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ISO 14001 practices – A study of environmental objectives in Danish organizations

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ABSTRACT

This article aims to shed light on how organizations implement environmental objectives in ISO 14001 certified Environmental Management Systems (EMSs), an issue that has been overlooked in the literature. More specifically, the flexible nature of ISO 14001 to set environmental objectives, considering the role of their stakeholders, and the specific environmental aspects addressed in the environmental objectives are analyzed. The field work based on mixed methods combined 20 qualitative interviews with a survey to 277 Danish certified organizations. Findings show that the key stakeholders for EMSs - namely, employees and customers - are rarely involved to set the environmental objectives, as top managers in collaboration with environmental managers set them. Objectives within the areas of energy/climate, waste, and water consumption are the most common ones, while the least used ones deal with biodiversity, lifecycle assessments and design. Thus, the rather operational focus of the EMSs is highlighted. Implications for organizations, managers, and other stakeholders are discussed.

1. Introduction

Management system standards, such as ISO 9001 and ISO 14001, have received much attention in industry and literature (Heras-Saizarbitoria and Boiral, 2013; Tarí et al., 2012), and there has been much debate in literature about the benefits of environmental management systems (EMS) (Heras-Saizarbitoria et al., 2020; Johnstone, 2020a). Two of the main certified system for EMS are the EU Eco-management and Audit Scheme (EMAS) and the ISO 14001 standard on environmental management, but organizations can also choose to implement alternative models for EMS, e.g. models developed specifically for SMEs (Heras and Arana, 2010). While different models exist, ISO 14001 appears to be the most widely implemented standard with 348.473 valid certificates and 568.798 certified sites in 2020 (ISO, 2021). In comparison, the number of EMAS certified organizations have been decreasing or stagnating since 2010, although the number of EMAS certified sites have increased (European Commission, 2021; Merli and Preziosi, 2018).

The concept of EMS has been widely implemented in practice and studied in academia (e.g. Heras-Saizarbitoria and Boiral, 2013; Tarí et al., 2012; Todaro et al., 2020). However, the findings are often inconsistent or contradictory, which may not lead to a better understanding of the subject, and the potentials, drawbacks and impact on

performance of ISO 14001 are still under debate (Boiral et al., 2018; Testa et al., 2014). Some studies have shown that EMS lead to improved environmental performance (Arimura et al., 2008; Arocena et al., 2021; Johnstone et al., 2013), while others have not been able to document an actual environmental performance improvement (Blackman, 2012; Dahlström et al., 2003; King and Hall, 2004). Prior research has thus shed light on the complex relationship between EMS and environmental performance (e.g. Arimura et al., 2016; Boiral and Henri, 2012; Johnstone, 2020b). Bansal and Bogner (2002, p. 282) even note that “a firm’s environmental performance could even deteriorate while the firm is certified.”, and Boiral and Henri (2012) dubbed the relationship between ISO 14001 and environmental performance as *controversial* due to the contradictory results presented in literature (Boiral and Henri, 2012, p. 85).

The environmental efforts of organizations have changed over the years from being focused on production processes towards product chain initiatives and lifecycle thinking (Adams et al., 2016; Hens et al., 2018; Remmen, 2001). This has been supported in EMS through the development of product-oriented EMS (POEMS) since the 1990s (de Bakker et al., 2002; Schmidt et al., 2001). With the 2015 revision of the ISO 14001 standard, the standard now includes specific attention to lifecycle thinking (among other elements, such as leadership and stakeholders), which may support organizations in using EMS as a driver for sustainable development (Bravi et al., 2020; da Fonseca, 2015). The 2015

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version of the standard thus aims for a more strategic approach to EMS, both in terms of lifecycle thinking that involves stakeholders outside the organization, the increased responsibility of the management in the organization, and the potential to integrate other strategic aspects, such as corporate social responsibility (CSR) and circular economy (CE) (Kristensen et al., 2021). This may be able to mitigate some of the challenges experienced by organizations with several years of experience with EMS, where it can become harder to identify feasible improvement potentials in the production (Mosgaard, 2008; Mosgaard and Kristensen, 2020). One of the options is then to broaden the scope of the system, and include more strategic or product-oriented initiatives in the objectives of the system, and thereby utilize EMS as a strategic vehicle to achieve objectives that go beyond technical and operational measures (Chiarini, 2017; Kristensen et al., 2021).

As ISO 14001 is a process standard rather than a performance-based standard (Arimura et al., 2016; Delmas, 2001), certified organizations are only required to implement systems or structures for monitoring environmental aspects, while no requirements are defined for environmental performance levels (Boiral, 2011; Chiarini, 2017; Heras-Saizarbitoria et al., 2020). ISO 14001 thus establishes requirements that the system has to comply with in the specific organization, but it does not specify which environmental objectives to be achieved (Delmas, 2001), which provides organizations with flexibility regarding the type of environmental objectives to establish (Arimura et al., 2016). This process-orientation of EMS has been criticized (Boiral and Henri, 2012; Heras-Saizarbitoria et al., 2020), as it opens up for a great variety in the environmental objectives and subsequent environmental performance of the organizations, making it complex to evaluate the actual environmental improvement of the organizations as a result of EMS (Arimura et al., 2016; Boiral and Henri, 2012).

While the publication requirement of an environmental statement in EMAS makes it possible to identify environmental objectives in EMAS certified organizations (see e.g. Heras-Saizarbitoria et al., 2020), knowledge of environmental objectives in ISO 14001 certified organizations are more difficult to identify, as ISO 14001 does not include any specific publication requirements. As ISO 14001 does not prescribe specific areas to be addressed in the objectives, organizations can define technical, operative as well as strategic objectives (Chiarini, 2017). However, technical and operative objectives are the ones mostly pursued by organizations with limited inclusion of more strategic aspects that go beyond operations (Boiral et al., 2018; Campos et al., 2015; Chiarini, 2017). Even in the case where non-technical and non-operative objectives are pursued, these refer mainly to stakeholder satisfaction, and financial benefits from EMS (Chiarini, 2017). Further research is needed to understand how organizations define their environmental objectives, and how they consider technical and operative objectives, but also strategic objectives, such as product-orientation (de Bakker et al., 2002; Schmidt et al., 2001) and circular economy (CE) (Kristensen et al., 2021).

Thus, while EMS has been widely studied from different perspectives, to the best of our knowledge, no studies have focused on the objectives defined by organizations that are certified according to ISO 14001. In addition, the reviews by Boiral et al. (2018) and Sartor et al. (2019) showed that the vast majority of EMS publications apply quantitative methods, and the need for EMS research that apply either strictly qualitative methods or mixed methods have been emphasized (Todaro et al., 2020).

This research is guided by the research question: “How do organizations implement environmental objectives in ISO 14001 certified EMS?” and aims to investigate the practices surrounding environmental objectives in Danish organizations through a mixed method approach. This study analyzes the process of defining environmental objectives, the role of stakeholder expectations in this process, and the specific environmental aspects addressed in the environmental objectives in Danish organizations.

