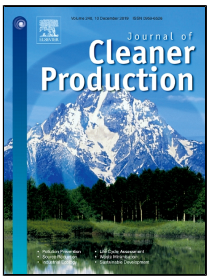

A systematic analysis of environmental management systems in SMEs: Possible research directions from a management accounting and control stance

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A systematic analysis of environmental management systems in SMEs: Possible research directions from a management accounting and control stance

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Abstract: This paper systematically reviews the drivers, implementation processes and performance outcomes of environmental management systems (EMS) in small to medium-sized enterprises (SMEs) from a management accounting and control (MAC) stance. It finds that there are various contextual, control and performance themes which require research attention. Regarding context, there is the need to: *a)* explore the relationship between firm size and the development of sustainability tools; *b)* assess the impact of context for better environmental performance and *c)* on adoption motivations; and *d)* explore how EMS affect corporate and individual accountability. Regarding control, there is the need to: *a)* theoretically explore the control typologies for SMEs; *b)* better understand the type (i.e. formal or informal) and nature (i.e. tight or flexible) of this control; and *c)* develop understandings of socio-ideological controls for improved sustainability. Finally, regarding performance, there is the need to: *a)* understand how environmental performance is defined and the interaction between its dimensions; and *b)* explore the relationship between EMS and environmental performance in SMEs. The paper serves as a first step to understanding MAC in SMEs, highlighting contemporary issues that are relevant for academic and professional sustainability practice.

Keywords: environmental management systems, EMAS, ISO 14001, management accounting and control, SMEs, sustainability

1. Introduction

Over recent years, much research has been conducted on the adoption and implementation of environmental management systems (EMS) in small to medium-sized enterprises (SMEs). Regarded as 'voluntary' certification schemes, EMS support the integration of sustainability into corporate policy (Hahn et al., 2015). In the management accounting and control (MAC) literature, EMS are seen as part of a broader framework of accounting tools to strategically improve both financial and non-financial performance outcomes (see Guenther et al., 2016) or as "management controls that arise from compliance frameworks" (Ahrens and Khalifa, 2015, p. 15). Nevertheless, research into EMS rarely features in the MAC stream (see Heras-Saizarbitoria et al., 2011), even though EMS are increasingly adopted by firms – big and small – to demonstrate environment management in particular and sustainable development in general (see Aragón-Correa et al., 2008).

Defined in Europe as companies with less than 250 employees *or* a turnover of ≤ €50m (2003/361/EC), SMEs are important to the world economically, ecologically and socially (Stubblefield Loucks et al., 2010). SMEs constitute around 99% of Europe's businesses, employ two-thirds of its citizens (Airaksinen et al., 2015) and, more crucially, generate most of its environmental pollution (ECAP; Kearins et al., 2010). Nevertheless, research into environmental management in SMEs is lacking from a MAC stance (Lavia López and Hiebl, 2015; Ghosh et al., 2019). Particularly, sustainability MAC research tends to focus on large firms with established control systems or fails to differentiate between firm size (e.g. Henri and Journeault, 2010; Pondeville, Swaen and De Rongé, 2013; Crutzen, Zvezdov and Schaltegger, 2017). However, SMEs are characteristically distinct from larger firms in terms of size, ownership, strategy, structure, resources, internal systems (Hillary, 2004; Stubblefield Loucks et al., 2010), and – as some argue – attitudes towards environmental issues (Perez-Sanchez, Barton and Bower, 2003). Consequently, the tools developed for larger firms are often difficult for SMEs to operationalise (Jenkins, 2004) and downscale to their needs (Stubblefield Loucks et al., 2010; Lavia López and Hiebl 2015).

Given that accounting information and tools are also necessary for controlling activities in small firms (Nandan, 2010), much remains to be known about the adoption and adaption of management accounting techniques in SMEs (Lavia López and Hiebl, 2015; Pelz, 2019). Particularly, there is little empirical research on how SMEs use EMS (Gibassier and Alcouffe, 2018). On the one hand, there is the assumption that accounting and control systems are less formal in SMEs (see McKeiver and Gadenne, 2005; Scapens, 2006) which tend to take 'ad hoc' or 'reactive' approaches to environmental management (Moore and Spence, 2006). On the other hand, there is the viewpoint that SMEs implement formal accounting systems by mimicking larger customers, viewing such systems as *the* course to better sustainability performance (see Nawrocka, 2008). Notwithstanding, some authors pose that control in SMEs becomes increasingly formal over time, for example, contingent on the owner-managers' sustainability values (Hosoda, 2018) or as internal systems become more established (Groen et al., 2012). Consequently, much remains to be known about the type and nature of sustainability control in SMEs (Ghosh et al., 2019).

