standard, the requirements in this standard have influenced the way companies have organised their EMS. In order to verify the results from the interviews, the interviewees were sent the transcripts, allowing them to go through their answers and provide corrections they might have come up with after taking a second glance.

Observer error may have occurred due to the semi-structured nature of the interviews. Although the questions were defined prior to the interview, and can be simulated in future research, the way follow-up questions are asked depends on the interviewee. Finally, observer bias is related to the perception of the researcher, and has possibly influenced the analysis of the case study. Because of the internship the researcher conducted at an external advisor, it is possible that the perception of the findings in this study differ from those of a person repeating this study without conducting an internship, or with experience in a different kind of environment.

Validity

During the interview, respondents were specifically questioned regarding certain elements of their EMS, in accordance with the conceptual framework derived from literature. They were also given the opportunity to come up with other elements that they found important in terms of how they handled environmental aspects of their organisation. By doing so, the conceptual framework was verified, and all elements of an EMS were discussed. However, in case of the self- and stakeholder assessments, questions were not directed to the way in which these assessments were conducted, but rather to the results of these assessments. In some cases, interviewees did not go into the processes themselves, and some insights may have been overlooked. Future research in this area should focus specifically on the way these elements are organised, rather than the results thereof. During the analysis of EMS standards, some existing standards are likely to have be overlooked. In addition, choices were made to incorporate standards based on availability in Dutch or English. Future research may incorporate other standards and identify additional approaches that are applicable for MEs.

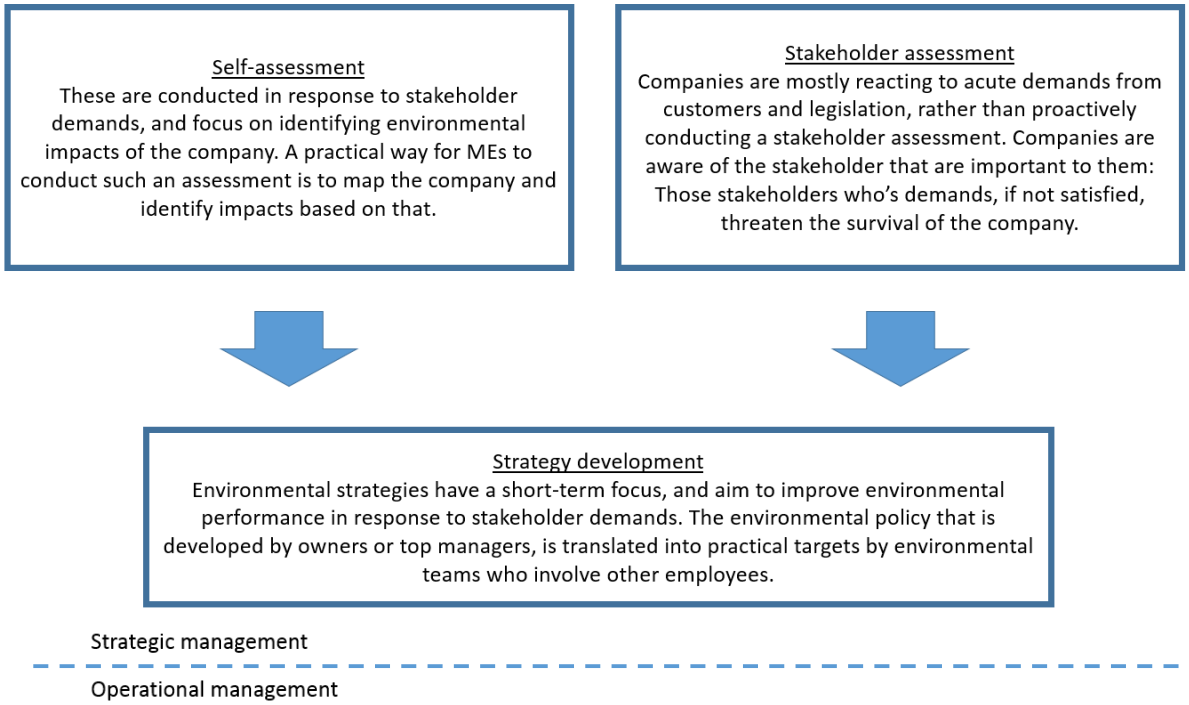
6. Conclusions

The research question that is answered in this study is *"How should an environmental management system be designed to fit the characteristics of medium-sized enterprises?"* To answer this question, a conceptual framework was constructed based on a literature review. Subsequently, a case study was conducted to find out how MEs address the elements of an EMS in practice. Additionally, existing EMS approaches were scrutinised to identify how these approaches address the elements of the conceptual framework, and whether these fit the characteristics of MEs. Based on the way companies address the elements of an EMS now, and whether they need help in certain areas, a synthesis is constructed that combines information from both analyses.

An EMS is used in an organisation to systematically deal with environmental aspects. It is the way that a company deals with demands from its stakeholders with regards to the environment, and how these demands are integrated into the organisation. Based on these demands, and based on the company's own environmental aspects, a strategy is embedded into the organisation to reach certain objectives. By observing the effectiveness of the strategy, and whether it is correctly implemented into the organisation, the organisation is also able to learn. It corrects the mistakes it makes, and adapts its future environmental policy and strategy based on past experiences. Every company has some sort of EMS, but to function properly, it has to suit the characteristics of the organisation. The characteristics of MEs that affect their EMS most are the informal behaviour in these companies, the short lines of communication and flat hierarchical structure, and the fact that owners focus mostly on the short-term survival of the company. For the EMS to function in these companies, it has to fit these characteristics. The environmental policy and –strategy in MEs is based primarily on demands by customers and legislation. Rather than conducting an analysis to map stakeholders' demands, and plan ahead based on these, MEs react to demands that are imposed on them. Therefore, the EMS does not require a stakeholder assessment procedure, but must be designed to respond to demands that become apparent to owners or other leaders in the company. In the same way, a self-assessment does not take place as a basis for an environmental vision, but rather to identify which aspects of the company certain demands apply to. MEs can conduct a practical self-assessment by drawing out the organisation's processes, and writing down the environmental aspects of each part of the company. Assessing the demands imposed on the company, owners can now identify which changes have to be made to remain compliant to their stakeholders' demands. After developing the general environmental policy and –objectives, employees are consulted to translate these into practice. This results in practical targets and projects which can be implemented directly into the organisation. Due to the flat structure of MEs and short lines between people, the organisational culture is easily affected and employees are strongly involved with the company. By involving employees in strategy development, and explaining the reasons behind policies, environmental issues are integrated into the organisation. This means that to implement an environmental strategy, MEs do not require the formalised procedures and guidelines that are used in larger companies. People are simply given the responsibility over environmental aspects of their work, and projects are divided that substantiate the objectives of the company.

To control the functioning of the EMS requires a system that observes the system and makes corrections when necessary. Evaluation of performance indicators and internal audits takes place during management reviews. Results from this evaluation serve as input for the strategy development process. Feedback also takes place directly through inspection rounds. Because of the small size of MEs, owners and managers are able to make inspection rounds on a regular basis, checking for any unwanted behaviour. When noticed, feedback on this behaviour is given directly, by explaining the reason behind certain policies. Behaviour of employees is an artefact of the organisational culture in the organisation. Therefore, inspection rounds are the way that MEs include the informal aspects of their organisation into the EMS. By continuously correcting itself and improving the EMS, companies are able to learn, and adapt to their ever changing (environmental) environment. Figure 5 gives an overview of the way each element can be addressed separately.

Figure 5 The design of an environmental management system to fit the characteristics of medium-sized enterprises.



Physical		Social Dynamics (Formal)	Social Dynamics (Informal)
Concrete projects, tasks, and targets. Also results from involvement of employees in planning.	Implementation	Division of responsibilities that holds employees or managers accountable for environmental aspects in their job. Setting up rules to ensure uptake of policy.	Creating awareness and a positive culture towards environment by involving employees in decision-making, and engaging in explanations regarding environmental policy.
Output control to measure quantitative targets through indicators. Evaluation of results during management reviews, which serve as input for strategy development.	Corrective action	Internal audits or inspection rounds, monitoring uptake of rules. Evaluation during management reviews, which serve as input for strategy development.	Inspection rounds, artefacts of culture (e.g. behaviour) monitored to control uptake of policy in informal aspects of the organisation. Feedback given directly through dialogue which explains motivation for certain policies.

7. Recommendations

This section provides recommendations for medium-sized enterprises and parties providing consultation or advice to these companies. In addition, recommendations are provided for actors engaged in the development of EMS approaches and to sector organisations.

Recommendations for medium-sized enterprises

The integration of environmental aspects into other parts of the organization is seen by many interviewees as a great benefit. Whenever the EMS can be integrated into other management systems, this saves time and resources. However, environmental aspects can be integrated into other parts of the organisation as well. For instance, incorporating environmental concerns when developing a product can result in innovative products and new business opportunities. By doing so, companies can start to reap the benefits of environmental management, rather than having a certification because customers will otherwise look for different suppliers. This requires a long-term view, rather than focusing solely on the short-term survival of the company. Looking at the environment with this long-term, optimistic focus, can prevent future threats from customers and legislation, and create new streams of revenue. It also generates a positive attitude towards the environment among employees, making it easier to implement changes into the organization.

Several companies indicate that employees are being actively included in the planning process. They provide insight based on their day-to-day experience that helps to come up with creative, but also concrete and practical solutions. Additionally, people feel engaged with the EMS, improving the uptake of policy, and the attitude of employees towards the environment. Involving employees in this way now happens only after policy has been developed. This means that they are not being involved in the identification of threats and opportunities, or the construction of long-term strategies. Doing so may lead to even more helpful insights, and make the EMS something that belongs to everyone, rather than a system that was created autonomously.

Many companies already use informal practices to implement, monitor, and feedback on environmental aspects in the organisation. This includes involving employees in translating policies into targets, policies being explained by company leaders, inspection rounds to monitor uptake of policies, and dialogue and explanation to give feedback during these rounds. By doing so, companies go beyond requirements from standards, and develop their EMS in a way that is suitable to their characteristics. Companies should be aware that in the new version of the ISO 14001 standard, requirements related to the development of procedures, and documentation of the control system have changed. The new guidelines allow for more informal methods to be used in the EMS, as long as they can be shown during external audits. For instance, companies can write down shortcomings that were observed during inspection rounds, and how these were solved, to serve as a control system. They can even save e-mails and show these during audits as a form of control. By reading into the requirements of the ISO 14001 standard, and defining how the current organisational routines can be used to comply with this standard, companies can make their EMS suitable to their own characteristics.

To conduct a practical self-assessment, the Ecomapping method described in the EMAS Easy approach can be used by MEs. This method allows companies to quickly draw a top-down map of their company, and point out the environmental aspects of each part of the company. Consulting with employees when assigning the environmental aspects provides practical input and increases involvement. The

Ecomapping process can also be combined with e.g. mapping the health and safety issues of the organisation. This saves time, and provides an integrated look at the companies' processes.

Recommendations for consultants

The social dynamics, and specifically the informal aspects thereof are underrepresented in EMS approaches, although they play a vital role in the uptake of environmental policy. In addition, this study shows that involving employees is not only necessary, but also leads to creative solutions and innovative ideas. Consultants can emphasize the importance of these aspects to their clients. Additionally, the new ISO 14001:2015 standard makes way for a less rigid system, where informal practices such as inspection rounds can be shaped in such a way that they meet the requirements. Helping companies to make their EMS meet the peculiarities of their organization (mainly their size, structure, and easy communication) can make maintaining the system easier, and improves the attitude of companies towards the environment.