2. Literature background

The ISO 14001 standard was first published in 1996 as the first international environmental management standard (Jørgensen and Remmen, 2007), and is now the most widely recognized EMS standard (Boiral et al., 2018; Salim et al., 2018). According to ISO, the main purpose of the ISO 14001 standard “is to provide a framework to protect the environment and respond to changing environmental conditions in balance with socio-economic needs” (ISO, 2015). In the ISO 14001 standard, ISO further defines an EMS as “part of the management system used to manage environmental aspects, fulfil compliance obligations, and address risks and opportunities” (ISO, 2015). The intention of EMS is thus to provide organizations with a structured process to manage environmental aspects. A core aspect of this is to set-up an environmental policy, which should steer the organization’s environmental efforts. EMS such as ISO 14001 and EMAS can thus support implementation of an organizations environmental strategy and creation of monitoring programs to improve the effectiveness of such policy (Balzarova and Castka, 2008; Boiral and Henri, 2012). The adoption of ISO 14001 usually compels organizations to acquire the best available environmental technologies (Prakash and Potoski, 2014), and implement more rigorous organizational procedures to reduce their impact on the environment (González-Benito and González-Benito, 2008; Turk, 2009). Adoption of ISO 14001 is thus expected to result in improved environmental performance (Erauskin-Tolosa et al., 2020; Garrido et al., 2020), as it is based on the assumption that better environmental management leads to improved environmental performance (Darnall et al., 2008; Tibor and Feldman, 1996).

Typically, an EMS is comprised of a formal set of procedures that specifies how an organization can manage its impacts to the natural environment (Arimura et al., 2016; Hillary, 2004). These procedures include developing an environmental policy, defining environmental objectives, monitoring the environmental progress through systematic auditing, and conducting management reviews (Arimura et al., 2016). An EMS is typically also based on the notion of continuous improvement to ensure that the organization update their environmental policy and objectives, aiming to continuously reduce the environmental impact through operational improvements (Arimura et al., 2016; Curkovic and Sroufe, 2011). However, with no formal consensus on the way to measure environmental performance (Boiral et al., 2018; Boiral and Henri, 2012), it becomes difficult to assess if in fact EMS adoption leads to improved environmental performance. This remains the most debated topic in EMS research (Sartor et al., 2019), as some have found a positive influence of EMS on environmental performance (Erauskin-Tolosa et al., 2020; Garrido et al., 2020; Heras-Saizarbitoria et al., 2020), while others have found that implementation of ISO 14001 does not necessarily lead to improved environmental performance (Blackman, 2012; Dahlström et al., 2003).

2.1. Drivers, barriers and outcomes of EMS adoption

Organizations are driven by different external and internal factors when implementing EMS (Heras-Saizarbitoria et al., 2011; Sartor et al., 2019). The external drivers include factors such as regulation (Arimura et al., 2016; Campos et al., 2015; Iatridis and Kesidou, 2018), market and customer pressure (Arimura et al., 2016; Granly and Welo, 2014; Iatridis and Kesidou, 2018), and societal pressure (Campos et al., 2015). The internal drivers include factors such as improved company image (Baek, 2017; Tuppura et al., 2016), cost savings (Mas-Machuca and Marimon, 2019), increased efficiency and improved resource utilization (Iatridis and Kesidou, 2018; Mas-Machuca and Marimon, 2019; Tuppura et al., 2016), or if the organization have established a management system based on ISO standards (Mas-Machuca and Marimon, 2019; McGuire, 2014).

Organizations can thus be motivated to implement EMS due to several reasons; however, several aspects have also been reported as

barriers to ISO 14001 implementation. Sartor et al. (2019) classified barriers into three categories: “those expected during the adoption of the certification”, “in the ongoing management”, or “in both these phases”. Barriers occurring during the adoption covers factors such as lacking governmental and institutional support for implementing ISO 14001 (Hillary, 2004; Massoud et al., 2010), or costs, where many SME’s experience the costs of implementation and maintenance to be higher than expected compared to the obtained benefits (Iraldo et al., 2010; Martín-Peña et al., 2014; Turk, 2009). In addition, some studies report that organizations experience negative outcome from implementing ISO 14001 due to non-realization of expected benefits (Hillary, 2004; Martín-Peña et al., 2014). Internal competences, such as lack of internal staff experience can also be a barrier for the implementation (Hillary, 2004; Martín-Peña et al., 2014; Turk, 2009). Other internal difficulties are related to lack of management commitment and organizational structure and culture (Hillary, 2004; Massoud et al., 2010; Mosgaard, 2015).

Concerning the main outcomes of EMS implementation, Boiral et al. (2018) identified five main outcomes in their review, namely “Rigor and effectiveness of practices”, “Waste minimization and management”, “Air pollution”, “Environmental performance in general”, and “Regulatory compliance”. Treacy et al. (2019) found that ISO 14001 implementation leads to improved operating performance when compared to non-adopters. Overall, organizations generally experience environmental, economic and operational benefits from implementing EMS (Arocena et al., 2021; Sartor et al., 2019). However, the review by Boiral et al. (2018) also demonstrated that the relationship between EMS implementation and improved corporate environmental performance differed depending on the way corporate environmental performance is measured. This is also confirmed by Erauskin-Tolosa et al. (2020), and Johnstone (2020b) emphasizes multiple pathways for improved performance from EMS implementation in organizations. Johnstone (2020b) further highlights the context-dependency of strategic implementation of EMS and the subsequent effect on environmental performance.

2.2. Environmental objectives

The ISO 14001:2015 standard operates with the term environmental objective (ISO, 2015), where environmental objectives are defined as the results set by the organizations to be achieved, and the standard requires that an organization “shall establish environmental objectives at relevant functions and levels, taking into account the organization’s significant environmental aspects and associated compliance obligations, and considering risks and opportunities.” (ISO, 2015, p. 10). These environmental objectives should also be in line with the environmental policy of the organization (ISO, 2015), and an environmental policy provides the framework for defining and pursuing environmental objectives, as well as defining procedures to ensure that the objectives are achieved (Boroń and Kosiek, 2019; Fura, 2000). In the ISO 14001 standard, it is further specified that the organization should ensure that the environmental objectives are measurable (if practicable), monitored, communicated and updated as appropriate (ISO, 2015). Bugdol and Wontorczyk (2021) identified four conditions for achieving environmental objectives in organizations: “Factors embedded in the external context”; “Subjective factors”; “Managerial factors”; and “Stakeholder identification”. These factors influence the definition, implementation, revision and achievement of environmental objectives. In addition: “who sets environmental objectives is very important for their achievement” (Bugdol and Wontorczyk, 2021, p. 1344), which highlights the importance of identifying and engaging the right stakeholders when implementing environmental objectives.

The environmental objectives should be in line with the environmental policy, and be measurable, monitored, updated, continually improved and take into account significant environmental aspect and compliance obligations. In ISO 14001:2015, the environmental

objectives should also consider risks, opportunities, and the environmental objectives should be communicated to relevant stakeholders within the context of the organizations. This implies that the organization needs to consider internal and external issues that can have an impact on the organization’s environmental objectives. Thereby, the organization will have a better understanding of the threats and opportunities the organization faces in relation to their environmental work. Most organizations define their environmental objectives to not only be compliant with regulatory obligations, but also to improve their management in relation to environmental protection (Al-Kahlout et al., 2019; Baek, 2017).

Additionally, the environmental objectives need to be transformed into concrete actions to be measured and monitored. The organization thus needs to plan actions on how they will achieve the environmental objectives. These plans need to include the specific action which will be taken, the resources available, who will be responsible, timeline and how the results should be evaluated (ISO, 2015). This also implies a need for environmental indicators and benchmarking to support continuous improvements and measure progress toward achievement of the environmental objectives. Some studies have addressed environmental indicators in EMS in general (e.g. Campos et al., 2015) or in specific industries, such as the automotive industry (Comoglio and Botta, 2012), the paper and pulp industry (Barla, 2007), or within hospitality and tourism (Heras-Saizarbitoria et al., 2020). Yet, as ISO 14001 is a process standard (Arimura et al., 2016), it does not specify specific indicators or monitoring frameworks to support continuous improvements; rather it clarifies that the environmental performance must be measurable and include significant improvements. However, no requirements are defined for environmental performance levels within organizations (Boiral, 2011; Chiarini, 2017; Heras-Saizarbitoria et al., 2020).