Based on these empirical and theoretical gaps, this systematic literature analysis extends previous studies on EMS in SMEs by consolidating extant empirical research from a MAC stance. This is necessary because sustainability constitutes a fast-moving topic and research becomes outdated, even if central themes or discourses are carried forward. Therefore, such periodic reviews allow researchers to reflect upon the direction of sustainability MAC in relation to the design and use of internal systems in specific contexts (Norris and O'Dwyer, 2004). Particularly, this systematic review asks: *a) Why do SMEs adopt EMS? b) How are the internal management accounting and control processes affected by this? And, c) What are the performance effects in relation to EMS adoption and implementation?* These questions are interesting for two reasons. First, previous research fails to summarise the antecedents, processes *and* outcomes of EMS in SMEs as environmental management tools, especially from a MAC stance. This paper consequently outlines the connections between analytical areas, as well as offers suggestions for future research attention. Second, MAC in SMEs provides an interesting empirical context as an emerging field with distinct characteristics (see also Gibassier and Alcouffe, 2018; Ghosh et al., 2019). This constitutes an important topic given that SMEs play an important role not only for the global economy, but also for sustainable futures that extend beyond temporal and spatial boundaries. Consequently, the paper contributes by overviewing extant research on EMS in SMEs and provides recommendations for developing understandings, conceptualisations and theorisations from a MAC stance.

The paper is organised as follows. Section 2 begins by positioning EMS into the MAC literature. This is followed by the characteristics and nature of control in SMEs, as well as EMS use in the SME context. Next, Section 3 communicates the method. Thereafter, Section 4 presents the primary findings from the reviewed articles before outlining the potential contributions to (sustainability) MAC research. Finally, Section 5 concludes the paper.

2. Background

Given the limited research on SMEs published in MAC journals, the article base for this background section spans fields such as environmental management and family business, among others.[1] It begins with a look at the connections between EMS and sustainability MAC in order to position the research. It then overviews existing understandings of the type and nature of control in SMEs. Finally, it looks at literature which reviews EMS in both SMEs and larger firms. This frames how EMS have previously been considered to inform the following systematic review.

2.1 Environmental management systems, management accounting and control

EMS, such as ISO 14001 or EMAS, provide guidelines – or practical measures – for organisations to continually improve their environmental operations and performance,

[1] Note that while there is an emerging stream of literature on MAC in family businesses (see Becker et al., 2011; Dekker et al., 2015) and start-ups (Davila and Foster, 2005, 2007), SMEs constitute a distinct empirical context given that not all SMEs are family firms and/or start-ups. Furthermore, it is wrong to assume that family businesses are characteristically small. Nevertheless, the findings from these wider MAC streams can help frame potential avenues of interest for the SME context.

and are understood as being valuable for SMEs (ECAP, 2011). EMS are commonly audited by an independent third-party for legitimising reasons (Ferrón-Vílchez, 2016).[2] While ISO 14001 is viewed as a strategic EMS to improve internal processes and procedures, as well as indirectly performance output (Boiral and Henri, 2012), EMAS is orientated towards performance outcomes, credibility and transparency (see Albelda, 2011). Therefore, while ISO 14001 concentrates on organisational improvements (i.e. improved efficiency and effectiveness), EMAS promotes public accountability by mandatory reporting on environmental performance (Bracke, Verbeke and Dejonckheere, 2008). Both EMS, however, arguably improve environmental performance through the introduction of accounting practices and control systems to meet certification aims. As Yin and Schmeidler (2009) comment, EMS aid organisations address regulatory demands through operational control and employee stewardship.

Resting at the interface between business and society, the adoption of an EMS affects internal MAC practices. Specifically, EMS constitute "a set of processes that enable[s] an organization to reduce its environmental impacts and increase its operating efficiency" based on a "continual cycle of planning, implementing, reviewing and improving the processes and actions […] to meet […] business and environmental goals" (Zorpas, 2010, p. 1547). Thus, management accounting practices are necessary to facilitate environmental management for EMS (Albelda, 2011). Notably, within the sustainability MAC literature stream, Guenther et al. (2016) position EMS at the strategic level of the firm-field interface and environmental management accounting (e.g. life-cycle costing or materiality assessment) at the operational level. These strategic and operational levels are bridged by the sustainability control system (SCS) (i.e. the combined package of measurement instruments) to meet performance outcomes (see also Johnstone, 2019b). Consequently, EMS are strategically deployed to improve organisational environmental control and minimise operating costs to enhance profits (Epstein and Roy, 1997).