Companies turn to consultants because they lack the knowledge or know-how to solve specific problems. In case of the studied MEs, this means they ask for help to conduct measurements, set up systems (documentation, procedures), or to come up with ways to improve their environmental performance. Because MEs often focus on their short-term survival, they are likely to look for quick fixes instead of strategic opportunities. Consultants have the possibility to guide companies in their identification of threats and opportunities, to open their eyes to new possibilities. These possibilities include 'green' product development, using sustainable resources, entering new markets that focus on sustainability, and developing new business models aimed at e.g. circularity or leasing.

Consultants can play an important role in helping MEs during the development of environmental strategies. The interviews conducted in this study show that many MEs are struggling to come up with areas in which they can improve their environmental performance. Based on the company's self-assessment of its environmental aspects, consultants can provide valuable input using their experience and knowledge, and providing MEs with suggestions for improvement.

Recommendations for companies engaged in the development of EMS approaches

As companies are well aware of the international image of environmental responsibility that the ISO 14001 certificate has, they are not interested in an alternative certificate, even though it may suit their characteristics. Developing alternative certificates or standards that cover the entire EMS of an organisation are therefore not helpful to MEs. However, certain specific tools and methods can still help MEs in operating their EMS. The Ecomapping tool used in the EMAS Easy approach is an example of this, and so are tools such as the CO2 calculator and chemistry wizard provided by the Green Network. These are tools that help MEs fill the knowledge gap they experience in terms of environmental aspects. They simply provide the answer to a certain question that MEs may have in an easy way.

Current EMS approaches focus strongly on the documentation of how the EMS functions, documentation of the resulting environmental performance, and communication of these results to external stakeholders. However, MEs experience practically no interest in their environmental performance by other external stakeholders than their customers and by the government. Additionally, customers are often only interested in small parts of the organisation (e.g. environmental impact of a certain project), or they are satisfied if a company adheres to a certain standard.

Governments conduct audits at companies to check whether they adhere to the relevant environmental legislation. Requirements in EMS approaches regarding the communication are only relevant for large companies, or those companies that attract a lot of attention from consumers. For the majority of companies, including business-to-business MEs in the metal sector, these requirements are a burden. EMS approaches, including the ISO 14001 standard could remove these requirements, or make them apply only to larger companies.

Recommendations for sector organisations

Sector organisations can play a valuable role in providing MEs with information that they lack the time and expertise to retrieve themselves. Many interviewees in this study indicate that they have a hard time remaining up to date with the environmental legislation that applies to their organisation. In many cases, this is the reason for companies to hire consultants, as they feel that it would cost them too much time to figure this out. This is partly due to the way environmental legislation is set up in the Netherlands, as it is divided over several governmental bodies and written down in a complicated way. By staying up to date with changes in legislation, and notifying members to which certain changes apply, would be a great help to MEs.

Sector organisation can also help MEs to develop their environmental policies and strategies. As the sector organisation is aware of the trends in the sector, it can suggest certain areas in which companies can improve their environmental performance. If sector organisations periodically provided their members with a list of (environmental) trends in the sector, MEs have an easy way to keep up with possible improvements.

8. Acknowledgements

The author of this study would like to thank several people who made this research possible. First of all, a warm thanks goes out to Sjors Witjes for providing feedback and support during all stage of this study. The author is also thankful for the input provided by Walter Vermeulen which brought this study to a higher level. A special thanks goes out to Thijs van Rossum and Jeannette Levels for supervising the author's internship at LBP|SIGHT. Besides providing input for the study itself, the practical experience acquired during the internship was a very valuable addition to this research. The author would also like to thank Dick Hortensius, Frans Stuyt, Gerard Wyfker for their time and expertise. Finally, thanks go out to all interviewees who participated in the case study and provided a look into their organisations.

9. Bibliography

Ammenberg, J., & Hjelm, O. (2003). Tracing business and environmental effects of environmental management systems - a study of networking small and medium-sized enterprises using a joint environmental management system. *Business Strategy and the Environment*, *12*(3), 163–174.

Aragon-Correa, J. A., Hurtado-Torres, N., Sharma, S., & Garcia-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of Environmental Management*, *86*(1), 88–103.

Asif, M., Searcy, C., Zutshi, A., & Fisscher, O. A. M. (2013). An integrated management systems approach to corporate social responsibility. *Journal of Cleaner Production*, *56*, 7–17.

Azapagic, A. (2003). Systems Approach to Corporate Sustainability. *Process Safety and Environmental Protection*, *81*(5), 303–316.

Azapagic, A., & Perdan, S. (2005). An integrated sustainability decision-support framework Part I: Problem structuring. *International Journal of Sustainable Development & World Ecology*, *12*(2), 98–111.

Baumgartner, R. J. (2014). Managing corporate sustainability and CSR: A conceptual framework combining values, strategies and instruments contributing to sustainable development. *Corporate Social Responsibility and Environmental Management*, *21*(5), 258–271.

Brewer, J. D. (2004). Ethnography. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 312–322).

Bryman, A. (2012). *Social Research Methods*. *Social Research Methods*.

Burke, S., & Gaughran, W. F. (2007). Developing a framework for sustainability management in engineering SMEs. *Robotics and Computer-Integrated Manufacturing*, *23*(6), 696–703.

Burns, S. (1999). The natural step: A compass for environmental management systems. *Corporate Environmental Strategy*, *6*(4), 329–342.

Carenys, J. (2012). Management control systems : A historical perspective. *International Journal of Economy, Management and Social Sciences*, *1*(1), 1–18.

Centraal College van deskundigen VCA. (2008). *SHE Checklist Contractors*.

Cramer, J. (2005). Experiences with structuring corporate social responsibility in Dutch industry. *Journal of Cleaner Production*, *13*(6), 583–592.

Darnall, N., & Edwards, D. (2006). Predicting the cost of environmental management system adoption: The role of capabilities, resources and ownership structure. *Strategic Management Journal*, *27*(4), 301–320.

Delmas, M., & Toffel, M. W. (2004). Stakeholders and environmental management practices: An institutional framework. *Business Strategy and the Environment*, *13*, 209–222.

Deming, W. (1986). *Out of the crisis*. MIT press: Cambridge.

Denison, D. R., & Mishra, A. K. (2012). Toward a Theory of Organizational Culture and Effectiveness, *6*(2), 204–223.

Duncan, W. J., Ginter, P. M., & Swayne, L. E. (1998). Competitive advantage and internal organizational assessment. *Academy of Management Perspectives*, *12*(3), 6–16.

Dyson, R. G. (2004). Strategic development and SWOT analysis at the University of Warwick. *European Journal of Operational Research*, *152*(3), 631–640.

ECOCAMPING e.V. (2015). *ECOCAMPING Management*.

Eco-Lighthouse Foundation. (2016). Eco-Lighthouse. Retrieved July 28, 2016, from

http://eco-lighthouse.org/
Eggers, D. M., Villani, J., & Andrews, R. (2000). Third-Party Information Providers and Innovative Environmental Technology Adoption. *American Behavioral Scientist*, *44*(2), 265–276.
EkoKompassi. (2016). Ekokompassi-Sertifikaatti. Retrieved May 25, 2016, from http://www.ekokompassi.fi/en/criteria/?lang=en
EMAS. (2012). *EMAS "easy" for Small and Medium Enterprises*.
Engert, S., Rauter, R., & Baumgartner, R. J. (2015). Exploring the integration of corporate sustainability into strategic management: a literature review. *Journal of Cleaner Production*, *112*, 2833–2850.
Epstein, M., Buhovac, A., & Yuthas, K. (2010). Implementing sustainability: The role of leadership and organizational culture, *91*, 41–47.
European Commission. (2009). "Step up to EMAS": Study on Guidelines for Transition from Non-Formal EMS and ISO 14001 to EMAS. Retrieved July 28, 2016, from http://ec.europa.eu/environment/emas/emas_publications/publications_studies_en.htm
European Commission. (2016). Eco-Management and Audit Scheme. Retrieved July 24, 2016, from http://ec.europa.eu/environment/emas/index_en.htm
European Parliament. (2013). Commission Decision establishing the user's guide setting out the steps needed to participate in EMAS under regulation 1221/2009. *Official Journal of the European Union*, *131*(76), 1–39.
Eurostat. (2014). *Eurostat regional yearbook 2014*. *Publications Office of the European Union*. Retrieved from http://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-HA-14-001
Feng, T., Zhao, G., & Su, K. (2014). The fit between environmental management systems and organisational learning orientation. *International Journal of Production Research*, *52*(10), 2901–2914.
Ferenhof, H. A., Vignochi, L., Selig, P. M., Lezana, Á. G. R., & Campos, L. M. S. (2014). Environmental management systems in small and medium-sized enterprises: An analysis and systematic review. *Journal of Cleaner Production*, *74*, 44–53.
Ferrón Vílchez, V., & Darnall, N. (2014). Two Better Than One: The Link Between Management Systems and Business Performance. *Business Strategy and the Environment*, (October), n/a–n/a.
Freeman, R. E., & Reed, D. L. (1983). Stockholders and stakeholders: A new perspective on corporate governance. *California Management Review*, *25*(3), 88–106.
Gianni, M., & Gotzamani, K. (2015). Management systems integration: Lessons from an abandonment case. *Journal of Cleaner Production*, *86*, 265–276.
Gleckman, H., & Krut, R. (1996). Neither international nor standard: the limits of ISO 14001 as an instrument of global environmental management. *Greener Management International*, 111–124.
Gomm, R., Hammersley, M., & Foster, P. (Eds.). (2000). *Case study method: Key issues, key texts*. Sage.
Green Network. (2016). Green Network. Retrieved July 28, 2016, from http://greennetwork.dk/
Griffin, R. W., & Moorhead, G. (2007). Organizational Behavior: Managing People and Organizations. *Organizational Behavious: Managing People and Organizations*, 1–25.
Griffiths, J., & Jones, G. (2016). *Green Dragon Environmental Standard 2016*.