3. Research design and methods

The empirical material used in this study consists of 20 qualitative interviews and a survey answered by 277 Danish organizations. All organizations included in this study are certified according to ISO 14001. Applying such mixed method strategy of combining elements of qualitative and quantitative research approaches allows for an investigation of both breadth and depth (Johnson et al., 2007) of EMS in Danish organizations. This study is an exploratory study of EMS practices in Danish organizations focusing on the practice concerning environmental objectives. Using a mixed method approach (Molina-Azorín and López-Gamero, 2016), this study builds on both qualitative and quantitative methods in studying the same phenomenon of EMS in Danish organizations. Mixed methods can help to understand the extent to which a study’s results are significant for the involved actors, or the practitioners, by including practitioners’ own discourses (Molina-Azorín and López-Gamero, 2016).

3.1. Qualitative interviews

The qualitative interviews in this study were used to gain a detailed understanding of how Danish organizations manage and work with ISO 14001. The selection criteria for the qualitative interviews were based on an information-oriented selection, and are presented in Table 1. These criteria were made to secure a sort of “maximum variation cases” to maximize the total inputs they could provide for this study (Flyvbjerg, 2011).

The 20 interviews were semi-structured (Brinkmann and Kvale, 2015; Yin, 2009) and lasted between 75 min and 120 min with an average of 100 min. The main elements addressed in the interviews are summarized in Table 8 in Appendices. Table 2 shows an overview of the organizations included in the qualitative study.

The overall themes covered in the interview are listed in the following; each was explored by several sub-questions.

Table 1
Overview of case selection criteria for qualitative interviews.

Criteria	Argument	Organizations in the study
Must have an ISO 14001 certificate and have had this for at least 5 years	With ISO14001 being the most widely implemented EMS standard, only inclusion of organizations certified according to the ISO14001 standard were included. Furthermore, a minimum of 5 years experience was required to ensure that the included organizations had experience with the PDCA cycle and had worked with EMS over time.	Certified for more than 5 years = 20
Must have a positive reputation/be perceived as environmentally proactive	To gain insights into the best practices of EMS in Danish organizations, only organizations with a positive reputation and a proactive environmental profile were included. To assess the proactive profile of organizations, four criteria were used, where organizations that met min. two of these criteria were included in the study.	Known for their environmental efforts = 18 Recipients of environmental awards = 10 Highlighted by other proactive organizations = 16 Highlighted by environmental networks = 15
Inclusion of both SME's and larger organizations	Inclusion of organizations of different sizes were also chosen to enable in-depth understanding of how practices may differ depending on size, as previous research has shown that smaller organizations gain less from implementing EMS compared to medium and large-sized organizations (Martín-Peña et al., 2014).	Small (0–49 employees) = 2 Medium (50–149 employees) = 10 Large (150+ employees) = 8
Inclusion of production and service companies and public sector organizations	Organizations from different sectors are included to investigate if and how their environmental management practices differ depending on the sector in which they operate.	Public sector organization = 5 Production company = 11 Service/distribution company = 4

- Background for certification
- Advantages and disadvantages of being certified
- How the environmental efforts are organized
- Environmental objectives, past, present and future
- Environmental, economic and organizational effects of environmental management
- Environmental management stakeholders
- Environmental managements relation to other environmental approaches (Product orientation, circular economy, industrial symbiosis, environmental labelling and CSR)
- Integrated management systems
- Other relevant topics (open questions)

The interviews were recorded and partly transcribed and the text was classified into different themes related to the aim of the study. The parts of the interviews that was fully transcribed were selected by the researchers, and focus on the elements of interest for this study. For less relevant parts of the interview a condensed text was made, this especially goes for discussions that was not covered by the interview guide. This approach can be applied to identify patterns in the text (Denzin and Lincoln, 2005). The respondents knew the main topic of the interview in advance but they did not know the specific questions and omissions might have occurred. The respondents were given the opportunity to review the transcribed text and verify the data in order to increase the validity of the outcome. The quotes applied in the article are translated from Danish by the authors.

3.2. Quantitative survey

To quantify and validate the current practices, experience and future potentials of EMS in Danish organizations, a national survey was conducted of ISO 14001 certified organizations. The survey was distributed to 837 organizations, of which 277 completed the survey, which corresponds to a response rate of 33%. Table 3 shows an overview of key information on the organizations included in the survey. The themes covered in the national survey are summarized in Table 9 in Appendices. The survey consisted of a mix of questions with predefined categories of answers and statements to be assessed on a Likert scale (strongly agree; agree; neither agree nor disagree; disagree, strongly disagree; do not know). To reduce the standard methods bias variations were made variations in the way the questions were posed, and the way the answering categories were set up. As an addition to this two control questions (repeated questions), and this did not show a bias. In addition, we could see that the respondents took quite long to answer the

questionnaire, indicating that they were thorough. To reduce bias due to social desirability, we made the answers confidential, and posing the questions in a neutral formulation. It is however possible that there is a bias in the answers as the respondents are familiar with environmental management and therefore have a notion of what the “right” answers might be.

4. Results

In this section, we present both the results from the quantitative survey and some quotes from the interviews. This is done in order to explore both the arguments for the results and their magnitude. First, we analyze the main drivers for having a certified ISO14001 system and the benefits that the organizations find that they get from the system. This is done in order to make a foundation to understand their motivations and how this influence the goals that are set in the system. After this, we go more into the specific process of setting the goals, and the areas that are addressed in these goals. Finally, we analyze what the organizations expect to include in the system in the future, and discuss the potentials incorporating more strategic themes in the system.

4.1. General practice, reasons for certification and experienced benefits

Table 4 shows an overview of how the survey respondents assess a number of statements concerning their perception of EMS. The majority of organizations reported that having an EMS was a customer demand (60%), and 55% finds that having an EMS makes it easier to comply with customer demands. For organizations operating on a B2B or B2G market, EMS as a customer demand was more common than for organizations operating on a B2C market, with 66%, 68% and 49% respectively agreeing to EMS being a customer demand. Furthermore, 48% reported that EMS was a license to operate. This is also shown by 82% of the survey respondents strongly agreeing or agreeing that being certified improves their image. This is further supported by 64% of the respondents reporting that they used their EMS for branding purposes. Although the respondents use their certification in marketing, only 35% report that their certification differentiates them from their competitors, while 41% neither agreed nor disagreed to this, which may be an indication of EMS being an industry standard, and thus widely adopted in some industries, making it difficult for organizations to differentiate themselves from their competitors.

Table 4 also shows a clear image of how EMS functions in a supply chain perspective from customer demands to supplier requirements. This supports previous research establishing the importance of

Table 2
Overview of organizations included in the qualitative study, and the criteria used to select each organization.