As an overview, Table 1 summarises the connection between the Plan-Do-Check-Act (PDCA) model for the two most popular EMS in Europe, namely ISO 14001 and EMAS.[3] Furthermore, it overviews the possible connections between these EMS and MAC based on a rather broad thematic analysis that frames the following systematic review. The discrete stages arguably connect to focal areas in MAC research (i.e. system design, system use, and performance measurement and evaluation). Nevertheless, the cyclical and overlapping nature of the areas must be emphasised. Particularly, performance measurement and evaluation are often difficult to separate, as well as ultimately lead back into strategic planning at the corporate level.

Table 1. Possible connections between the PDCA improvement model, EMS (ISO 14001 and EMAS), and management accounting and control

[2] ISO 14001 does not necessitate an independent third-party audit given that there is the option to self-declare (ISO 14001: 2015).

[3] Note that there are also other introductory clauses to ISO 14001 and steps to EMAS that are not embedded into the table as they do not relate directly to the PDCA cycle.

Improvement model criteria	***Related ISO 14001: 2015 clauses***	***EMAS guidelines***	***Potential relation to management accounting and control***
Plan	4. Context of the organisation 5. Leadership 6. Planning 7. Support	Environmental policy and programme	System *design* – Strategic formalisation, planning and risk assessment at the firm-field interface based on external, contextual disturbances (e.g. contingency, institutional and stakeholder perspectives)
Do	8. Operation	Implement EMS	System *use* – Management accounting processes, information and decision-making for performance outcomes
Check	9. Performance evaluation	Internal environmental audit	Performance *measurement* – The internal and external audit process
Act	10. Improvement	Continuous environmental performance improvements; produce an environmental report for external verification	Performance *assessment* and *evaluation* – Realigning targets, setting new KPIs, reporting, disclosure etc.

2.2 The characteristics of control in SMEs

As suggested in the introduction, it is unclear how control is characterised in SMEs. While some authors argue that it becomes increasingly formal over time (Groen et al., 2012), others suggest that is primarily informal due to the unique characteristics of SMEs in relation to, for example, size, ownership and structure (e.g. Perez-Sanchez et al., 2003). Nevertheless, the specific characteristics of SMEs arguably give rise to distinct accounting systems which require further theorisations from a MAC stance (Ghosh et al., 2019).

Arguably, the informal qualities of MAC for SMEs share parallels with other literature streams. For example, the accounting and family business literature suggests that control is often based on flatter organisational structures, personal relationships and trust, rather than codified procedures (Senftlechner and Hiebl, 2015). This stream also poses that there are key differences between family and non-family firms, asserting that 'control' in the former may be concentrated to a few individuals who make accounting decisions guided by personal interests or emotions (Prencipe, Bar-Yosef and Dekker, 2014), rather than through formalised management control systems (MCS). Here, goals may not only be financial (Senftlechner and Hiebl, 2015), but based on long-term survival. As such, the information produced by MCS may not be fully utilised due to what can be regarded as a 'flexible decision-making process'. Thus, there is the perception that MAC practices and systems, in their conventional, functionalistic and bureaucratic sense, are less applicable to family firms (Duréndez, Ruíz-Palomo, García-Pérez-de-Lema and Diéguez-Soto, 2016; Quinn, Hiebl, Moores and Craig, 2018).

Arguably, some of these findings relate to the SME context. The broader SME literature indicates that the adoption of EMS is contingent on the owner-managers' values (Castka, Balzarova, Bamber and Sharp, 2004; Stubblefield Loucks et al., 2010; Spence, 2016; Schaefer, Williams and Blundel, 2018). Additionally, there is the viewpoint that environmental education and awareness are positively associated with formal EMS adoption in SMEs (McKeiver and Gadenne, 2005). This suggests that individual characteristics and skills are needed to drive proactive strategies in SMEs for not only a long-term sustainable edge vis-à-vis competitors, but also sustainable futures that extend beyond the firm due to moral motivations (see Aragón-Correa et al., 2008; Bos-Brouwers, 2010). Thus, decision-making power, which is concentrated to a few individuals, can give rise to – what can be termed – 'ad hoc', but not necessarily reactive, systems as Moore and Spence (2006) suggest. Specifically, one can assume that commitment by SME owner-managers often sets the path for sustainable systems in *reaction* to external stimuli which thereafter becomes embedded within *(pro)active* business responses. This is in contrast to early research in corporate environmental management which suggests that SMEs tend to exhibit *reactive* responses regarding the adoption of environmental strategies (Bianchi and Noci, 1998; Ferenhof, Vignochi, Selig, Lezana and Campos, 2014), and do not adopt formal strategic tools, perceiving them as costly (Alonso-Paulí and André, 2015).