Hall, R. H. (1999). *Organizations Structures, Processes, and Outcomes*. New Jersey: Prentice Hall.
Hatch, M. J., & Cunliffe, A. L. (2013). *Organization Theory. Modern, Symbolic, and Postmodern Perspectives*. *New York*.
Henri, J.-F. (2006). Management control systems and strategy: A resource-based perspective. *Accounting, Organizations and Society*, *31*(6), 529–558.
Heras, I., & Arana, G. (2010). Alternative models for environmental management in SMEs: the case of Ekoscan vs. ISO 14001. *Journal of Cleaner Production*, *18*(8), 726–735.
Hill, T., & Westbrook, R. (1997). SWOT analysis: It's time for a product recall. *Long Range Planning*, *30*(1), 46–52.
Hillary, R. (Ed.). (2000). *Small and Medium-Sized Enterprises and the Environment*. Greenleaf Publishing.
Hillary, R. (2004). Environmental management systems and the smaller enterprise. *Journal of Cleaner Production*, *12*(6), 561–569.
Hui, I.-K., Law, H., Lewis, W. G., Pun, K.-F., Hui, I.-K., Lau, H. C. W., … Lewis, W. G. (2002). Development of an EMS planning framework for environmental management practices. *International Journal of Quality & Reliability Management*, *19*(6), 688–709.
Institute of Environmental Management & Assessment. (2016). Acorn Scheme. Retrieved July 28, 2016, from http://ems.iema.net/acorn_scheme/bs8555
International Organization for Standardization. (2016). Management System Standards. Retrieved December 7, 2015, from http://www.iso.org/iso/home/standards/management-standards.htm
Iraldo, F., Testa, F., & Frey, M. (2009). Is an environmental management system able to influence environmental and competitive performance? The case of the eco-management and audit scheme (EMAS) in the European union. *Journal of Cleaner Production*, *17*(16), 1444–1452.
Johnson, M. P., & Schaltegger, S. (2015). Two Decades of Sustainability Management Tools for SMEs: How Far Have We Come? *Journal of Small Business Management*, 1–25.
Johnson, P. (2004). Analytic Induction. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 165–179).
Jørgensen, T. H., Remmen, A., & Mellado, M. D. (2006). Integrated management systems – three different levels of integration. *Journal of Cleaner Production*, *14*(8), 713–722.
Kast, F. E., & Reosenzweig, J. E. (1972). General Systems Theory : Applications for Organization and Management. *Academy of Management Journal*, *15*(4), 447–465.
Kloot, L. (1997). Organizational learning and management control systems: responding to environmental change. *Management Accounting Research*, *8*(October 1996), 47–73.
Labodová, A. (2004). Implementing integrated management systems using a risk analysis based approach. *Journal of Cleaner Production*, *12*, 571–580.
Länsisalmi, H., Peiró, J.-M., & Kivimäki, M. (2004). Grounded Theory in Organizational Research. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 242–255).
Lehtonen, T. (n.d.). Ecostart. Retrieved July 28, 2016, from http://www.mittnorden.net/download/18.2bb36ac710a89e4920c80001254/
Linnenluecke, M. K., & Griffiths, A. (2010). Corporate sustainability and organizational culture. *Journal of World Business*, *45*(4), 357–366.
Lozano, R. (2013). Are companies planning their organisational changes for corporate sustainability? An analysis of three case studies on resistance to change and their

strategies to overcome it. *Corporate Social Responsibility and Environmental Management*, *20*(5), 275–295.
Maon, F., Lindgreen, A., & Swaen, V. (2009). Designing and Implementing Corporate Social Responsibility: An Integrative Framework Grounded in Theory and Practice. *Journal of Business Ethics*, *87*(S1), 71–89.
Massoud, M. a., Fayad, R., El-Fadel, M., & Kamleh, R. (2010). Drivers, barriers and incentives to implementing environmental management systems in the food industry: A case of Lebanon. *Journal of Cleaner Production*, *18*(3), 200–209.
McKeiver, C. (2005). Environmental Management Systems in Small and Medium Businesses. *International Small Business Journal*, *23*(5), 513–537.
McShane, S., & Von Glinow, M. (2011). *Organizational Behavior*. Irwin/McGraw-Hill.
Meuser, M., & Nagel, U. (2009). The expert interview and changes in knowledge production. In *Interviewing Experts* (pp. 17–42).
Michie, S., & West, M. A. (2004). Managing people and performance: an evidence based framework applied to health service organizations. *International Journal of Management Reviews*, *5-6*(2), 91–111.
Moors, E. H. M., Mulder, K. F., & Vergragt, P. J. (2005). Towards cleaner production: barriers and strategies in the base metals producing industry. *Journal of Cleaner Production*, *13*(7), 657–668.
Murillo-Luna, J. L., Garcés-Ayerbe, C., & Rivera-Torres, P. (2011). Barriers to the adoption of proactive environmental strategies. *Journal of Cleaner Production*, *19*(13), 1417–1425.
Nanda, A. (1996). Implementing Organizational Change Ashish Nanda, (617).
NEN. (2015). NEN-EN-ISO 14001 Milieumanagementsystemen - Eisen met richtlijnen voor gebruik.
OECD. (2005). *OECD SME and Entrepreneurship Outlook - 2005 Edition*.
Ouchi, W. (1978). The Transmission of Control Through Organizational. *The Academy of Management Journal*, *21*(2), 173–192.
Pfadenhauer, M. (2009). At Eye Level: The expert interview- A talk between Expert and Quasi-expert. In *Interviewing Experts* (pp. 81–97).
Pojasek, R. (2012a). Checking and Reviewing Sustainability Progress. *Environmental Quality Management*, 83–91.
Pojasek, R. (2012b). Implementing a Sustainability Management System. *Environmental Quality Management*, *20*(1), 83–90.
Pojasek, R. (2012c). Planning a Sustainability Thrust for Organizational Governance. *Environmental Quality Management*, 77–85.
Raps, A. (2004). Implementing strategy: Tap into the power of four key factors to deliver success. *Strategic Finance*, (June), 49–54.
Raps, A. (2005). Strategy implementation – an insurmountable obstacle? *Handbook of Business Strategy*, *6*(1), 141–146.
Reger, R. K. ., Gustafson, L. T., Demarie, S. M., & Mullane, J. V. . (1994). Reframing the Organization : Why Implementing Total Quality is Easier Said Than Done. *The Academy of Management Review*, *19*(3), 565–584.
Revell, A., Stokes, D., & Chen, H. (2010). Small Businesses and the Enviroment : Turning Over a New Leaf ? *Crr Conference 2008*, (September), 19.
Rollinson, D. (2002). *Organisational Behaviour and Analysis*.
Santos, G., Mendes, F., & Barbosa, J. (2011). Certification and integration of management systems: the experience of Portuguese small and medium enterprises. *Journal of*

Cleaner Production, *19*(17-18), 1965–1974.
Saunders, M., Lewis, P., & Thornhill, A. (2008). *Research Methods for Business Students*. *Research methods for business students*.
Schein, E. H. (2010). *Organizational culture and leadership*. *Leadership* (Vol. 2).
Seawright, J., & Gerring, J. (2008). Case Selection Techniques in A Menu of Qualitative and Quantitative Options. *Political Research Quarterly*, (1975), 294–308.
Silverman, D. (2006). *Interpreting qualitative data: Methods for analyzing talk, text and interaction*. Sage.
Simons, R. (1990). The role of management control in creating competitive advantage: new perspective. *Accounting, Organizations and Society*.
Sine, W. D., Mitsuhashi, H., & Kirsch, D. (2006). Revisiting Burns and Stalker: Formal structure and new venture performance łdots. *The Academy of Management Łdots*, *49*(1), 121–132.
Spence, L. J. (1999). Does size matter? The state of the art in small business ethics. *Business Ethics: A European Review*, *8*(3), 163–174.
Stichting Keurmerk Branches. (2015). *Reglement metaalunie MVO-monitor*.
Stichting Klimaatvriendelijk Aanbesteden & Ondernemen. (2015). *CO2 Performance Ladder 3.0*.
Supyuenyong, V., Islam, N., & Kulkarni, U. (2009). Influence of SME characteristics on knowledge management processes: The case study of enterprise resource planning service providers. *Journal of Enterprise Information Management*, *22*(1/2), 63–80.
Teece, D. J., Gary, P., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533.
The European Commission. (2003). Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. *Official Journal of the European Union*, 36–41.
The Green Key. (2016). Green Key hotel criteria and explanatory notes.
Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, *27*(2), 237–246.
Vermeulen, W. J. V, & Witjes, S. (2016). On addressing the dual and embedded nature of business and the route towards corporate sustainability. *Journal of Cleaner Production*, *112*, 2822–2832.
Wernerfelt, B. (1984). A Resource-Based View of the FIrm. *Strategic Management Journal*, *5*(2), 171–180.
WWF Green Office. (2016). What is Green Office? Retrieved July 28, 2016, from http://wwf.fi/en/green-office/what-is-green-office/
Zobel, T., Almroth, C., Bresky, J., & Burman, J. O. (2002). Identification and assessment of environmental aspects in an EMS context: An approach to a new reproducible method based on LCA methodology. *Journal of Cleaner Production*, *10*(4), 381–396.
Zorpas, A. (2010). Environmental management systems as sustainable tools in the way of life for the SMEs and VSMEs. *Bioresource Technology*, *101*(6), 1544–1557.

10. Appendix

A. Interview questions

Annotations have been made in the interview questions to indicate at which point the different elements from the conceptual framework were discussed: (1a) Self-assessment, (1b) Stakeholder assessment, (2) Strategy development, (3) Implementation, (4) Monitoring, (5) Feedback.

1. **Introductie**

Ik ben mijn studie begonnen in Amsterdam aan de VU, waar ik de Bachelor Aarde & Economie heb gevolgd. Deze studie was gericht op de wetenschappelijke, en meer technische kant van de aardwetenschappen en economie: Binnen aardwetenschappen betekende dit dat ik leerde over hoe de aarde en haar atmosfeer in elkaar zitten, met alle scheikundige en natuurkundige aspecten die daar bij komen kijken. Wat betreft economie ging dat over zaken als vraag, aanbod en prijs, en kwamen er veel grafieken en formules bij kijken. Na deze theoretische vooropleiding heb ik gekozen voor een praktische vervolgopleiding: Sustainable Business & Innovation aan de Universiteit Utrecht. Deze opleiding heeft een sterke link met het bedrijfsleven. De colleges en literatuur richten zich op hoe bedrijven omgaan met duurzaamheid, en daarnaast staat praktijkervaring door contact met bedrijven centraal. Dit gebeurt bijvoorbeeld door een consultancy project waarbij met een zelf te benaderen bedrijf aan de slag wordt gegaan met een vraagstuk dat zij hebben op gebied van duurzaamheid.
Tijdens het eerste jaar van deze opleiding kwam ik ook geregeld in aanraking met MKB-ers, maar werd in de theorie juist vaak de nadruk gelegd op de grotere bedrijven en hoe die omging met duurzaamheidsvraagstukken. Ook qua milieumanagement, en de standaarden en normen die daarvoor de revue passeerden, lag de focus vaak op de grotere bedrijven, en hoorde ik van kleinere bedrijven juist dat ze tegen barrières aan liepen. Dat is ook de inspiratie geweest om met dit onderwerp aan de slag te gaan, en uit te zoeken hoe het MBK met milieu omgaat, en hoe standaarden of andere tools hen daarbij kunnen helpen. Het doel van dit interview is dan ook vooral om te kijken hoe bij u omgegaan wordt met milieu en om richting het einde van dit gesprek te kijken wat volgens u beter zou kunnen en welke rol daarin ook SAM zou kunnen spelen.

2. **Algemeen**

(Wat gebeurt er precies in uw bedrijf?)
Wat zijn uw dagelijkse werkzaamheden?
Op welke manier komt u daarbij in aanraking met milieu? Zijn er andere werkzaamheden die met milieu te maken hebben binnen uw bedrijf die door anderen worden uitgevoerd? Welke rol spelen externe adviseurs hierin?
Welke verschillen ziet u tussen uw bedrijf en grotere bedrijven, op het gebied van milieu?
Wordt er anders naar jullie gekeken door bijvoorbeeld klanten of overheden? Zijn er andere eisen of wensen? Hebben de twee verschillende mogelijkheden? Vindt u dat de een andere verantwoordelijkheden heeft dan de ander? (Hoeveel werknemers binnen het bedrijf?)

3. **De huidige situatie**

Hoe wordt (2) het milieubeleid opgesteld, en (1a + 1b) op basis waarvan wordt dit gedaan?
Is er een bepaalde (1a) visie, voor welke termijn?