Organizational information				Selection criteria			
Organization	Size	Type	Position of interviewee	Known for their environmental efforts	Recipients of environmental awards	Highlighted by environmental networks	Highlighted by other proactive organizations
A	Large	Production	Environmental coordinator	x		x	x
B	Large	Production	Health and safety coordinator	x	x		x
C	Medium	Production	Environmental coordinator	x	x	x	x
D	Small	Public	SCR manager		x	x	
E	Medium	Production	Health and safety coordinator	x	x	x	
F	Large	Production	Head of production	x		x	x
G	Medium	Service	Environmental coordinator	x	x	x	x
H	Medium	Public	Health and safety coordinator	x	x	x	x
I	Medium	Service	Environmental manager	x		x	
J	Small	Production	Production engineer	x		x	
K	Medium	Service	Environmental coordinator	x	x	x	x
L	Large	Public	Environmental manager	x		x	x
M	Medium	Production	Environmental coordinator	x	x	x	x
N	Large	Public	CSR manager	x			x
O	Medium	Production	Health and safety manager	x			x
P	Large	Production	Head of production	x	x	x	x
Q	Large	Production	Environmental manager	x	X	x	x
R	Large	Production	Health and safety and environmental manager	x			x
S	Medium	Production	Environmental coordinator	x			x
T	Medium	Service	Head of department			x	x

Table 3
Key information on survey organizations.

Attribute	Survey results
Sector ($n = 277$)	Production company Service company Public sector organization Other (e.g. utility companies, waste managers, distribution, consultants)
Size ($n = 277$)	Small (0–49 employees) Medium (50–149 employees) Large (150+ employees)
Certified since ($n = 274$) ^a	1995–1999 2000–2004 2005–2009 2010–2016
Primary customers ($n = 277$)	Private customers (B2C) Private companies (B2B) Public sector (B2G) NGOs Other (e.g. equal share of public and private customers)

^a Three organizations in the survey were no longer certified according in ISO 14001, and did not respond to this question.

stakeholders in relation to EMS adoption and motivation (Boiral et al., 2018; Heras-Saizarbitoria et al., 2016), as well as the connection between EMS and green supply chain management (Darnall et al., 2008; Nikolaou et al., 2018). Several stakeholder groups are relevant for organizations in relation to their EMS, and the results from the survey highlight customers, suppliers, authorities and employees as the key stakeholder groups for environmental management in Danish organizations (see Table 4). Special attention is given to customers, as they are highlighted as one of the key stakeholders and influencing factors for the organizations to have implemented EMS, which could indicate that customer demands influence the environmental objectives defined in Danish organizations.

4.2. The prevailing Danish practice of defining environmental objectives in ISO 14001

The qualitative interviews showed that the environmental staff are the primary actor in the process of defining environmental objectives in the proactive Danish organizations. These proposed environmental objectives are then reviewed and approved by the top management. The environmental staff develops the suggestions for environmental objectives on the basis of different processes and sources of inspiration:

“I develop the environmental objectives, but the management has to approve them. I am very inspired by our auditors” (G)

Table 4
Perception of EMS in Danish organizations (n = 277).

Statement	Strongly agree/agree	Neutral	Strongly disagree/disagree	Do not know
Organizational aspects				
Environmental management is part of our organizational culture	75%	21%	4%	0%
The time we spend on EMS is a good investment	65%	27%	5%	3%
The financial cost of EMS exceeds the generated savings and earnings	28%	33%	24%	15%
Employees are an important stakeholders in our EMS	72%	18%	9%	1%
Value and benefits from EMS				
EMS is "license to operate" for us	48%	34%	17%	9%
EMS supports a good external image	82%	16%	1%	1%
We are actively using EMS in our branding activities	64%	24%	10%	2%
Having an EMS gives us environmental benefits	90%	9%	1%	1%
Having an EMS gives us economic benefits	58%	31%	9%	3%
Having an EMS gives us organizational benefits	45%	41%	11%	3%
Authorities				
Authorities are an important stakeholders in our EMS	68%	20%	9%	2%
Having an EMS is important to ensure regulatory compliance	71%	18%	10%	1%
Supply chain aspects (customers and suppliers)				
Customers are an important stakeholders in our EMS	72%	19%	7%	2%
EMS is a customer demand	59%	24%	15%	1%
Having an EMS makes it easier to meet customer demands	65%	24%	8%	3%
We require our suppliers to have an EMS	44%	32%	22%	3%

"I develop suggestions, based on the input I get from different people. Mostly employees and consultants, who are close to the production process." (R)

"We have two CSR consultants connected to our business, who keeps us updated on new developments. Our executive manager is full of new ideas for environmental objectives." (M)

From the survey, the prevailing practice appears to be that the top management defines the environmental objectives (Fig. 1), which confirms the final approval by top management, as seen in the interviews. According to the survey, 84% of the organizations replied that the top management defined the environmental objectives, whereas fewer responded that the objectives were defined in connection with the certification process (16%), on the advice by the auditor (15%) or on the advice by a consultant (12%).

Although the top management are reported to be the main actor in defining the environmental objectives in Danish organizations, the interviews showed that this often includes a process within the organization for employees and key staff to propose new environmental objectives, which are then reviewed and approved by the top management. The respondents, who answered 'other', elaborate this in the survey, as most of these answers were connected to an answer of top management. In these elaborations, there were three main answers of how the environmental objectives were defined: in a collaboration process between employees and management, from suggestions by

internal environmental/QHSE department, and by group management.

Remarkably, despite employees and customers being reported as key stakeholders (see Table 4), the process of defining environmental objectives in Danish organizations rarely include these stakeholders directly. However, it can be expected that these stakeholder groups influence the environmental objectives indirectly through continuous participation in environmental action by employees and demands from customers.

4.3. Difficulty in ensuring continuous improvements by defining new objectives

The ISO 14001 standard require that the organizations ensure continuous improvements by continuously defining new environmental objectives (ISO, 2015). However, the interviews showed that some organizations were struggling to identify new environmental objectives, while others found it easy to keep identifying improvement potentials. The organizations, who struggled to identify new environmental objectives, reported that the most feasible improvement potentials had been identified and realized, thus making it more difficult to keep identifying new environmental objectives targeting feasible improvement potentials:

"We are running out of internal objectives. We have green electricity; our heating comes from district heating. There are barely any improvements left." (K)

"It is difficult to define measurable objectives. [...] The auditor is very focused on ensuring the objectives are measurable, but it is definitely getting more difficult to keep defining relevant objectives concerning new initiatives focused on products and ecolabels, and not just our own consumption." (C)

On the other hand, other organizations reported no difficulties in defining new environmental objectives. However, these organizations have acknowledged either the need to expand the scope of their EMS beyond operations or the need to accept smaller improvements:

"There are plenty of new areas to include. We have continuously expanded the scope from operations to wider in our product chain." (L)

"Now we are only able to keep improving, if our customers are on board and chooses the right products. Large customers with green profiles have not been asking for the environmentally friendly solutions, and we are now challenging this." (G)

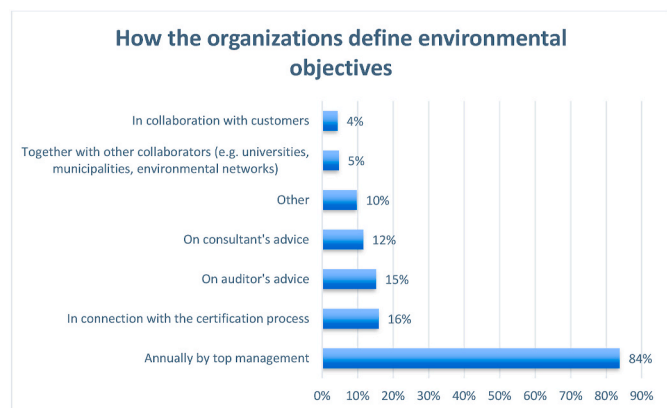


Fig. 1. How Danish organizations define environmental objectives in EMS, more than one answer possible (n = 277).