The type and nature of sustainability control in SMEs is also contingent on the above-mentioned characteristics. Santos et al. (2011) suggest that the implementation of internal systems to meet operational ends depends on SME resources or perceived cost constraints. This is echoed in the family business literature which indicates that the type of control as formal or informal is due to the availability of resources (see Moores and Mula, 2000) and/or firm size (Senflechner and Hiebl, 2015). From a sustainability MAC stance, Hosoda (2018) poses that formal control systems are supported by informal ones in small companies, reflective of the CEOs' CSR values. The authors further that it is the combination of both formal and informal 'systems' that integrate stakeholders' opinions as well as motivate employees. Taken together, such findings suggest that as the SME develops, the internal MAC systems and corporate (sustainability) values also develop. Yet, the literature suggests that the decision to implement sustainable systems is often be guided by individual values in SMEs. Notwithstanding, there is also the suggestion that standardised systems can be introduced in SMEs to meet conditions imposed upon them by larger firms in the supply chain (see Wu, 2017). Here, control may take more of a bureaucratic form, embedded into formalised MCS due to third-party pressures.

2.3 Environmental management systems in SMEs

EMS are viewed as strategic sustainability management tools for *action* in SMEs (Johnson and Schaltegger, 2016). Nevertheless, many SMEs do not currently have a formalised EMS or environmental policy in place (ECAP, 2011). Hillary (2004) suggests that SMEs also are less likely to adopt EMS due to resource constraints, uncertainty or ambiguity regarding the implementation process, as well as perceived lack of compensatory mechanisms. While these barriers have internal (e.g. corporate culture and attitudes) and external (e.g. institutions and economics) orientations, the internal factors are posed as most likely to hinder EMS implementation (Hillary, 2004). Arguably, such findings have implications for the SCS development process.

SMEs benefit from the adoption of formalised EMS in various ways. Ferenhof et al. (2014) argue that EMS implementation enables innovation through improved internal processes and procedures, and subsequent (short and long-term) performance. Thus, EMS reconcile economic and environmental matters. These authors also argue that EMS allow SMEs to demonstrate compliance or commitment to environmental improvement in a given context by 'stimulating the control of environmental risks'. To this end, Hillary (2004) comments that formal EMS can foster both internal (organisational, financial and people) and external (commercial, environmental and commitment) benefits. Internally, EMS improve employee awareness (Perez-Sanchez et al., 2003), involvement (Curkovic, Sroufe and Melnyk, 2005; Albelda, 2011; Heras-Saizarbitoria and Boiral, 2013), expertise/experience (Stubblefield Loucks et al., 2010) and commitment (Ardente, Beccali, Cellura and Marvuglia, 2006; Salim et al., 2018), as well as the company's formalised environmental processes and procedures (ISO 14001: 2015). These features arguably increase the likelihood of EMS success in terms of performance outcomes. Externally, EMS provide a regulatory function that indicates commitment on the part of the organisation to sustainable futures. Thus, EMS act as assurance mechanisms to various stakeholders.

As an overview, Salim et al. (2018) group studies on EMS in SMEs into three categories. The first is orientated towards the socio-ecological elements at firm-field interface. This regards the drivers and motivations for EMS adoption (e.g. Zorpas, 2010). Meanwhile, the second relates to environmental performance outcomes, management tools and processes (see Ferenhof et al., 2014). Finally, the third group is founded upon the economic performance outcomes of EMS adoption (e.g. Lavia López and Hiebl, 2015). From this, one can posit that studies on EMS in SMEs tend to focus on the adoption drivers, environmental measures and methods, and economic outcomes respectively. Although, most studies tend to concentrate on the socio-ideological elements (see Heras-Saizarbitoria, Arana Landín, and Molina-Azorín, 2011), and less so on the 'technical' implementation processes and performance outcomes (see Heras-Saizarbitoria and Boiral, 2013; Salim et al., 2018) that are integral to environmental MAC. Consequently, much remains to be known about how EMS are implemented within firms.

3. Method

This systematic literature analysis is motivated by the need for periodic reviews within the sustainability MAC stream which allow researchers to reflect on the current state-of-the-art (Norris and O'Dwyer, 2004; Lueg and Radlach, 2016). Systematic reviews are useful for this purpose given that they collate existing research and summarise results as baselines to move forward from. The research process is schematised in Figure 1 below and expounded upon in the following paragraphs.

Insert Figure 1 here

The first step in the review process involved an initial database search using Scopus, Web of Science and Google Scholar. Keywords were initially limited to "ISO 14001" (as the most influential global EMS) *AND* "SMEs" *OR* "small to medium-sized enterprises". The decision was made to begin the review from 2004 as this is the year

when the first updated version of ISO 14001 appeared. This decision also allows for a contemporary understanding of EMS in SMEs given that environmental management constitutes a fast-moving topic.