Wordt er een (1a + 1b) inventarisatie van de huidige stand van zaken gemaakt? Zo ja, wat wordt daarbij allemaal meegenomen? Achterhalen wat de weging is van verschillende aspecten.
(1a) Intern: Fysieke eigenschappen, kennis/competentie, technologie, processen, grondstoffen, locatie, gebouw, cultuur, mensen
(1b) Extern: Stakeholders/belanghebbenden, globale trends, trends in de sector, concurrenten, wet- en regelgeving, klanten, de gemeenschap
(2) Hoe vertaald het beleid zich naar doelstellingen? Alleen kwantitatief en tastbaar (Kan bijvoorbeeld ook het creëren van bewustzijn zijn)?
(3) Hoe worden visie, beleid, doelstellingen, resultaten etc. op gebied van milieu gecommuniceerd? Intern en extern?
(3) Hoe wordt er gezorgd dat het beleid goed wordt opgenomen in de organisatie? Denk aan handleidingen, KPIs, trainingen, praatgroepen, nieuwsbrieven, verdeling van verantwoordelijkheden. Wordt er daarbij gebruik gemaakt van ICT-hulpmiddelen? Terugkoppeling naar de verdeling van werkzaamheden, is iedereen bezig met 'milieu'?
(4 + 5) Hoe wordt de uitvoering van het beleid/het behalen van doelstellingen gecontroleerd en gewaarborgd? Alleen kwantitatief (KPI)? Op operationeel niveau, maar ook het systeem in z'n geheel, welke rol speelt u of de directie hierin? Wat wordt er gedaan met de gevonden resultaten?
Zijn er andere zaken die u doet op het gebied van milieu, die nog niet ter sprake zijn gekomen?
En zijn er aan de hand van wat we hier besproken hebben nog andere punten aan te wijzen waarop uw bedrijf verschilt van een grotere organisatie (Terugkoppeling)?

4. **Normen en standaarden**

Heeft u het idee dat de bestaande normen/standaarden goed aansluiten bij uw bedrijf? Ligt dit aan de afstemming van normen op grotere bedrijven? Controle dat alle certificaten bij mij bekend zijn.

Er zijn een aantal 'aanpakken' te onderscheiden die standaarden gebruiken, sluiten deze aan bij wat u wilt zien van een norm?

- **Gefaseerde aanpak onderweg naar ISO 14001 of EMAS. Elke fase kan apart worden gecertificeerd om inzet op dit gebied aan te tonen en elke fase levert tastbare resultaten op.**
- **Een focus op het monitoren van impact, stimuleren om hier iets aan te doen, maar vrij in de manier waarop**
- **Een norm die hele specifieke eisen stelt (bijvoorbeeld het gebruik van bepaalde waterbesparende toepassingen, of het verminderen van uitstoot met een bepaald percentage). Deze eisen worden actueel gehouden**
- **Het opzetten van een norm die integratie van meerdere soorten (milieu-, kwaliteit-, veiligheid-) management systemen stimuleert.** (Denk aan HLS of Ecostep)

5. **Hoe kan het beter**

Wat zou volgens u de rol moeten zijn van een norm of standaard om uw bedrijf te helpen om te gaan met 'milieu'?
Is deze rol voor alle soorten/groottes bedrijven even waardevol? In welke mate moet er ruimte zijn voor creativiteit/innovatie binnen een norm (bijv. norm gericht op resultaat, maar weg daarheen voor

eigen rekening)? Welke rol speelt certificering daarin, het 'papiertje aan de muur'? Welke redenen zijn er om te voldoen aan een bepaalde standaard of norm?
En als we verder kijken dan deze normen of standaarden, zijn er dan nog andere manieren of tools waardoor het omgaan met milieu bij u makkelijker gemaakt kan worden? Vanuit SAM, de overheid, Metaalunie (of andere sectorinitiatieven), Europees etc.?
Heeft u verder nog opmerkingen of vragen?

6. <u>Afsluiting</u>

Ik ga dit interview uitschrijven en zal u deze daarna opsturen, dan kunt u eventuele opmerkingen nog doorgeven. De uiteindelijke resultaten van het onderzoek verwacht ik in juni of juli gereed te hebben, deze zal ik tegen die tijd ook naar u opsturen. Ik ga vervolgens met SAM aan de slag om te kijken hoe aan de hand van deze resultaten de dienstverlening verbeterd kan worden, en welke andere initiatieven nog gestart kunnen worden.

B. Analyses of existing EMS standards

In this appendix, existing EMS standards are discussed following the elements described in the conceptual framework. A general introduction is also given as well as comments relating to the standard's effectiveness in general, and its applicability to MEs specifically.

Acorn Scheme / BS 8555 (Institute of Environmental Management & Assessment, 2016)

General

This British example provides guidelines for the adoption of an EMS in six phases. Its goal is to provide the organisation with quick, measurable environmental performance increases. Because of this, it should be more suitable for SMEs, as it requires less resources to implement, but gives quicker results that can be demonstrated within the supply chain. It aims to provide maximum competitive advantage, showing suppliers and buyers that the company is involved in environmental management. After certification, a yearly update is required to keep certification. The sixth phase of implementation makes the EMS certifiable to the ISO 14001 standard. The number behind each statement indicates the phase in which the measure is required to have taken place.

Analysis

Self-assessment

Conduct a baseline assessment in order to develop an understanding of the environmental impacts and issues facing the organisation. This is done by reference to your existing management programmes and practices, stakeholders, and by identifying the environmental aspects and impacts of the organisation's activities, processes, products and services. This assessment will also help to identify opportunities for cost savings and achieving competitive advantage (1). An approach is developed to assess the significance of all environmental aspects (3).

Stakeholder assessment

A baseline is established identifying relevant stakeholders (1). Identify any other environmental requirements that apply to you (including codes of practice, industry standards, voluntary agreements, internal management requirements, and contractual requirements) (2).

Strategy development

An environmental policy is set up, as well as a plan to implement the EMS (1, draft)(3, complete). Identify where and how exactly the requirements from stakeholders apply within the organisation, identifying areas of non-compliance (2). Develop and implement action plans to address non-compliance situations (2). Specific environmental targets are set in accordance with the policy designed by the organisation (3). Responsibilities, timescales, and required resources are assessed in relation to environmental targets (3). Documentation and identification of all relevant management structures, roles & responsibilities, and communication lines (4).

Implementation

Formal: Develop and implement action plans to address non-compliance situations (2). All policies, objectives, targets, and management plans should be communicated to relevant parts of the organisation (3). The system is implemented with some indicators of improvement, and by creating

feedback loops to ensure continual improvement (1)(2)(3)(4)(5). **Informal social:** Creating employee involvement in environmental practices is stimulated through awareness raising and environmental training (1). Create a process of organisational culture change (2)(3). Training and awareness raising programmes are structured (4).

Monitoring

Indicators of key environmental issues are introduced in phase 1 **(physical)**. Indicators of compliance are introduced in phase 2, as well as operational control procedures and emergency response procedures (2). Quantitative performance indicators (**physical**) are implemented in accordance with environmental targets (3). Develop management performance indicators that identify effectiveness of the EMS as a whole (4). A structured internal auditing system is set up, and documented, which communicates results to both the top management as well as all other relevant stakeholders (internal and external (5).

Feedback

Develop and implement action plans to address non-compliance situations and emergency response procedures (2). Corrective and preventive action procedures are established and operationalized (5). Implement management review and feedback loops concerning the EMS as a whole (5).

Comments

Explicit commitment from leadership or top management is required (1).

The Acorn Scheme/BS8555 provides a step-by-step approach that ensures that value is created from the implementation of the EMS from the start. It starts by identifying low-hanging fruit, and evolves into a complex EMS, certifiable to ISO 14001 or EMAs standards. The step-by-step approach is said to allow SMEs to take a slow approach to the concept of EMS. However, it also means that the first steps generate an incomplete EMS. For instance, management review practices that check the effectiveness of the EMS as a whole are only introduced until phase 4. What the Acorn scheme does do is take away barriers regarding complex documentation by only introducing these later, focusing the earlier phases on the identification of relevant environmental aspects and the organisation's context in regard to environmental issues, and how to install procedures that continuously improve environmental performance. The big difference with the ISO 14001 is the explicit mentioning of organisational culture. However, there is no specification whatsoever as to what role culture plays, how it should be monitored, or how it should be influenced. All that is said is to 'continue the process of organisational culture change'. Looking at the EMS as a whole, the Acorn Scheme does not necessarily provide a novel approach or guidelines that might be more suitable for MEs. It is argued that the stepwise approach (resulting in quick results) is what sets this approach apart for MEs. However, the EMS that is finally described is a very formal system with many procedures, documentations and checks. The approach does not adapt to the informal characteristics of MEs, or to the lack of time and knowledge regarding management systems. All in all, the system is very similar in complexity to the ISO 14001 and EMAS approaches.

CO2-Prestatieladder (Stichting Klimaatvriendelijk Aanbesteden & Ondernemen, 2015)

General

The CO2-Prestatieladder (or CO2-performance ladder) is a Dutch instrument that was introduced by rail company ProRail. It serves as a CO2-management system, focusing only on this facet of environmental sustainability. The ladder was introduced by ProRail as a means to incentivise their suppliers to reduce CO2 emissions. It has 5 different levels, each of which represents a greater effort to reduce emissions, and consequently results in a greater discount on tenders. Initially, these tenders originated only from ProRail; their suppliers would hand in plans with associated prices for ProRail. If any of these companies had achieved a certain level in the CO2 Performance ladder, they would get a (fictive) discount on their tender, with each level representing a larger discount. Within the ladder, 4 themes exist: Insight (into own processes/emission), reduction of emissions, transparency, and participation. When a company reaches a certain level in each of these themes, it can get certified at that level of the CO2 Performance ladder. Currently, the ladder is being used by a variety of (mostly public) companies to stimulate reduction of CO2 emissions through their tenders. It is used in various sectors, and the ladder has been expanded to allow for greater reductions.

Analysis

Self-assessment

The 'insight' theme is focused on evaluating the company's emissions. As the company moves up through the levels of the performance ladder, insight must be more thorough. Level 3 starts including scope 2 emissions, and level 4 and 5 include scope 3 emissions. The process of determining these emissions must be documented, and must leave no reason for discussion. The entire insight theme is based on internal threats (A).

Stakeholder assessment

Identification of stakeholders is introduced in the transparency theme (C2). This theme moves from internal and external, ad hoc communication of policy (C1), to structural internal communication (C2), and structural internal and external communication (C3). C3 also introduces external communication of quantitative goals and documentation of a communication-plan. Only in C4 does the company have to maintain a constant (>2/year) dialog with external stakeholders and their demands. C5 includes commitment to a (or multiple) public reduction programmes, and structural, all-inclusive (all scopes) communication of footprint, goals, and progress, internal and external. Identification of external opportunities is introduced in the 'participation' theme. D1 requires knowledge of relevant chain-initiatives.

Strategy development

Within the 'participation' theme, D2 involves passive- (donation), and limited active participation in a relevant chain-initiative. Higher levels include more active participation (D3), organising such an initiative (D4), and organising a sector-wide initiative, for which documents can prove the company's involvement (D5). Based on the evaluation of emissions in the 'insight' theme, the company identifies the areas in which it can save energy (B1). The company has qualitative (!) targets for reduction of energy use and use of alternative fuel and green electricity (B2). These targets are recognized by top management and documented, and communicated. The company has quantitative (!) targets for

reduction of emissions in scope 1 & 2, as well as an energy plan. Both are included in a policy that is recognized by top management (B3). The company includes policy and targets based on analysis of scope 3 emissions of 2 projects as described in A4, and possible reductions thereof, and reports half-yearly on their progress (B4). Lastly, the company develops a strategy to reduce emissions in all scopes, accompanied by quantitative targets, which are being met demonstrably (B5).

Implementation
None

Monitoring
Internal audits take place to monitor the formal social dynamics of the organisation; they are meant to assess whether implementation of the EMS was successful as a whole, and whether requirements of the CO2 Performance ladder are being met. Internal audits should be conducted based on specific guidelines, and documented thoroughly. Management is responsible for finding an objective candidate to conduct the internal audit, and for providing resources (time, training) that the auditor requires. Monitoring physical dynamics is part of B3 and higher. The company is required to monitor progress of quantitative goals to reduce emissions.