Table 5
Survey results for three statements concerning environmental objectives.

	Statement #1 It is easy to define new environmental objectives				Statement #2 It has become more difficult to identify feasible improvement potentials				Statement #3 Our environmental objectives have become less ambitious over time			
	Freq.	%	95% LCL	95% UCL	Freq.	%	95% LCL	95% UCL	Freq.	%	95% LCL	95% UCL
Strongly agree	9	3%	1%	5%	42	15%	11%	20%	4	1%	0%	3%
Agree	56	20%	16%	25%	143	52%	46%	58%	39	14%	10%	18%
Neither agree nor disagree	112	41%	35%	47%	63	23%	18%	28%	72	26%	21%	31%
Disagree	84	31%	25%	36%	18	7%	4%	10%	130	47%	42%	53%
Strongly disagree	12	4%	2%	7%	4	1%	0%	3%	25	9%	6%	13%
Do not know	1	0%	0%	1%	4	1%	0%	3%	4	1%	0%	3%
Total	274	100%			274	100%			274	100%		

LCL = lower confidence level. UCL = upper confidence level.

“We are saving less now; we took all the low hanging fruits in the beginning. But there are still significant saving potentials.” (F)

The survey supported this diversity of answers in relation to how easy it is to define new environmental objectives. When asked, 23% agreed or strongly agreed to this, 41% were neutral and 35% disagreed or strongly disagreed with this (see Table 5). However, when asked if it has become more difficult to identify feasible improvement potentials, 65% of the respondents agreed or strongly agreed, 23% were neutral and 8% disagreed (see Table 5). Taking a closer look at the respondents, who agreed or strongly agreed that it was difficult to keep identifying improvement potentials (185 of 274 respondents), 45% of these also found it difficult to define new environmental objectives, while 39% were neutral and only 16% of these respondents found it easy to define new environmental objectives. This indicates a correlation between the difficulty of identifying new improvement potentials and defining new environmental objectives.

Despite the difficulties to continue identifying feasible improvement potentials and defining new environmental objectives, the organizations did not assess their environmental objectives to have become less ambitious over time, with 56% of the respondents disagreeing or strongly disagreeing to this, 26% were neutral and 15% agreed or strongly agreed (see Table 5). Furthermore, the survey also showed that the responding organizations’ environmental objectives cover the most significant environmental aspects, as 90% of the respondents replied that they strongly agreed or agreed with the statement that their environmental objectives comprised the most significant environmental aspects.

Some of the respondents in the survey also elaborated the difficulty of defining new objectives and identifying improvement potentials by

answering open-ended qualitative questions. These respondents explained that this was caused by having worked with environmental management for many years:

“After 18 years of working with environmental improvements, it is difficult to find any objectives that makes sense”

“It is difficult to identify new objectives, when you have worked with the system for 15 years or more.”

“Since we have had ISO 14001 and EMAS since 1998, it is becoming more difficult to identify areas of improvement that we can measure.”

This could indicate that organizations over time have trouble to keep identifying feasible improvement potentials and defining environmental objectives, and thus continue to experience environmental improvements and long-term added value of having a certified EMS, which has been shown to be a factor for decertification of ISO 14001 (Mosgaard and Kristensen, 2020) and EMAS (Daddi et al., 2018; Merli and Preziosi, 2018). However, looking at the distribution of answers to statement #1 and statement #2 in relation to how long the organizations have been certified, there seems to be no difference in how the answers are distributed, as shown in Fig. 2. This could indicate that other factors affect these aspects of EMS in Danish organizations, and the overall results from the survey do not support previous findings on how organizations over time struggle to define new environmental objectives (Mosgaard and Kristensen, 2020), although some respondents do report time to be the reason for having difficulties to define new environmental objectives.

Other factors that may explain this distribution could be that Danish organizations in general work with environmental improvements

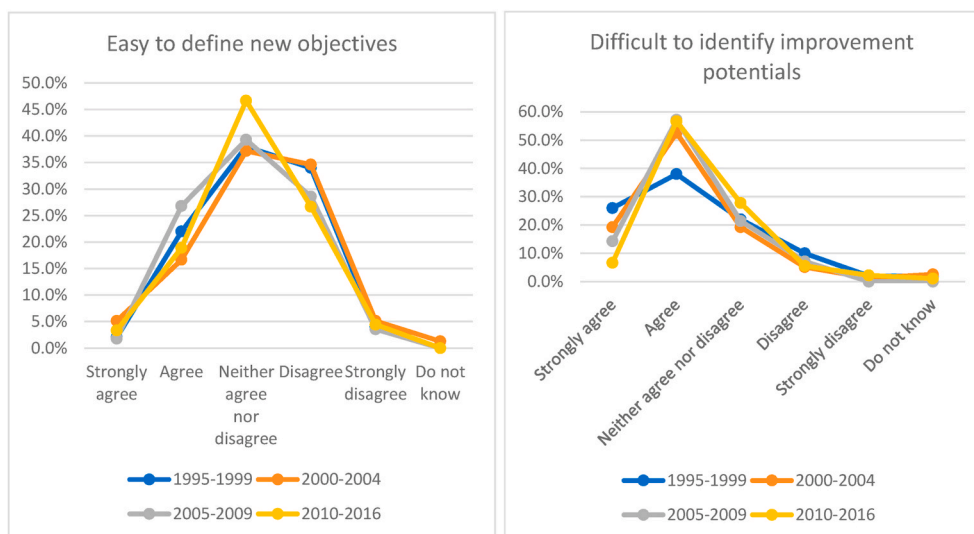


Fig. 2. Distribution of survey answers comparing the answers to the two statements with when the organization was first certified. (n = 274).

without EMS (Remmen, 2001), and may thus have identified and realized many improvement potentials prior to being certified. This could be caused by a general development in regulation, customer demands etc., which affect organizations both with and without EMS. Furthermore, some studies have shown that the effectiveness of EMS is greater where organizations have been certified longer (Prajogo et al., 2014; Testa et al., 2014), which could explain that organizations who have been certified longer have established well-functioning practices to define new environmental objectives. This could also be linked to an organizational learning process and the maturity level within the organizations, where they might find it difficult to identify improvements potentials and define objectives in the beginning, since this a new practice. However, through internalization of EMS in organizational practices, the organizations are more likely to experience visible environmental improvements (Testa et al., 2014), which can empower further exploration of other areas of improvement within the organization.

4.4. A dominating practice of focusing on operations and process optimization

During the qualitative interviews with the proactive organizations, most reported that the scope of their EMS had expanded from operations to also include more aspects connected to the supply chain:

“In the beginning there were a lot of low hanging fruits concerning smoke, noise and waste. But now it is more related to projects. This is something we are working with strategically.” (H)

“In the first years, it was mainly focused on operations and internally, when we defined our environmental objectives. [...] We now see ourselves as a company who provide a service to others, and we need to manage that and support our customers in becoming more sustainable.” (L)

Although the proactive organizations have expanded the scope of their EMS, they are also still working with environmental objectives linked to operations to ensure continuous improvements of environmental aspects related to production, such as energy, water and waste. In the survey, this focus on operations was further emphasized, as 78% of the respondents strongly agreed or agreed that their EMS focus on operations. Fig. 3 shows the results from the survey for how the organizations responded to three statements, which shows how EMS is focused on operations and process optimization in Danish organizations, and that they find it difficult to define environmental objectives for areas that are not directly related to operations. The same distribution of answers occur for the organizations independent of their sector (production, service, public sector organization) for the first and last statement, while public sector organizations respondents seem to be more neutral in regards to the second question compared to the other sectors (45% neither agreed nor disagreed). This may related to the fact that the public sector organizations rarely engage in product innovation (they are service providers and utility companies) and therefore the question might not be relevant for them.