As sustainability issues are inherently interdisciplinary, the literature base spans various fields such as environmental management, production and robotics. After reading the titles, abstracts and keywords, those studies which were not empirically grounded were thereafter excluded from the analysis, although used to supplement the general discussion and literature background. Further, book chapters and conference papers were excluded in order to focus on peer-reviewed empirical articles. Additionally, articles that concentrated on integrated management systems were also omitted to concentrate on the nuances of environmental management (i.e. accounting for sustainability), rather than broader quality, and/or health and safety systems. Upon an initial reading, papers were thereafter excluded if they did not explicitly deal with EMS in detail; that is, the articles needed more than merely mentioning an EMS or its adoption reasons. Finally, additional studies were added to the list by reviewing the references and in-text citations from those already obtained. This initial search process returned 13 usable articles.

Given this limited number, the search was extended to include “EMAS” OR “EMS” AND “SMEs” OR “small to medium-sized enterprises”, following the same procedure as above.[4] This is because ISO 14001 and EMAS are the two most widely-used EMS on the market from a European stance. Furthermore, searching for EMS in general also ensured that other systems were not excluded. This resulted in another eight articles being added to the initial sample.

The third step regarded a ‘forward-looking’ analysis. This involved reviewing articles which cited the preliminary sample. The citations were taken from the initial databases. This led to a total of 23 usable articles for the review of EMS implementation in SMEs since 2004 (Table 2). Although this number is small, it is deemed comparable to similar reviews (e.g. Ferenhof et al., 2014) and reflects the limited research attention in this area.

Table 2. Chronological overview of empirically grounded articles for review

Author	***Title***	***Journal***	***Method(s)***
Burke and Gaughran, 2006	Intelligent environmental management for SMEs in manufacturing.	Robotics and Computer-Integrated Manufacturing	Qualitative interviews, site visits, website analysis and local media in six Irish ISO 14001 certified manufacturing SMEs.
Halila, 2007	Networks as a means of supporting the adoption of organizational innovations in SMEs: the case of Environmental Management Systems	Corporate Social Responsibility and Environmental Management	Case study of nine Swedish manufacturing SMEs involved in a network; interviews, participant observation and document analysis. Not all certified to ISO 14001.

[4] The existing exclusion criteria for reviewing the articles post-2004 remains. This is because the current version of EMAS regards Regulation 1221/2009 disregards previous versions. This also included additional studies being added to the list from in-text citations.

	(EMSs) based on ISO 14001.		
Zobel, 2007	The 'pros' and 'cons' of joint EMS and group certification: a Swedish case study.	Corporate Social Responsibility and Environmental Management	Case study of a project initiated in Sweden by a consultancy, involving the implementation and certification of EMS in 15 SMEs; interviews, project documentation and participation at project meetings and training sessions.
Balzarova and Castka, 2008	Underlying mechanisms in the maintenance of ISO 14001 environmental management system	Journal of Cleaner Production	Case study of two industrial SMEs in the UK; semi-structured interviews, observation and document analysis.
Nawrocka, 2008	Environmental supply chain management, ISO 14001 and RoHS. How are small companies in the electronics sector managing?	Corporate Social Responsibility and Environmental Management	Qualitative interviews with environmental and purchasing managers of 21 SMEs in Swedish-based manufacturing companies.
Seiffert, 2008	Environmental impact evaluation using a cooperative model for implementing EMS (ISO 14001) in small and medium-sized enterprises.	Journal of Cleaner Production	Exploratory action research consulting four Brazilian firms in the implementation of a cooperative model for establishing EMS systems; document analyses, semi-structured interviews and participant observation.
Heras and Arana, 2010	Alternative models for environmental management in SMEs: The case of Ekoscan vs. ISO 14001.	Journal of Cleaner Production	Initial qualitative interviews and case studies to prepare the quantitative survey of 262 ISO 14001 and Ekoscan certified companies.
Chan, 2011	Implementing Environmental Management Systems in Small- And Medium-Sized Hotels: Obstacles	Journal of Hospitality and Tourism Research	A statistical analysis of questionnaires from 48 hotels in Hong Kong.
Campos, 2012	Environmental management systems (EMS) for small companies: A study in Southern Brazil.	Journal of Cleaner Production	A comparative analysis of data collected from 83 small and 24 large companies in Brazil using bibliometric field research and a survey.
Halila and Tell, 2013	Creating synergies between SMEs and universities for ISO 14001 certification	Journal of Cleaner Production	An action research approach between university researchers and nine SMEs in Sweden based on semi-structured interviews, quantitative data analysis and participant observation. Not all certified to ISO 14001.
Granly and Welo, 2014	EMS and sustainability: Experiences with ISO 14001 and Eco-Lighthouse in Norwegian metal processing SMEs.	Journal of Cleaner Production	Semi-structured, in-depth interviews with nine Norwegian manufacturing firms that are ISO 14001 or Eco-Lighthouse certified.
White, Lomax and Parry, 2014	The implementation of an environmental management system in the not-for-profit sector	Benchmarking: An International Journal	A four-year participatory action research study of knowledge transfer partnerships in the UK not-for-profit sector.
Hörisch, Johnson and	Implementation of sustainability management and	Business Strategy and the Environment	Two survey datasets from 152 large firms and 177 SMEs in Germany.