Feedback
A management review (or board review) is conducted to involve leadership in the feedback process. It involves making sure that the EMS works properly, and that continuous improvement is accomplished. Controlling the effectiveness of the EMS involves evaluating the targets, communicating these evaluations, deciding whether changes should be made, and allocating resources to realise these changes (**formal**). Continuous improvement as a result of the adaptation of goals is also required.

Comments
The ladder follows a trajectory of phased implementation. In this way, it provides organisations with less ambition or possibilities with the option to participate as well. In contrast with the Acorn scheme however, the different levels do not always introduce different concepts of the EMS, but often only introduce more severe requirements of the same concept. The approach does not really state how environmental management should be conducted in a company, but rather imposes a set of requirements that aim to improve the company's performance. In terms of self-assessment, the approach takes a narrow route as it focuses solely on CO2-emissions. The stakeholder assessment focuses on dialogue in the supply chain and in the sector, and learning from other initiatives. This offers companies a means to look for interesting opportunities, rather than focusing only on threats. In terms of strategy development the approach emphasises involvement of owners or top managers, but does not specify a means to develop strategies that are suitable to the organisation. This permeates through the operational elements of the EMS, as the CO2-performance ladder only demands a certain performance from companies, rather than offering guidelines on how to achieve this.

Eco-Lighthouse Programme (Eco-Lighthouse Foundation, 2016)

General

This EMS approach is a Norwegian scheme aiming to increase the environmental performance of companies in all industries. It includes general guidelines for all types of companies, and over 70 sets of specific criteria.

Analysis

Self-assessment

Energy consumption per month.

Stakeholder assessment

Identify applicable regulations.

Strategy development

Company must adhere to legislation. Employees must be trained in ways to be more environmentally friendly within the company. Company must have an environmental officer responsible for initiating new environmental measures. Company must adhere to an energy efficiency checklist, and any initiatives with a payback period below two years must be implemented. Similar kinds of requirements and checklists apply for transport and waste.

Implementation

None

Monitoring

None

Feedback

None

Comments

The Eco-Lighthouse Programme focuses solely on providing certain criteria that companies must adhere to. Certified companies show a commitment in certain areas, but are free in the way they set up their EMS as long as they meet the requirements. The checklist does provide MEs with an easy way to see which improvements they can make. Additionally, the programme introduces industry-specific criteria, making it even more applicable to individual companies. This also saves companies time, and solves any lack of knowledge they might have when having to identify their most prominent environmental impacts. However, because the criteria are so strict, companies lose the possibility to move at their own pace. The Eco-Lighthouse Programme offers no suitable approach for any of the other elements of the EMS besides the strategy development.

Ecocamping (ECOCAMPING e.V., 2015)

General

EMS developed especially for campsites to combine environmental, economic, and H & S aspects into one system. Associated campsites demonstrate their commitment to the environment by adhering to this standard.

Analysis

Self-assessment

Consultation with an Ecocamping representative provides a fresh look at the site's environmental aspects, as in internal threats and opportunities. Furthermore, the campsite has to document its annual consumption of water, heat energy and waste for the past three years (baseline).

Stakeholder assessment

After certification, the site joins the Ecocamping network, allowing continuous consultation and training.

Strategy development

An action plan is established for a period of three years for the realization of the Ecocamping principles, these are predefined objectives. These seem to be communicated by the Ecocamping representatives, the principles are not stated in any available documents or on the website. The standard also demands a CO2 offsetting plan. The site is free to arrange this as it sees fit.

Implementation

Participation of staff is required.

Monitoring

Documentation of the annual consumption of water, heat energy and waste and the implementation of a CO2 offsetting plan must be maintained **(physical)**.

Feedback

None

Comments

Very shallow approach. Seems to have been designed primarily from a marketing perspective. The makers set up their own principles and carry out consultation audits themselves. Based on these, targets and objectives for the campsites are determined. Besides these, only water, heat energy and waste are mentioned and a CO2 offsetting plan. For all this, the site pays a fee, and joining the Ecocamping network requires another fee. In return, the site gets his name into some brochures and is allowed to use the logo. However, as the approach is designed for campsites which have no real processes and impacts to speak off, it seems appropriate for the scope of these companies.

Ecocompass (EkoKompassi, 2016)

General

This scheme was designed in Finland for the tourism sector. At present, it is still only used in Finland, but is available for all sectors. The scheme requires its associated companies to adhere to 10 criteria.

Analysis

Self-assessment

Environmental assessment is conducted, charting the initial situation and the most significant environmental impacts from the company's operations.

Stakeholder assessment

Identification of environmental laws and regulations.

Strategy development

Company has an environmental policy which forms the basis for the environmental goals. It makes sure it adhere to the laws and regulations that were found applicable. A waste management plan is constructed which sorts waste according to (at least) regional regulations. Hazardous waste is stored safely and delivered appropriately. The company chooses two themes (which have to be altered at least once every three years) out of a list provided by Ecocompass, including energy saving and procurement. Within these themes, the company prepares an environmental programme that builds on the major impacts it identified earlier.

Implementation

Staff is informed regarding the need to take environmental issues into account during their work, and about the safe use of chemicals.

Monitoring

Goals that were set have to be monitored, but it is not specified how.

Feedback

None

Comments

Standard is very straightforward, but gets companies to start think about environmental aspects of their organisation in a systematic fashion. Little focus on stakeholder interaction and social dynamics of the EMS, and lack of commitment to organisational learning. Also, environmental programmes need only focus on 2 sub-sectors at a time. This means that all other (negative) environmental impacts can be ignored, missing a holistic approach. The EMS approach does not provide a complete EMS, but rather points out some areas in which to improve. For small companies it may be a first step on the way to environmental management.

EcoStart (European Commission, 2009; Lehtonen, n.d.)

General

The EcoStart programme uses workshops to help companies set up their EMS. These include inspections to identify the relevant environmental impacts, as well as homework sessions and workshops to construct the environmental policy. The programme is highly subsidised, reducing the cost that would otherwise be associated with lengthy workshops and consultancy fees.

Analysis

Self-assessment

Inspections by an EcoStart consultant help identify the relevant environmental impacts and teach the company to identify these impacts for themselves.

Stakeholder assessment

None

Strategy development

Employees are involved in the strategy development by actively allowing them to influence the environmental objectives and detailed goals of the program.

Implementation

Information regarding the environmental policy is disseminated through the organisation by internal information streams **(informal social)**. Employees are also involved in strategy development.

Monitoring

Operational indicators are installed, method of monitoring is not specified.

Feedback

None

Comments

The unique approach of this scheme lies in the (subsidised) consultancy and workshops that are offered, whereby the participants are closely guided during their self-assessment and strategy development. This approach recognises the heterogeneous nature of MEs, and the fact that every company is different in terms of their environmental aspects. Due to the subsidies, the costs remain low, otherwise this approach would have been impossible to pay for, for most MEs. Although this scheme reduces the disadvantage MEs have in terms of their knowledge and resource availability, it does not offer much besides this, as the requirement for the operational level of the EMS are not specified. Involvement of employees in strategy development is a valuable inclusion as it raises awareness in addition to resulting in practical environmental objectives.

EMAS (European Parliament, 2013)

General

The European Eco-management and Audit Scheme (EMAS) is an initiative of the European Commission to stimulate environmental management in its member states and associates of the EU. It is comparable to the ISO 14001 standard, but adds some features such as an explicit reporting requirement. The distinctive key elements are performance, credibility, and transparency. Performance means that EMAS aims to improve environmental performance and reduce environmental impact of organisations by. Credibility is ensured through reliable registration bodies, ensuring that certified organisations continuously improve their environmental performance, and disclose reliable information to the public. Transparency is assured by providing reliable information to the public, the EMAS logo stands for reliability and transparent reporting, internal and external, to the public. What sets EMAS apart from other EMS standards is the mandatory environmental statement. Organisations are required to communicate this to external stakeholder and interested parties, it includes various topics such as a description of the policy, the objectives, and the identified environmental aspects of the organisation. 'Soft aspects' are mentioned briefly as something that should be included too, the standard mentions 'changes in behaviour' as one of these soft factors.

Analysis

Planning

Self-assessment

An environmental review serves to identify all relevant environmental aspects of the organisation's activities, products, and services, as well as the existing environmental management practices and procedures. The company identifies opportunities to increase performance based on its self-assessment.

Stakeholder assessment

The initial environmental review also identifies the organisation's relevant legal and regulatory framework. Other stakeholders are not included.

Strategy development

Environmental policy (vision) is established that defines the organisation's intentions and direction in relation to environmental aspects. It must include strategic goals and objectives, on which specific targets may be based, and a commitment to continuous improvement, and compliance to regulations. Based on the environmental policy and –review, specific objectives are set, and linked to targets, and actions. Top-management must subsequently allocate resources to ensure the implementation of the EMS. Documentation requirements are abundant and include policy, objectives and target, scope, method of implementation of the EMS, an environmental management manual covering policy, protocols, and activities.

Implementation

Implementation of the EMS involves assigning responsibilities, ensuring competencies are present, and providing training if needed (**formal social)**.

Monitoring

A system of operational control is in place that identifies relevant environmental aspects, and includes emergency response protocols. Furthermore, the organisation must maintain a procedure to monitor and measure significant parameters related to its targets and compliance **(output control, formal)**. An internal audit serves to periodically evaluate the effectiveness of the environmental performance of the organisation as a whole, as well as the effectiveness of the EMS itself **(social, formal)**. Findings are reported to management. Depending on an organisation's needs, awareness may be measured **(social, informal)**.

Feedback

Implementation of the EMS requires a system of operational control that includes emergency response, and guidelines on how to identify relevant environmental aspects. Non-conformities that are identified from the monitoring and measurements, must be dealt with in a methodological (and documented) fashion, allowing for corrective action (and preventive if possible). Management review takes place based on internal audits to see if the EMS functions **(formal)**.

Comments

The EMAS requirements are very similar to those of the ISO 14001, a fact that is confirmed by the developers themselves. The most relevant difference is the mandatory environmental statement, although this statement is often already part of national legislation as pointed out by Dick Hortensius of the NEN. Again, the social dynamics are nearly absent in this EMS standard, although they are mentioned twice as 'also important'. The approach is highly formal and bureaucratic in nature. The protocols and procedures it requires aim towards developing a rigid EMS for large organisations. Informal implementation, monitoring, and feedback methods are hardly recognised. Furthermore, EMAS clearly focuses on providing a certificate that shows that a company is 'environmentally responsible'. The requirements for self-assessment and stakeholder assessment involve impact reduction and legislation only. The scheme does not focus on the development of the company towards being environmentally conscious, or aware of its opportunities, both internal and external.

EMAS Easy (EMAS, 2012)

General

Traditional quality and environmental management tools do not fit into the reality of the small or micro-business with less than 10 employees. Nor do they fit well in many MEs. It is not the intrinsic qualities of those standards which are too high - it is more the internal and external barriers to access which are more demanding – cost, bureaucracy, resources, knowledge. EMAS easy is a way to implement EMAS which is proportional to the size, financial capacity and organisational culture of small business. It assists, using a number of new features, with compliance with ISO 14001 and EMAS but still focusing on what matters – environmental protection on the shop floor. The EMAS Easy methodology offers pre-developed forms which SMEs can use to map their environmental aspects etc. These offer a more practical approach to the development of an EMS, and get around the difficult 'language' in which the ISO 14001 standards for example is written.