The organizations thus seem to focus on operations and process

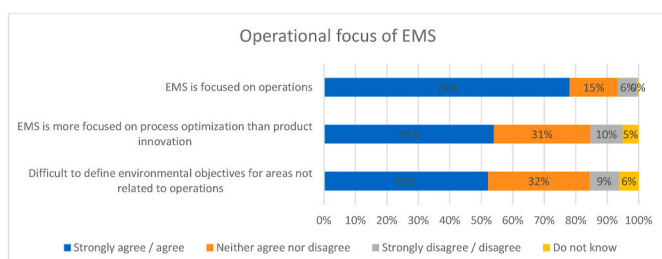


Fig. 3. Operational focus of EMS in Danish organizations. (n = 274).

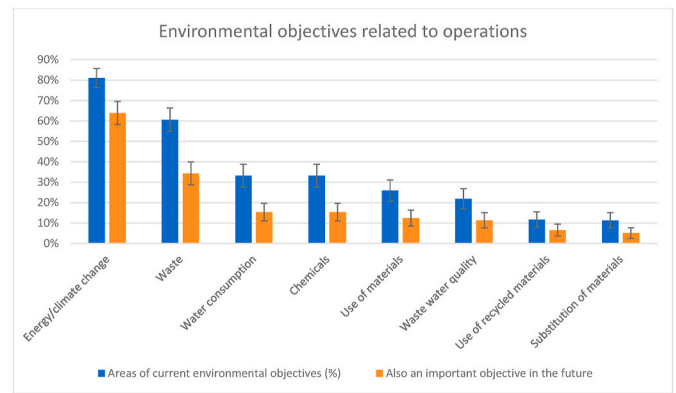


Fig. 4. Environmental objectives related to operations that organizations currently use in their EMS and their assessment of the same objectives’ importance in the future. (n = 274).

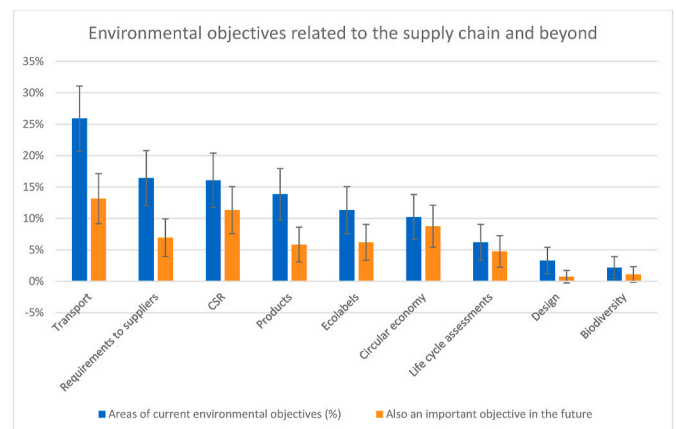


Fig. 5. Environmental objectives related to the supply chain and beyond that organizations currently use in their EMS and their assessment of the same objectives’ importance in the future. (n = 274).

optimization in their EMS, which is closely connected to the fact that many of the organizations found it difficult to define environmental objectives to aspects not related to their operations. However, it is unclear from the survey if one causes the other; e.g., a focus on operations makes it difficult to define objectives for other areas, or the difficulty in defining objectives for other areas result in an EMS that only focus on operations.

4.5. Environmental objectives in Danish organizations

The survey showed that the areas in which most of the organizations have defined their environmental objectives mainly were related to production processes, such as energy/climate change (could also be the use phase) (81%), waste (61%), water consumption (33%), chemicals (33%), and consumption of materials (26%). Fig. 4 and Fig. 5 show the areas in which the respondents currently have defined environmental objectives, related to either production processes and operations (Fig. 4) or to areas that go beyond the fence of the organization, and thus extend to the supply chain and further through more strategic aspects (Fig. 5).

Few organizations had environmental objectives outside the scope of their production processes and operations, such as biodiversity, design, CE, LCA, requirements to suppliers, and products. Thus, there seems to be a predominance of environmental objectives related to the production processes with limited inclusion of a lifecycle and product perspective. This could be an indication that despite the attempts to expand the focus of the ISO 14001 standard towards a lifecycle

Table 6

Survey results from open-ended qualitative question concerning areas, within which the organizations struggle to define environmental objectives.

Overall theme	Summarized findings from the survey
Aspects related to operation and production processes Energy (16 respondents)	<ul style="list-style-type: none"> • Energy consumption as a dependent variable to activity levels, customers etc. • Water consumption • Energy optimization in rented building • Reduction of energy consumption while growing the company • Standby consumption • Heating • Reduction of consumption
Waste (waste water, resources) (6 respondents)	<ul style="list-style-type: none"> • Reduction of waste • Recycling of waste • Waste water treatment • Reduction in waste water • Impact from recycling waste
Resources and materials (input to production processes) (6 respondents)	<ul style="list-style-type: none"> • Limited choice of suppliers makes it difficult to define ambitious objectives • Material consumption • Substitution of materials • Reducing use of additives in production • Preventing chemical accidents
Aspects related to the supply chain Suppliers (9 respondents)	<ul style="list-style-type: none"> • Supply chain management • Requirements to suppliers • Assessment of environmental impact from suppliers • Using environmental aspects as criteria for selecting suppliers • Limited opportunity for influencing suppliers due to company size
Customers (11 respondents)	<ul style="list-style-type: none"> • Challenge of being a sub-supplier to other companies, who do not prioritize environmental management • Difficult to influence sustainable consumption • Advising and guiding customers • Providing sustainable projects and solutions • Efforts made by sales personal in guiding and advising customers
Fuel and transport (8 respondents)	<ul style="list-style-type: none"> • Fuel consumption • Reduction of fuel consumption • Control/statistics of each vehicle • Internal logistics
Aspects related to the organization Social value/soft side of EMS (13 respondents)	<ul style="list-style-type: none"> • Behavior • Human side of EMS • Employee engagement and understanding of environmental aspects • New practices and routines • Ethical considerations • Perceptions and understandings • Internal purchasing practices to include environmental considerations
Purchasing practices (2 respondents) Aspects related to strategic areas	
Lifecycle thinking and climate change (10 respondents)	<ul style="list-style-type: none"> • Measurable objectives for lifecycle thinking • Prolonging the lifecycle of items • Lifecycle assessment (LCA) • Managing scope III impacts • Reducing CO₂ emissions • Measure CO₂ emissions • Reuse (internal and external) • Take-back solutions for products • Take-back solutions for packaging • Leasing/rental solutions • Long-term goals for CE • Measures for biodiversity efforts (internal and external) • Biodiversity impacts
Circular economy (8 respondents)	
Biodiversity (4 respondents)	<ul style="list-style-type: none"> • CSR measures • Connecting EMS to CSR in organization
CSR (3 respondents)	
Product design (3 respondents)	<ul style="list-style-type: none"> • Design of more 'green' products • Resource efficiency in product design

perspective, Danish organizations still apply a predominantly operational focus in their environmental objectives. Organizations, who reported EMS as being a customer demand, work with all the proposed environmental objectives in Figs. 4 and 5, which indicates that this focus on operational environmental objectives could be caused by customer demand to these specific environmental aspects.