Schaltegger, 2015	company size: A knowledge-based view.		
Singh, Brueckner and Padhy, 2015	Environmental management system ISO 14001: Effective waste minimisation in small and medium enterprises in India.	Journal of Cleaner Production	Survey of 63 manufacturing and service SMEs in India. Respondents include CEOs, general managers, environmental managers, quality assurance managers and HR managers.
Graafland and Smid, 2016	Environmental impacts of SMEs and the effects of formal management tools: Evidence from EU's largest survey.	Corporate Social Responsibility and Environmental Management	Quantitative survey of 5205 SMEs in 12 European countries (Denmark, Finland, Sweden, the Netherlands, Germany, France, Austria, Hungary, Poland, Italy, Spain and the UK).
Santos, Rebelo, Lopes, Alves and Silva, 2016	Implementing and certifying ISO 14001 in Portugal: motives, difficulties and benefits after ISO 9001 certification	Total Quality Management and Business Excellence	A survey of 80 Portuguese SMEs with an implemented QMS.
Shahedul Quader, Kamal and Hassan, 2016	Sustainability of positive relationship between environmental performance and profitability of SMEs: A case study in the UK.	Journal of Enterprising Communities: People and Places in the Global Economy	A qualitative analysis of SMEs in the UK based on interviews with five experts in the retailing and manufacturing sector, as well as secondary data from surveys and document to supplement the argumentation.
Johnson, 2017	Knowledge acquisition and development in sustainability-oriented small and medium-sized enterprises: Exploring the practices, capabilities and cooperation	Journal of Cleaner Production	Qualitative interviews and content analyses of 10 SMEs in the process of adopting EMAS or ISO 14001.
Laskurain et al., 2017	Contribution to Energy Management of the Main Standards for Environmental Management Systems: The Case of ISO 14001 and EMAS	Energies	A qualitative content analysis of EMS and ISO 14001, followed by eight case studies in the hospitality sector – four with ISO 14001 and four with EMAS.
Witjes, Vermeulen and Cramer, 2017	Exploring corporate sustainability integration into business activities. Experiences from 18 small and medium sized enterprises in the Netherlands.	Journal of Cleaner Production	Cross-case study of 18 Dutch SMEs at round table discussions organised by a consultancy.
Voukkali, Pantelitsa Loizia, Mihaela Pociovalisteanu and Zorpas, 2017	Barriers and difficulties concerning the implementation of an environmental management system in a bakery-confectionary industry in Cyprus for 8 Years	Environmental Processes	Analysis of annual reports from an independent certification body of a Cypriot SME.
Graafland, 2018	Ecological impacts of the ISO14001 certification of small and medium	Journal of Cleaner Production	A survey of 3633 SMEs from 12 European countries regarding the ecological impacts of ISO 14001 certification.

	sized enterprises in Europe and the mediating role of networks		
Valdez-Juarez et al., 2019	ISO 14001 and 26001, Agents of Change in the SME.	Journal of Management and Sustainability	Linear regression analysis of 215 SMEs in Mexico.

The analytical procedure for this systematic review was operationalised around three key themes, namely: the antecedents, processes and outcomes of EMS in SMEs. This aimed to connect the strategic and operational factors that are of interest in the exploration of environmental management within SMEs from a MAC stance. The themes were loosely framed ex-ante around Salim et al.'s (2018) categorisations of the contextual, socio-ideological motivations for EMS adoption in SMEs, internal environmental performance processes and procedures, and economic performance outcomes. As previously suggested, these categories imply a focus on the adoption *motivations* (external and/or internal), environmental measures and methods (i.e. the *implementation process*), and 'economic' *performance outcomes* respectively. They also relate to the main areas of the certification schemes as illustrated in Table 1. Specifically, *1)* the EMS is strategically adopted in response to contextual factors, which consequently affects *2)* the internal implementation processes as well as *3)* financial *and* environmental performance outcomes through measurement and evaluation for future strategic system (re)design.