Framework

Planning

Self-assessment

The identification of the organisation's environmental aspects is done through Ecomapping. First, a map is drawn of the company's location and immediate surroundings including important infrastructure. On this picture, the relation to neighbours is specified, as well as the traffic generated by the company's cars, what kind of sewage system is used, etc. Second, the input (fuel, resources, packaging), and output (waste, emissions) are identified. Then, employees are involved through a survey in which they can specify for certain topics (e.g. use of raw materials, motivation of employees), whether they are a strong or weak spot in the company's EMS. Finally, maps are drawn of the actual shop floor. On each map, hotspot for different topics are identified (e.g. water consumption, or air, odours, noise). This Ecomap is then used as the basis for the EMS. This process generates a list of internal threats and opportunities for the organisation. The informal ecomaps can now be transformed into a more formal format by ordering the information into boxes (e.g. impacts, legislation, or data). Now, an environmental policy can be generated, indicating where the company wants to go (beyond compliance).

Stakeholder assessment

The approach specifies going beyond compliance. Stakeholder assessment includes identifying relevant regulations, but also voluntary agreements, codes of conduct etc. These are all related to compliance, but include stakeholders other than the government.

Strategy development

Environmental objectives and targets are constructed that are in line with the self-assessment and stakeholder assessment. An environmental action plan follows to carry out the required tasks to reach set targets.

Implementation

Action plan includes the tasks that have to be carried out to reach a certain target, these are physical and social, and formal and informal in nature. For instance, reduction of fuel leads to roof insulation

(**physical**), awareness raising about fuel savings for mobility (**informal social**), and assigning employees responsible for achieving objectives (**formal social**). To summarise, Implementation of the EMS is done in a similar fashion to the EMAS standard, involving structure and responsibilities, as well as training, awareness and competence creation where necessary. Implementation of the EMS requires a system of operational control that includes emergency response, and guidelines on how to identify relevant environmental aspects.

Monitoring

The organisation must maintain a procedure to monitor and measure significant parameters related to its targets and compliance (**social and physical**, depending on targets). An internal audit serves to periodically evaluate the effectiveness of the environmental performance of the organisation as a whole, as well as the effectiveness of the EMS itself. Findings are reported to management.

Feedback

Non-conformities that are identified from the monitoring and measurements, must be dealt with in a methodological (and documented) fashion, allowing for corrective action (and preventive if possible). A management review takes place to evaluate the effectiveness of the EMS, and whether strategic adaptions are required (**formal**). A 'control panel' of the EMS serves to constantly check and improve on both the objectives and targets set by the organisation itself, as well as staying compliant with environmental legislation (**formal**).

Comments

The EMAS Easy presents itself as a significantly different EMS, which serves as a step-up to EMAS or ISO 14001 certification. What it really is, is a different methodology to reach EMAS certification. It gives a step-by-step way of reaching this certification, but in the end, the requirements are exactly the same. However, the methodology provided does seem genuinely convenient for MEs, as it translates the difficult language in which the ISO 14001 and EMAS standards are presented to a more practical approach to setting up an EMS. In this regard it may provide a significant improvement, and serve as a way to overcome certain barriers (e.g. requiring expensive consultants to translate complicated standards). The Ecomapping method can be used for self-assessment, it could also be extended to include all processes of the company, identifying environmental opportunities in addition to impacts. The operational management level of EMAS Easy includes some informal methods as well, although it still requires the company to set up extensive procedures and protocols, and requires them to document findings and systematically carry out tasks.

Green Dragon (Griffiths & Jones, 2016)

General

The Green Dragon standard provides a similar approach as the Acorn Scheme, offering a stepwise approach to constructing a formal EMS that can be certified to ISO 14001 standards or EMAS. It is very similar to the ISO 14001 and EMAS approaches, although the self- and stakeholder assessments are slightly more elaborate. The strategy development, implementation, monitoring and feedback are similar to the ISO 14001 analysis.

Analysis

Self-assessment

An environmental review is conducted, including all internal facets of the organisation. Identification of environmental conditions, such as climate change, biodiversity, natural resources, contamination, air and water quality and land use affected by the organisations activities. An extensive lists of examples is given by the Green Dragon organisation. Identification of those internal activities, products, services, strategic direction and capabilities that have or could have an impact on the environment. Collation of available environmental data, evaluation of current environmental competence and performance. The defined scope and boundaries of the Environmental Management System. The scope of the EMS shall be made available to interested parties.

Stakeholder assessment

The environmental review also includes identification of external cultural issues, such as legal and regulatory, economic, competition, technological, social and political issues, and administrative (local, regional, national and international) issues.

Strategy development

Similar to the ISO 14001 and EMAS requirements: Leadership determines the environmental policy based on these analyses the compliance needs identified from the stakeholder assessment. The policy needs to be aimed to make the organisation compliant with any demands, and offer possibilities for continuous improvement. Within the policy, targets are set that relate to context- and risk analysis. Environmental targets have to apply to the identified threats/opportunities/context and be measureable (if possible). The environmental policy needs to be documented, communicated internally (with relevant information being provided to relevant employees), and be available to stakeholders. Documentation includes not only the final policy as determined, but also the process of establishing this policy (e.g. which criteria were used to determine threats and opportunities). The environmental policy has to take into account both (environmental) emergencies and how to deal with them, as well as changes (including future developments) that might affect the organisation's threats and opportunities (includes technological changes). Finally, the environmental policy needs to describe how actions to reach set goals will be implemented, and how they will be evaluated. The policy should always be aimed to achieve continuous improvement of the organisation's environmental performance.

Implementation

Implementation involves analysis of the competencies and awareness of employees in regards to environmental aspects of the organisation. If insufficient, these should be developed by means as training, hiring, or assigning responsibilities to different people within the organisation (**formal social**). The ISO 14001 standard requires a great deal of documentation. Both the process of establishing policy, as the manner of implementing it, and how it will be monitored and evaluated should be documented. Furthermore, the way in which documentation takes place (e.g. format/language) has to be decided upon, and all documentation should be available to the relevant people.

Monitoring

The physical monitoring requirements in the ISO 14001 standard are quite explicit. Firstly, monitoring requires an analysis of the tools and methods required to monitor the processes involved in the targets that were set. This is focused only on monitoring of **physical** dynamics in the organisation, and also involves communication of results internally and (where applicable) externally. The norm further requires an explicit monitoring of compliance (as determined in the environmental policy, and going beyond regulation)(**formal social**). Internal audits take place in the grey area between **physical** and **social**, they are meant to assess whether implementation of the EMS was successful as a whole, and whether requirements of the ISO 14001 are being met. Internal audits should be conducted based on specific guidelines. A management review (or board review) is conducted to involve leadership in the monitoring process. It involves making sure that the EMS works properly, that stakeholders' demands are being met, and that continuous improvement is accomplished.

Feedback

Threats and opportunities identified in the management review are to be fed back into the policy making process (**formal**). Any opportunities for improvement, based on measurements, internal audits, or management review are to be determined and actions undertaken to improve the EMS. When deviations are identified, evaluation of the (environmental) effects thereof is required, as well as an analysis of whether these deviations could occur more often/elsewhere in the organisation. Based on these analyses, changes should be implemented, and the entire process is to be documented (**formal**).

Green Key (The Green Key, 2016)

General

Green Key was developed as a way for tourist organisations to show the public that they are aware of their environmental responsibility. The scheme developers have set up a list of strict criteria that organisations can follow. When audited, they receive the right to show the Green Key logo. Starting with hotels, the scheme has expanded into the field of B&Bs, campsites, restaurants, attractions etc. The following analysis is focused on hotels. The themes are similar to other kinds of tourism, but details change in relation to the specific nature of each.

Analysis

Self-assessment

Measurement of current CO2 emissions (internal threats) is conducted.

Stakeholder assessment

Collaboration with stakeholders is established (at least one group e.g. NGOs), and maintained (external opportunities). The establishment clearly communicates to its guests the steps that it takes, and leaves the possibility for guests to comment.

Strategy development

An (ambitious) environmental policy must be established for the long-run (not based on any facts), and objectives and an action plan for constant improvement must be linked to it. The norm has very specific criteria for water-, and energy use, as well as waste management, and the food and beverages that are served, and other products that are procured. Procedures have to be in place to minimise the measured CO2 emissions. Employees are involved through meetings 1-3 times per year. During these meetings and during training, awareness is raised and the possibility for bottom-up initiatives is given.

Implementation

Competencies are generated through training programmes that are facilitated by top-management for all employees (**formal social**). Employees are involved through meetings 1-3 times per year. During these meetings and during training, awareness is raised and the possibility for bottom-up initiatives is given (**informal social**).

Monitoring

The norm requires active monitoring of CO2-footprint (**physical**).

Feedback

The EMS has to be up to date with Green Key criteria which can change annually. Feedback on the EMS itself is not included.

Comments

Top-management has to appoint a leader from their midst: the environmental manager. The Green Key is mostly a checklist that ensures that the associated establishments adhere to some strict rules. The criteria are updated regularly, and associated establishments are required to stay up-to-date on

these changes, and implement them before every next audit. In this way, the Green Key leaves very little area for innovative solutions, and doesn't really take into account a complete management system, but rather focuses on a sort of checklist. Translating this norm to the metal industry would result in very strict criteria in regards to e.g. substances used, and waste generated. The strength of the norm lies in the number of applicants it has and the fact that others feel obligated to adhere to the same standard. However, the entire sector is thereby reliant on the makers of the norm in terms of the speed with which they are becoming more sustainable. In terms of the EMS itself, the Green Key approach offers no approach that seems particularly applicable to MEs.

Green Network (Green Network, 2016)

General

This EMS approach focuses on Environment, Employment, Economy, and Ethics. The Green Network organisation offers a certificate for CSR to companies who achieve sustainability in all 4 areas. However, it also offers a sustainable business partnership, which can be achieved by either getting the certificate, or having employees follow a certain course.
In terms of the certification, organisations are required to have an EMS that has a certain level in terms of environment, employment, economy, and ethics. The company can either follow a training to reach this level, or undergo a test to see if they already have this level.

Analysis

Self-assessment

Tools that can be used in the self-assessment include:

- Chemistry wizard (identifying hazardous materials and their impact)
- CO2 calculator
- Conversion ratios to calculate CO2-emissions

Stakeholder assessment

None

Strategy development

The green network offers tools including:

- Quick guide to green procurement
- Energy conservation guides for small and medium enterprises
- Chemistry wizard (setting up a strategy to minimise risks)

It also offers training to set up a custom EMS, courses and seminars. The Green Network provides a platform for companies to get the knowledge they need in terms of environmental aspects, while setting up their own EMS.

Implementation

None

Monitoring

None

Feedback

None

Comments

The Green Network provides valuable methods and tools that can be used by companies to manage their environmental aspects.

Green Office (WWF Green Office, 2016)

General

The Green Office is a practical EMS for offices, reducing ecological footprint and emissions. The organisation offers some tools to people who wish to adhere to the criteria. However, it does not specify how the EMS should look, just that it should be effective.

ISO 14001:2015 (NEN, 2015)

General

The goal of this international norm is to provide organisations with a framework that helps protect the environment and that helps react to changing environmental circumstances, while remaining in balance with socio-economic needs. The framework creates possibilities for companies to contribute to sustainable development by:

- Reducing negative environmental impact of the organisation
- Reducing negative impact of the environment on the organisation
- Helping to remain compliant
- Improving environmental performance
- Using a lifecycle perspective when developing products or services
- Gaining financial benefits from implementing environmentally responsible alternatives
- Communicating environmental information to relevant stakeholders

It has a double PDCA-structure (both on strategic and on operational level).

Analysis

Self-assessment

A context analysis provides insight into the organisation itself. It requires taking into account all phases of the product/service-lifecycle. This includes the design process, purchasing (including making demands to suppliers), production processes, and the use- and end-of-life phase of products.