However, the areas that most organizations identified as new important areas in the future of their EMS were use of recycled material (21%), CE (18%), chemicals (16%), substitution of materials (14%) and LCA (14%). This indicates that environmental objectives related to operations have been established in the organizations, who then expect to expand the scope of their EMS to also include environmental objectives

related to the supply chain and perhaps even further to more strategic aspects. This could also be an indication of a general development in society towards organizations taking more responsibility for sustainability, CE etc., whereby the organizations might expect non-operative objectives to become customer demands in the future.

The interviews showed that the majority of proactive organizations also focus their environmental objectives on aspects closely related to production processes, which supports the findings from the survey. This includes environmental objectives related to energy, waste, water, fuel consumption etc. However, considering more strategic aspects, the proactive organizations in the interviews had different perceptions of whether or not EMS was the right place to integrate such aspects:

“It (the environmental objectives) has always been electricity and fuel; the other aspects that we are working on are not part of our environmental objectives” (T)

“Energy and waste are our main areas, and then we have other strategic focus areas in addition to that, but those are implemented in another way.” (A)

“Our environmental objectives are focused on our production. Requirements to products is something completely different; it concerns legal requirements and the executive order on building regulations, not environmental management.” (O)

4.5.1. Aspects that are difficult to integrate in EMS

In the survey, the respondents were asked to elaborate on any aspects that were difficult to define environmental objectives to through an open-ended qualitative question. Key results from this are summarized in Table 6, where four key areas of environmental objectives emerged: aspects related to operation and production processes, aspects related to the supply chain, aspects related to the organization, and aspects related to more strategic areas. Many respondents reported aspects related to production processes as areas where they found it difficult to define environmental objectives, which shows that it is not only areas not related to operations that the organizations struggle with (as seen in Fig. 5), but also areas related to operation. This indicates that despite a common practice of focusing on environmental objectives related to operations, many respondents still struggle to define meaningful objectives within these areas. One of the reasons for this could be that many of the organizations have realized the largest environmental improvements earlier and now struggle to keep defining objectives within these areas, where the improvement potentials have been reduced over time. Furthermore, this could also indicate difficulties in relating overall environmental objectives with specific actions to improve the environmental performance, and thus understanding how to define environmental objectives that are realistic and achievable within the organization. Lastly, the respondents in the survey also highlighted concerns regarding the nature of the environmental objectives: absolute vs. relative and quantitative vs. qualitative. Firstly, the use of absolute measures of consumption and reduction are rarely appropriate for the organizations, as more meaningful objectives would focus on relative measures, e.g. of consumption pr. produced unit, sales volume or similar. The respondents expressed a need for benchmarking and developing flexible objectives that fit fluctuating production, where it is difficult to define meaningful objectives. Furthermore, several respondents emphasized the need for environmental objectives focusing on the process and qualitative measures rather than quantitatively measuring the outcome. For these respondents, such shift from strictly quantitative objectives towards also including qualitative objectives would allow for objectives that are more meaningful to the organization, and enable a closer connection between environmental objectives and

general practice.

4.6. Development in scope and focus of environmental objectives and ISO 14001 practice

The view on environmental aspects has developed over the years from a focus on end-of-pipe solutions, to cleaner technologies, environmental management, environmental impacts from products, and more recently towards sustainability and CE (Remmen, 2001; Remmen et al., 2015). The ISO 14001 standard represents the environmental management step; however, the standard has through the revisions increased the focus on product-orientation and a lifecycle perspective. As the most important new areas of environmental objectives in Danish organizations were assessed to be recycled materials, CE, chemicals, substitution of materials and LCA, the practice of EMS in Danish organizations appear to be developing from strictly operational towards more strategic areas. However, these aspects have also been highlighted in the survey as areas in which the organizations find it difficult to define environmental objectives, which could hinder implementation of these new aspects in EMS.

Table 7 shows how many organizations in the survey are working different strategic aspects and whether this is integrated in their EMS. While not all organizations responded to these questions, it still appears that the majority who do work with aspects of CSR, industrial symbiosis, LCA etc. have integrated this in their EMS. However, although it is integrated in their EMS, the organizations have rarely defined environmental objectives for these areas. The organizations working with these aspects and monitoring progress, but not measuring specific outcomes could explain this. However, it could also be an indication of environmental policies that include these aspects, while the practice of defining objectives do not cover these aspects. The interviews also showed challenges for the organizations to define environmental objectives to areas that are not closely connected to operations, where one of the public organizations, who is a service-provider, said:

“We have environmental objectives concerning electricity and water, but we do not have any objectives that focus on influencing our visitors, even though that is our main work. It is just so difficult measure.” (D)

This lack of strategic focus is also present in the production companies, as one argues:

“It (environmental objectives) has been established for many years; it is very focused on the efficiency of our processes. The strategy is not really considered.” (F)

This indicates that even the proactive organizations can struggle in defining environmental objectives that go beyond operations, and target the strategic aspects, presented in Table 7.

Table 7
Survey results on strategic aspects and whether it is integrated in EMS. (n = [175–200]).

	Work with the concept in the organization					It is integrated in EMS		Environmental objective	
	Strongly agree/agree		Strongly disagree/disagree		No of organizations responding	Amount of organizations working with the concept who has integrated it in their EMS		Amount of organizations who have integrated the concept in EMS and defined related objectives	
	Freq.	%	Freq.	%		Freq.	%	Freq.	%
CSR	142	76%	46	24%	188	89	63%	36	40%
Industrial symbiosis	96	50%	96	50%	192	57	59%	–	–
Ecolabels	69	35%	131	75%	200	54	78%	20	37%
LCA	63	34%	120	66%	183	33	52%	8	24%
Environmental assessment of suppliers	153	77%	47	24%	200	133	87%	34	26%
Ecodesign ^a	63	36%	112	64%	175	40	63%	24	60%

^a environmental objective for ecodesign is the sum of ‘design’ and ‘products’, and may not be completely accurate.

5. Discussion

This study shows that the current practice of EMS in Danish organizations is focused on operations (78% of the survey respondents) and optimizing production processes (54%), and although there is an increasing attention towards product orientation within the organizations, indicating an interest in utilizing EMS as a strategical vehicle (Chiarini, 2017), it is still rather unexplored in Danish EMS. This could be an indication of the organizations preferring status quo and perhaps having a limited interest in changing their environmental practice (Sorooshian and Yee, 2019); however, it could also be an indication of the organizations experiencing difficulties in defining and implementing such strategic objectives with only 9% of the organizations not finding this difficult. This could be related to the process of defining environmental objectives, as the top management primarily defines these, and it can be questioned whether top management have the right knowledge for this.

This study shows that customer demands have a significant influence on Danish organizations decision to have a certified EMS, which highlights how EMS functions in supply chains. However, despite customers being a key stakeholder in relation to EMS (72%) and EMS being a customer demand (59%), only 4% of the organizations collaborate with customers when defining environmental objectives. Similarly, in the upstream chain, 44% of the organizations in the survey reported to set requirement to their suppliers to have an EMS, but only 16% of the respondents have defined environmental objectives targeting requirements to suppliers. This indicates that the supply chain perspective of EMS is not fully explored and utilized. This indicates that the supplier considerations are not transferred further upstream in the chain through the environmental objectives, but rather through other actions that may be in place to manage environmental aspects in the upstream supply chain, such as green supply chain management that might not be managed through EMS. This shows that the organizations have identified customers and suppliers as key stakeholders, however these have limited influence on the environmental objectives.