The first step of the analytical procedure regarded tabulating the above thematic groupings manually in a word document by analysing the main research question(s) and core findings from each study. From this, an ex-post thematic area also arose from the initial analysis, namely: the *network effects* of EMS in SMEs. This 'fourth' theme, however, was viewed as overlapping the motivational, implementation process and performance groupings to various degrees. As such, it does not constitute a separate discussion thread in the first-stage findings. Meanwhile, the second stage of the analytical procedure involved a higher-order thematic analysis of the reviewed articles by connecting their core findings to the broader MAC literature stream. This gave rise to some conclusions and recommendations for future MAC research. Nevertheless, as any systematic analysis is inherently an interpretive process, it must be recognised as limited in the sense that there is no way to control for alternative understandings of the reviewed articles. Furthermore, the search and analysis regarded articles that were published in English. In this sense, the author recognises that there may be other relevant articles in non-English journals that could have been missed.

4. Findings and discussion

Although there are some descriptive trends that can be noted from the studies (i.e. a concentration of European-based research, small qualitative sample size etc.), elaborating on these is not the aim of this systematic review. Particularly, this section is based on clustering the findings into key – connected – themes on EMS in SMEs, namely: the adoption *motivations*; the *implementation processes*; and, the *performance measures and outcomes*. This is deemed beneficial to build a

comprehensive picture of the extant literature which can be directly related to MAC as a foundation for future research to move forward from. Interestingly, none of the reviewed articles embrace all three themes in their empirical analyses. Consequently, the first stage findings pave the way for the secondary analysis orientated towards EMS in SMEs from a MAC stance.

4.1 First-stage findings

4.1.1 EMS adoption motivations

Previous research highlights that motivation is key to understanding the implementation processes and performance outcomes of EMS (Singh et al. 2015). Yet, there appears to be no clear patterns of motivations for EMS adoption (Heras-Saizarbitoria et al., 2011).

Only a handful of the reviewed papers explicitly refer to the benefits of *implementing* an EMS in terms of *adoption motivations* (e.g. White et al., 2014; Santos et al., 2016). To this end, there appears to be key areas related to *external drivers* and internal *strategic concerns* that affect the adoption decision (see also Hillary, 2004). While these themes contain elements of overlap, for the sake of structuring the discussion, they are treated as individual elements.

External drivers such as stakeholder pressures, especially customer requirements (Nawrocka, 2008; Granly and Welo, 2014; Witjes et al., 2015) or regulation (Shahedul Quader et al., 2016) are noted as the primary adoption motivation for SMEs to adopt an EMS. This suggests a reactive response to external stimuli. However, as Nawrocka (2008) comments, the likelihood of adoption is also affected by proximity in the supply chain to end customers because adoption drivers diffuse over space. Meanwhile, others indicate that adoption relates to 'keeping one step ahead' of customers (Halila, 2007) in terms of marketable value (White et al., 2014). This suggests a proactive approach to environmental management which is founded upon extra-organisational considerations to remain competitive.

Meanwhile, the broader literature base suggests that *internal drivers* are also important for EMS adoption in SMEs (Ilomäki and Melanen, 2001). Localised drivers (Stubblefield Loucks et al. 2010) in addition to moral and personal reasons (Castka, Balzarova, Bamber and Sharp, 2004) guide the adoption decision and subsequent performance effects. Heras-Saizarbitoria et al. (2011) find that firms which pursue EMS certification for internal reasons yield greater performance benefits. For the reviewed studies, Nawrocka (2008) observes that having an EMS indicates commitment to environmental work, even if it does not necessarily act as 'proof of good practice'.

Although external pressures are presented as the dominant motivation for adopting an EMS, an internal vision is also important (Witjes et al., 2015). Here, external drivers are complemented by an internal organisational drive and there appears to be a combination of both extrinsic and intrinsic motivational forces at play. Zorpas (2010) states that the key motivations relate to financial, market, legislative *and* community/employee relations. Moreover, Nawrocka (2008) indicates that adoption decisions are increasingly moving from reactive to proactive approaches as the

number of drivers increase over time and space. To this end, Balzarova and Castka (2008, p. 1956) maintain that an "optimistic and proactive approach" must be upheld, even when dealing with legislative requirements, in order to use the EMS most effectively to satisfy not only external, but also internal requirements. Such findings only serve to build the argumentation for further research on the internal MAC as instrumental to performance outcomes, beyond strategic planning at the organisation-environment interface.