Stakeholder assessment

The context analysis also includes identifying relevant stakeholders, and their demands and expectations. Based on all demands and expectations, the company determines what compliance means for their particular situation. As the environmental policy requires taking into account future developments, the stakeholder assessment should include future threats and opportunities, such as technological changes or trends in the sector.

Strategy development

Leadership determines the environmental policy based on these analyses the compliance needs identified from the stakeholder assessment. The policy needs to be aimed to make the organisation compliant with any demands, and offer possibilities for continuous improvement. Within the policy, targets are set that relate to context- and risk analysis. Environmental targets have to apply to the identified threats/opportunities/context and be measureable (if possible). The environmental policy needs to be documented, communicated internally (with relevant information being provided to relevant employees), and be available to stakeholders. Documentation includes not only the final policy as determined, but also the process of establishing this policy (e.g. which criteria were used to determine threats and opportunities). The environmental policy has to take into account both (environmental) emergencies and how to deal with them, as well as changes (including future developments) that might affect the organisation's threats and opportunities (includes technological changes). Finally, the environmental policy needs to describe how actions to reach set goals will be implemented, and how they will be evaluated. The policy should always be aimed to achieve continuous improvement of the organisation's environmental performance.

Implementation

Implementation involves analysis of the competencies and awareness of employees in regards to environmental aspects of the organisation. If insufficient, these should be developed by means as training, hiring, or assigning responsibilities to different people within the organisation (**formal social**). The ISO 14001 standard requires a great deal of documentation. Both the process of establishing policy, as the manner of implementing it, and how it will be monitored and evaluated should be documented. Furthermore, the way in which documentation takes place (e.g. format/language) has to be decided upon, and all documentation should be available to the relevant people.

Monitoring

The physical monitoring requirements in the ISO 14001 standard are quite explicit. Firstly, monitoring requires an analysis of the tools and methods required to monitor the processes involved in the targets that were set. This is focused only on monitoring of **physical** dynamics in the organisation, and also involves communication of results internally and (where applicable) externally. The norm further requires an explicit monitoring of compliance (as determined in the environmental policy, and going beyond regulation)(**formal social**). Internal audits take place in the grey area between **physical** and **social**, they are meant to assess whether implementation of the EMS was successful as a whole, and whether requirements of the ISO 14001 are being met. Internal audits should be conducted based on specific guidelines. A management review (or board review) is conducted to involve leadership in the monitoring process. It involves making sure that the EMS works properly, that stakeholders' demands are being met, and that continuous improvement is accomplished.

Feedback

Threats and opportunities identified in the management review are to be fed back into the policy making process (**formal**). Any opportunities for improvement, based on measurements, internal audits, or management review are to be determined and actions undertaken to improve the EMS. When deviations are identified, evaluation of the (environmental) effects thereof is required, as well as an analysis of whether these deviations could occur more often/elsewhere in the organisation. Based on these analyses, changes should be implemented, and the entire process is to be documented (**formal**).

Comments

Leadership is one of the key aspects of the ISO 14001:2015 norm. It requires directors (or top-management, those responsible) to be involved in the EMS, rather than just making someone responsible. Leadership of the organisation is required to stay involved and take action to improve or adapt the EMS if necessary. The ISO 14001:2015 is a widely used EMS approach that shows environmental responsibility by the certified company. However, the standard is very formal and requires much documentation. The new iteration of the ISO 14001 has removed many of the requirements regarding procedures, and has made documentation easier. In this version, something like an email can be used as documentation, if it stored correctly. Furthermore, since the standard focuses on risks, it is more practical in nature. However, the formal tendencies are still very present, making it a difficult EMS approach to adopt for MEs.

MVO-Monitor (Stichting Keurmerk Branches, 2015)

General

The MVO-monitor is a tool that was developed by the Dutch Koninklijke Metaalunie (Royal Metal Union) in association with the (also Dutch) Stichting Keurmerk Branches. The latter develops certificates for specific sectors, allowing companies within these sectors to demonstrate their development in certain areas to each other and their buyers. The monitor discusses six facets of Corporate Social Responsibility (CSR), including environmental affairs, but also fair business and end-user interests. The following analysis discusses the environmental part, which focuses mostly on monitoring and plans of action to reduce impact, rather than presenting a complete EMS.

Analysis

Self-assessment

The company identifies an annual overview of the used dangerous substances, the energy use, and the emissions to air and water. A risk analysis concerning dangerous substances has been carried out. An overview is available concerning the in- and outgoing goods and how much of which fuel is used in this process. An overview is available concerning all CO2 emissions in scope 1 & 2 (as described in the CO2 Performance ladder). An analysis has been conducted into the environmental impact of resources used in the supply chain.

Stakeholder assessment

Company is in possession of an overview of the applicable environmental legislation from the Dutch Activiteitbesluit. An annual test is done to identify whether new developments exist that may provide environmentally friendly alternatives for the current processes or machines. Furthermore, recycling possibilities within the supply chain have been identified, as well as an assessment of the environmental performance of suppliers (identification of external opportunities and threats).

Strategy development

The company publishes an annual overview of the used dangerous substances, the energy use, and the emissions to air and water. This overview is supplemented with any controlling- or conserving measures that may be applicable to these substances. The company has an energy-savings programme in place, as well as a resource-efficiency plan, and a water-saving plan.

Implementation

None

Monitoring

No means of monitoring specified. A current up-to-date overview of impact, and plan of action to reduce this, must be present at all time. This implies a monitoring- and continuous improvement-infrastructure. However, the way in which this must be implemented is not specified.

Feedback

None

Comments

The MVO-monitor (or at least the environmental component) does what it says it does: it monitors environmental impacts in all relevant areas (internal and external). The certified company is required to have a current plan-of-action available to reduce these impacts in most cases, the way in which it does this, how it monitors progress and how progress is communicated is not specified.

VCA (Centraal College van deskundigen VCA, 2008)

General

VCA is a certificate for a company's veiligheid, gezondheid, en mileu (VGM) (or safety, health, and environment (SHE) control system. It is specified for contractors (Aannemers), although the organisation also owns a similar certificate for intermediaries and principals.

The VCA is awarded based on a checklist that is audited by a Certification institute, but serves as guideline for a control system that aims for continuous improvement. Initially set up as a certificate for safety precautions, it has an environmental component as well. Three levels can be distinguished within the certificate VCA*, VCA**, and VCA-Petrochemical, all having different requisites. VCA* only aims at direct control of SHE issues during execution of operations. VCA** does the same as VCA* and adds control of the SHE-structure, including SHE-policy, SHE-organisation, and improvement management. VCA-Petrochemical is similar to VCA**, only adding some specific demands for the petrochemical industry. This analysis includes the VCA* and VCA** requirements, and leaves out the specific requirements for the petrochemical industry.

Analysis

Self-assessment

The company has conducted a risk analysis based on hazards (focus on waste and soil pollution), a methodology to assess risks, as well as a plan of action to resolve them. Strategy includes an effective response to emergency situations.

Stakeholder assessment

None

Strategy development

A SHE policy statement is required, devoting attention to the prevention of environmental damage and endeavours to achieve continual improvements in the SHE performance. Organisational structure description is required, including responsibilities of managers in regard to SHE issues. Appraisal (evaluation) of managers incorporates SHE issues. An Environmental Officer has been appointed, who reports directly to management board. Involvement of the management board, active and visible, including assessments of compliance, is required. Strategy includes an effective response to emergency situations. Determination of SHE targets, and plan of actions to reach them. In situations with high risks, work is not commenced until after adequate measures have been implemented.

Implementation

None

Monitoring

Strategy includes an effective response to emergency situations (**formal**). (Optional:) Observation programme focused on improvement of SHE conduct/awareness of all operational staff and supervisors (both as individuals and groups)(**informal**).

Feedback

The management board evaluates compliance, corrective measures are taken accordingly. Strategy includes an effective response to emergency situations. Conduct improvement programme based on findings from observation, feedback mechanism to inform relevant employees of findings (**informal**).

Comments

Strong focus on health, safety and incidents. Some attention to environmental aspects, focusing on waste and soil pollution, as well as hazardous incidents. Monitoring and feedback of physical dynamics open for interpretation of the company, as long as a procedure exists. Involvement of social dynamics is optional, relates to behaviour and awareness, not to culture, but has an eye for individual and group dynamics. The VCA is mostly a checklist, it shows contractors that the certified company adheres to some basic criteria. In terms of the EMS, VCA focuses almost solely on the strategy development phase, as it prescribes the areas in which the EMS should focus.

C. Summaries of expert interviews

Dick Hortensius

Discussion with Dick Hortensius, senior standardisation consultant management systems at NEN.
The conversation took place on February 22nd and lasted around 86 minutes.
Topics are indicated in bold, all text is derived from remarks by Dick Hortensius.

NEN: The organisation

The NEN works as a normalisation institute and sets up standards in all kinds of industries. Starting with a national orientation, the institute has been working together with other national normalisation institutes more and more over the last few decades to set up European or global standards. National standards have become unnecessary due to open borders allowing for increasing international transactions. The organisation has been working to limit the amount of new standards, arguing that the existing HLS and ISO standards can be used for a variety of industries and companies. Integration of different standards into the HLS has been a major goal for the NEN.

HLS

Serves as a generic 'basis' on which the other ISO standards are based. Large organisations often find the HLS to be sufficiently informative to base their management systems upon, while SMEs may need some extra guidance. This is largely due to the fact that SMEs have less knowledge in-house about these subjects, and lack an employee or department focused on these aspects of the organisation. The HLS should however be applicable to both large and smaller organisation. Adding extra guidelines may make the standard easier to implement for SMEs, but at the same time make it more complicated for them. The core requirements included in the HLS involve mapping the critical processes (opportunities and threats) and assessing whether you have the competencies available to deal with them. The terminology may be a bit of a barrier, it requires companies to take a little time to familiarise themselves with it in order to be able to work with the standards. The context analysis that was added may also seem like a challenge for SMEs, but can be simplified to a matrix showing the relevant stakeholders and their most prominent demands. Using such tools may make life easier for SMEs, while large organizations will require a far more elaborate analysis of their context.

Development of standards, the role of SMEs

SMEs always play a part in the decision-making process when standards are developed. Key principles here are 1) keeping the standard as simple as possible, and 2) making it readable for everyone. The ISO 14001, from its first version in 1996 has been applicable for SMEs. The interviewee has never seen any big elements that would have to be changed to fit SMEs. The ISO 14005 provides a phased implementation system, but it still leads up to the same norm: 14001. However, phased implementation may also cost more money and resources, making its applicability for SMEs questionable. As the aim of ISO 14001 is to deal with environmental aspects in a systematic way, the question can be asked whether these systems are relevant for SMEs at all, since they may have very little environmental impact. This is dependent on the sector the company operates in, the inputs it uses etc.

The main goal of an EMS

To deal with environmental aspects in a systematic fashion, with the aim to comply to societal demands. These demands come in the form of legislation, but also include all other stakeholders and the responsibility that the company has towards society.

Drivers for EMS

The role of governments has decreased significantly. Their subsidies in late eighties and early nineties started the process of getting EMSs implemented on a large scale. These programmes however have ended, and the drivers for EMS adoption mainly come from the market itself nowadays. Drivers for EMS come mainly from larger companies (e.g. Philips, AkzoNobel, Shell), towards suppliers in their supply chain. This often changes quickly into a demand from these large companies, who want their demand from their suppliers to have a certain certificate (such as ISO 14001). However, this is very generic, and not aimed towards specific, supply chain-related emissions or impacts. It is easier to demand one single certificate, but not more effective.