As the majority of organizations find it difficult to keep identifying feasible improvement potentials, integrating more strategic elements in their EMS could support them in changing the scope of their system and thus identifying new improvement potentials that lie beyond operations (Kristensen et al., 2021). This study shows that Danish organizations do expect future environmental objectives to focus on such aspects in addition to operations, which highlights the importance for organizations to continue to improve operational practices while expanding the scope of EMS to also function in the supply chain, and in some cases beyond the traditional supply chain. Some of these new areas to integrate in EMS goes beyond what has traditionally been included in environmental policy, objectives and procedures, which poses a challenge for organizations. This could be related to CE, as CE implementation require further collaboration and partnerships. The plan-do-check-act cycle of EMS have been presented as a good tool for CE implementation in organizations (Marrucci et al., 2019), which will require organizations to define circular objectives in their EMS and consider a broader range of stakeholders (Kristensen et al., 2021).

Furthermore, the supply chain function may also challenge the organizations in exploring environmental objectives that go beyond a traditional chain, and may represent an obstacle for ISO 14001 to remain relevant. As the environmental perception has developed over time from end-of-pipe solutions over pollution prevention towards environmental management and sustainable development (Remmen, 2001), the understanding of environmental aspects in the ISO 14001 standard has developed in a similar fashion. However, this study shows that although the general understanding of environmental aspects have broadened, the implementation of this in EMS in Danish organizations appear to fall behind. In order for EMS to remain relevant in organizations, the implementation of the system and the subsequent environmental objectives and actions must reflect the overall trends in

environmental aspects. For example, including LCA and biodiversity in the EMS reflect such development, as these aspects have entered the general environmental understanding during recent years, and as such, EMS should reflect this. Attention must be paid to developing an EMS that is able to accommodate new topics on environmental aspects to avoid that the system thinking leads to implementation of environmental objectives that are not the most strategic relevant for the organizations.

Furthermore, such environmental objectives that follow the development of environmental trends appear to be needed for the organizations to continue to define environmental objectives and identify improvement potentials. This is due to the fact that many of the organizations have realized many improvement potentials related to operations, and struggle to continue to identify new improvement potentials and to continue to define environmental objectives within the same areas. This is also evidenced by the expected importance of future environmental objectives to focus on integrating aspects that go beyond operations, such as product design, ecolabels, CSR and CE.

6. Conclusions

This study investigated how Danish organizations implement environmental objectives in ISO 14001 certified EMS. We show that the current practice of implementing environmental objectives in Danish organizations is based on top management defining environmental objectives, and the scope of the objectives focus on operational aspects with limited attention to strategic aspects. This study provides new insights into the practices that surround environmental objectives in ISO 14001 certified organizations, and shows that the prevailing practice is focused on environmental objectives related to operations and process optimizations. The study also shed light on the roles of different stakeholders in relation to environmental objectives. Although customer demands have been highlighted as a key driver for implementing EMS and an important stakeholder in relation to EMS, customers' interests are not included in the process of defining environmental objectives. This could indicate a disconnect between the factors that drive EMS implementation and the actual implementation, which in turn might result in limited benefits from implementation.

In the analysis, we find that there is no coherence between the amount of time an organization have been certified according to ISO14001 and how hard they find it to set relevant reduction targets. This could indicate that other factors affect these aspects of EMS in Danish organizations, and do not support previous findings on how organizations over time struggle to define new environmental objectives (Mosgaard and Kristensen, 2020).

The findings of this study have implications for organizations, managers, and other stakeholders. From the findings, organizations and managers should be aware of the supply chain function of their EMS, and explore potential new ways of engaging relevant stakeholders when defining environmental objectives. In addition, attention should be given to improvement potentials that are not directly related to operations as a means to ensure continuous improvements and making EMS a strategic vehicle for sustainable development. Further, decision makers need to pay attention to the development of standards that follow and support the continuous development of environmental perception and practice in organizations in order to maintain the relevance of EMS. Denmark have had a long tradition for a political support towards sustainable transformation through pilot projects and larger cleaner technology programs (Remmen, 2001), these kinds of political support can be further developed to support strategic implementation of EMS.

Limitation and further research: A potential bias in the results might occur, as the respondents are familiar with environmental management and therefore have a notion of what the "right" answers might be. Similar to this a standard method bias can occur. The mixed method approach however made it possible to compare results between interviews and surveys and this did not give us any contradictions, but

there might still be a standard method bias. Additional to this there might be variables influencing the study that we did not check for, such as the position of the respondent and the specific answers to management related questions, just as an example. The limitations of this study provides avenues for further research. First, the scope of this study focused on EMS in Danish organizations, and as such cannot be expected to be transferable for organizations in other geographical contexts, as the institutional pressure arising from different regulatory settings influence the outcome of ISO 14001 in organizations (Arimura et al., 2016). Similar studies of environmental objectives in ISO 14001 certified organizations in other geographical areas would thus be relevant, as well as further investigation of how the different institutional and contextual setting influence the environmental objectives within organizations. Second, this study presents a snapshot of environmental objectives in Danish organizations, and shows that the organizations expect more strategic areas to be included as environmental objectives in the future. Further research could then focus on the development of objectives and practices over time, and provide in-depth insights into how time since certification impacts the identification of feasible improvement potentials and the process of defining environmental objectives. While this study suggests that organizations struggle equally to define environmental objectives and identify improvement potentials, independent of how long they have had a certified EMS, further research

should investigate what causes these difficulties, such as organizational maturity and internal capabilities.

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CRediT authorship contribution statement

Mette Alberg Mosgaard: Conceptualization, Methodology, Investigation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Anja Marie Bundgaard:** Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Heidi Simone Kristensen:** Formal analysis, Visualization, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendices.

Table 8

Overview of interview themes

Theme	Sub-themes addressed
Introduction/background information of respondent	Education, employment, tasks, experience with environmental management, other relevant experience
Background of EMS	Motivations for being ISO14001 certified, internal organization of EMS
Drivers and barriers for EMS	Advantages and challenges of being ISO14001 certified
Objectives and effects of EMS	Environmental objectives, development of objectives over time, environmental improvements due to ISO14001, economic, social and environmental effects of EMS
Emerging themes in EMS	Product-orientation, circular economy, industrial symbiosis, carbon footprint, ecolabels, CSR, integrated management systems
Dialogue with and involvement of stakeholders	Environmental communication with authorities, customers, suppliers, and other stakeholders
The 2015 standard	Implementation and expectations to the ISO14001:2015 standard (for those not yet having implemented the new standard)

Table 9

Overview of themes in national survey

Theme	Sub-themes addressed
Background	- Personal information, employment, experience, environmental knowledge - Organizational information: size, industry, primary markets etc.
Certification	- Details of certification: time, certification body, costs of certification etc. - Integrated management systems
Environmental objectives	- Process of defining environmental objectives - Focus areas of current environmental objectives (water, energy, waste, CSR, CE etc.) - Expected areas of importance in the future
Advantages and disadvantages of EMS	- Economic, environmental and organizational effects of EMS - Drivers and barriers for EMS
EMS implementation	- Focus of EMS: production, product, strategic - General practice of EMS and environmental efforts within the organization - Integration of strategic and broader concepts: CSR, industrial symbiosis, circular economy, ecodesign, LCA, supply chain management etc.
Stakeholders	- Importance and relevance of stakeholders: authorities, customers, neighbors, employees, knowledge institutions, local environmental networks
ISO 14001 (2015) new themes	- Awareness of the revised standard - Impact of the standard on EMS processes and practices

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