Other standards

EMAS: Has never been popular in the Netherlands. Very similar to ISO 14001, with a couple of (non-essential) extra components (environmental reporting as the most important one, which was already embedded in Dutch legislation). The interviewee sees little future for EMAS, neither in the Netherlands, nor in the rest of Europe. However, due to political reasons it will probably exist for some time to come. CO2-prestatieladder. It is a valuable tool to solve a specific problem that Prorail was dealing with. However, it is only aimed towards a single environmental aspect. Furthermore, it is applied generically to all suppliers, a consultant has to go through the same process as a metal tool supplier.

Alternative EMS standards for SMEs

They have their value as a step up to ISO 14001, but should aim towards having the same core requirements, to make it easy for companies to adopt ISO 14001 in future. A specific EMS standard for SMEs may take ISO 14001 as a starting point and peal of certain aspects that are difficult for SMEs (e.g. internal audits, a heavy measure). Furthermore, it may provide specific tools for how a SME in a certain sector may deal with legislation and environmental aspects that are unique for that sector. So based on an ISO 14001 skeleton (HLS?), the developer of the standard fills in the required legislation, and points out the relevant environmental aspects for a certain sector. Subsequently, these facts are translated to a standard that is easily applicable for a SME with limited capabilities or resources. Actors such as Metaalunie can play a role in this process, making this a service to their members.

Characteristics of SME (and how HLS relates to those capabilities)

SMEs operate on a day-to-day basis, having little time for long-term visions or analyses. This doesn't make them less important, but whereas a large multinational may have a department specialised in a assessing global trends, an owner of a SME may only assess these trends once a month (this includes all aspects, not just environmental trends). Successful SMEs are those that can remain up-to-date on

global trends regarding technology, innovation, competencies of employees, health & safety, and environmental issues. Again, sector organisations such as Metaalunie can play a role in this (and they do e.g. circular supply chain meeting).
(This role may be to provide sector specific information that members can use to integrate in their context analysis. This saves time, and ensures reliable information is provided.)

Conceptual Framework:

Internal Audit: Monitors the soft aspects, but also hard aspects. For instance, during such an audit, the effectivity of formalised processes is checked. Internal audits are mainly focused on judging whether the policies and processes that were 'installed' actually work. Monitoring soft aspects can also be a facet (including monitoring competencies and awareness).

Social dynamics: May be done through internal audit, but is very difficult to control. Within an EMS, or any MS for that matter, control of soft aspects is always overlooked almost entirely as it is very difficult to accomplish. Not only the control, but also the way it is influenced is difficult. Leadership is a way to accomplish this, and it can be influenced indirectly through hard aspects, but it is also still a topic of research to uncover how these aspects may be influenced.
Human behaviour is affected by seven factors in organisations, these factors where established by Muel Kaptein, a researcher at the Erasmus University in Rotterdam:

1. Clarity
2. Role-Modelling
3. Achievability (is it possible to achieve environmental impact reduction with the present demands that employees face regarding their output or revenues)
4. Commitment (of employees, with the company (e.g. reward systems))
5. Transparency (of rules, but also of consequences of certain behaviour)
6. Openness
7. Enforcement (of rules)

A lot of these are really hard aspects that indirectly influence behaviour and culture (e.g. reward systems).

Social dynamics in SMEs
SMEs have a smaller hierarchy structure, and the lines between managers and employees are shorter. Because of this, leaders can influence the behaviour and culture of their employees more directly. Formalisation, for instance, becomes less important in smaller organisations, where leaders can directly improve awareness and competencies. Assessing both hard and soft aspects remains essential, also for environmental aspects, where a lot of impacts may seem very quantifiable.

Focus of MSs: Formal or informal?
MSs, certainly the control systems within them are focused still on formal aspects, but a trend can be seen towards including informal aspects.

Leadership in HLS

Has been emphasised in HLS to ensure commitment of top-level management. The influence that this commitment has on soft aspects in the organisation (leading by example), is a positive (but unintended) side-effect.

Social and physical controls in ISO 14001 audits

Both are valid methods of controlling the effectiveness of your (environmental) policy as long as the company can prove that the control system is valid.

Baseline

The HLS also advocates a life cycle perspective, meaning that the supply chain should also be incorporated into your baseline mapping. Furthermore, the way the company can influence its supply chain should be incorporated in the policy making process.

Practical: The empirical phase of the research

It is very likely that the framework will be too complicated for SMEs when they are interviewed. The terms should be translated, the amount of words should be minimised. A process-based visualisation may be easier to understand, asking questions such as: What are your long-term goals (vision), to get to those goals, we need to figure out where we stand (baseline, internal external) etc.

And for hard and soft aspects: Do we have the right tools? Are the responsibilities clear? Do my employees have the appropriate manuals? Do my employees show the correct behaviour? Do they have the necessary competencies? And, how do I control all of this?

A flow chart may be an idea? The questions you want to answers, and arrows towards how you are going to answer them…

Frans Stuyt

Discussion with Frans Stuyt, managing director at Stichting Coördinatie Certificatie Milieu- en arbomanagementsystemen (SCCM).
The conversation took place on February 18th and lasted around 57 minutes.
Topics are indicated in bold, all text is derived from remarks by Frans Stuyt.

The SCCM consults with businesses, governmental institutions, and certifying companies to develop and improve the ISO 14001, EMAS, ISO 50001, and OHSAS 18001 standards. The website mentions the different parties involved in the committees that have been set up to discuss standards. Large corporations are clearly involved in the committee that reviews the environmental standards, what is the role of SMEs in these committees, and do the capabilities of SMEs get special attention when standards are discussed?
There is no representative from a company in the SME range, there is a representative from a consultancy firm that works closely with SMEs, and therefore has a clear view of how SMEs are incorporating EMS. The norms are generic, and therefore applicable to every company, irrespective of size. However, larger companies have employees available to take care of these issues, and have knowledge of these issues. The SCCM provides an example of a fictive SME implementing an EMS on its website.

Drivers for implementing an EMS.
Increasingly through supply chain actors (buyers). Larger companies often have to implement an EMS as a decree from their head office, this is absent with SMEs.
General drivers for EMS:

- Out of own wish to have clear view of their environmental aspects, find sustainability important
- Covering risks (including legislation)
- Saving costs
- Buyers' request
- Governmental (to a lesser degree)

SCCM started from a governmental wish to get going with sustainability. Currently, this drive originates from businesses themselves.

The new ISO 14001:2015 norm and the HLS.
Introduction of the HLS has increased the importance of the strategical aspects of an EMS, building on the already existing prominence of operational aspects. The HLS requires a long-term vision from companies, looking at the future of their market and supply chains, and how they can adapt their services and products to possible changes. Furthermore, leadership (from directors) has become more important, it is not possible any more to drop this responsibility on a health and safety manager. As strategic elements have been emphasized in the HLS, and are (later in the conversation) designated as problematic for SMEs, the new ISO 14001:2015 norm has definitely not made it easier on SMEs.

The main goal of an EMS.
Setting up environmental policy, and executing it.

EMAS

SCCM is barely involved with EMAS, only five companies are EMAS certified in the Netherlands, soon to be four. EMAS is nothing more than a few extra requirements to the ISO 14001 norm. Interviewee predicts little future for EMAS in Europe. The amount of companies certified to EMAS, compared to ISO 14001 is very small.

Alternative EMS standards for SMEs

Interviewee has little knowledge of the alternative EMS standards (Acorn Scheme, Eco Lighthouse). An alternative standard especially developed for SMEs, to exist next to ISO 14001, does not seem necessary. It can be used as a marketing tool, but ISO 14001 should be applicable to all organisations.

Conceptual Framework

- Qualitative and quantitative monitoring: Why separate, they are both monitoring.
- Qualitative monitoring: Also feeds back into the baseline.
- Communication, not explicit enough. Add to hard aspects (communication structure) or soft aspects (how communication takes place between employees).
- A clear distinction between strategic and operational aspects within the figure may give a better overview.
- Baseline: Distinction between internal and external aspects of the baseline?
- Technology also plays a role, possibly in the baseline, but also in the policy aspect. The technological developments in the market (and the world) influence policy, baseline, and vision.
- Vision: Add the word 'sustainable'? Or 'integrated'? The economic goals a company has, influence its environmental possibilities. E.g. Unilever wants to double its revenues, while cutting its emissions in half. Means that the emissions per unit revenue should be reduced fourfold. Maybe add this to the text: vision is determined by factors such as economic goals, not just the future you see for your company.
- Demands are bundled within the risk analysis. Demands come from regulations, but also through other stakeholders.
- Internal audit should be explicit in text, checking whether your company is compliant to all demands.
- Add competencies (of employees) as an aspect: Hard or soft, both? Norms may differ also in the way they develop competencies, some may do this through training, others through memos etc. Leadership may also be a way to develop competencies, to lead by example.
- Leadership exists twofold: As a way to influence behavior and culture, but also as a separate element: directors have to take initiative.

Which elements can be designated as problematic for SMEs as opposed to larger companies?

The strategic aspects of the framework may be a problem for SMEs, including the vision for instance. These companies operate from a day-to-day basis, rather than having a long-term view on sustainability. Another issue is the culture within SMEs as opposed to larger companies, they may not be harder to influence, but the way culture is developed and how it may be influenced is different

between these groups. Checklists are popular with SMEs, large companies often see that some of the ‘boxes’ of this checklist are not important for them and therefore prefer a custom EMS. A standard such as VCA is therefore more popular with SMEs, a checklist is more straightforward.

Gerard Wyfker

Discussion with Gerard Wyfker, policy secretary environment at Metaalunie.
The conversation took place on February 4th and lasted around 45 minutes.
Topics are indicated in bold, all text is derived from remarks by Gerard Wyfker.

Which stakeholders play a role in term of environmental aspects for SMEs in the metal industry?
First of all, the national government, through the Activeitenbesluit Milieubeheer (regulation). This used to be done through the local governmental bodies, but this changed into a national regulation.
The current (national) regulations are often based on European directives, but translated into national regulations by the central government.
Secondly, B2B has been coming up over the last few years, and is expected to become even more relevant over the course of the coming years/decades. This is a gradual process, also including social aspects or safety regulations etc. Integrated systems have been becoming more prominent.
Thirdly, there is a theoretical possibility of NGOs, or communities demanding certain sustainability efforts. However, this has not been experienced by the interviewee.
Pressure by internal stakeholders (employees) is also a theoretical possibility, but not experienced. Leaders as internal stakeholders also have a theoretical influence, some see running a sustainable business as a must.

Drivers for sustainability

- Regulations, legal
- Marketing, Increasing market share
- Low-hanging fruit (win-win) (waste as a resource)
- Altruism of owners

Specific actors that influence SMEs in the metal industry in terms of environmental aspects

- Local governments, provinces, as a result of Het Dossier Duurzaam Inkopen.
- PIANOo
- Prorail
- SKAO
- Océ
- Volkswagen
- Volvo
- Economisch Instituut voor Midden- en Kleinbedrijf

What is the general feeling about sustainability in SMEs in the metal industry?
A trend can be seen towards a more sustainable sentiment in the metal industry. But at this point the knowledge regarding sustainability and the amount of time and energy spent in environmental aspects is still low (about 10%). This is expected to grow over the years, as that trend has been seen over the past decade(s).

What can be added, or what needs to emphasized in regards to the conceptual framework

- Maybe the relational aspects of the organization can be measured, through psychological tests for instance.
- Law and regulations can be presented more explicitly
- Shouldn't the EMS be integrated into other management systems in the organization? If not, different systems are created, requiring more work, and making sustainability something that is 'outside' of the organization.