Beyond the external and internal drivers, the findings also illustrate the importance of network involvement for EMS adoption. Particularly, local networks with, for example, other SMEs are posed as useful for overcoming EMS adoption barriers as well as building expertise (Chan, 2011; Halila and Tell, 2013). These studies suggest that networks play a vital role in supporting organisational environmental management innovation (see also Lavia-Lopez and Hiebl, 2015). Nevertheless, Graafland (2018) finds that EMS certification itself stimulates network participation, rather than vice-versa. This is because SMEs seek external guidance on how best to implement ISO 14001 given their 'lack of knowledge'.

4.1.2 EMS implementation process

Many of the reviewed articles focus on the implementation process of EMS in SMEs. To this end, the main themes are founded upon: *a)* stepwise systems and a formalisation process through planning the EMS implementation process, *b)* tangible or formal (e.g. life-cycle assessment) and intangible or informal (e.g. employee knowledge and engagement) sustainability tools, and *c)* the use of networks as improving the design and use of internal systems.

First, stepwise (e.g. Burke and Gaughran, 2006; Halila, 2007; Balzarova and Castka, 2008; White et al., 2014) or collaborative (Seiffert, 2008) inductive models are proposed for optimising the EMS implementation process in SMEs. These models serve a practical function for SMEs by idealising how the EMS implementation process should occur in practice. They also imply the use of both formal and informal management control tools.

Second, the implementation process is related to a combination of both social and technical elements of system design. Witjes et al. (2017) propose that a holistic understanding of sustainability as a corporate value is necessary for true environmental integration in SMEs. This requires a balance of social (behaviour, leadership and shared beliefs) and physical (results, process, product and resources) dimensions. Particularly, employee skills and characteristics (e.g. common sense, awareness, enthusiasm, buy-in, environmental and legal knowledge and communication skills, among others) are considered valuable for the EMS implementation process in SMEs (see also Santos et a., 2011; Campos, 2012; Witjes et al., 2017). Hörisch et al. (2014) further that sustainability knowledge, rather than firm size, mediates the adoption of sustainability management tools. Nevertheless, the findings reveal that SMEs may consider it difficult to engage employees in the development process (i.e. the design and implementation) of EMS (see Santos, Mendes, and Barbosa, 2011; Granly and Welo, 2014). To this end, collaboration

between management and employees is deemed as crucial for setting operational objectives at the design stage (Balzarova and Castka, 2008; Voukkali et al., 2017). This is both implicitly and explicitly recognised in broader sustainability MAC research (e.g. Won Kim and Matsamura, 2017; Johnstone, 2019b). Here, employee skills in addition to organisational values and strong leadership are important for the successful implementation of sustainability systems.

Employee engagement is also evidenced through formal policies and controls in the reviewed SMEs. This regards, for example, training programmes, organisational structure and performance indicators (Santos et al., 2011; Campos, 2012). Some even argue that EMS-certified organisations are more systematic and formal in sustainability efforts due to the focus on documentation and procedures (Granly and Welo, 2014). Graafland and Smid (2016) challenge the assumption that SMEs should not formalise CSR because they are different to larger companies. They comment that formal tools are easier to implement in SMEs due to a lack of corporate bureaucracy. Meanwhile, others suggest that formal system design should support and reinforce individual development and knowledge for the EMS implementation process (Graafland and Smid, 2016; Johnson, 2017). In this sense, successful environmental performance is contingent on not only formalised, codified procedures, but also intangible employee qualities (Balzarova and Castka, 2008).

Finally, networks are considered instrumental for the implementation process of EMS in SMEs. Chan (2011) suggests that collaboration with similar businesses, environmental bodies or trade associations can minimise uncertainty or ambiguity regarding EMS implementation by sharing experiences and working together, as well as has the potential to reduce certification costs (see also Halila, 2007; Graafland, 2018). Gaining and sharing knowledge from and with external entities is also attributed to increasing stakeholder communication and cooperation (Johnson, 2017). However, although generally accepted as something positive for the implementation process of EMS, networks also pose some challenges. Halila (2007) suggests that networks are limited when it comes to firm-specific activities of the operating systems. Nevertheless, Zobel (2007) proposes that network coordinators can mitigate such weaknesses by providing a sound understanding of local knowledge, complemented with extensive environmental training and joint policies. He suggests that network initiatives can ensure cost efficiencies and increased employee awareness, as well as speed up the implementation process due to institutional effects. This is extended in a later study by Halila and Tell (2013) who propose that collaborative learning networks, which involve researchers and businesses, can induce EMS systems which are tailored to the SMEs' environmental aspects and measures. This has implications for the external audit process by improving internal processes and procedures. Hence, the findings suggest that network involvement may offer an alternative, tailored, more cost-efficient and/or valuable approach for SMEs that are implementing EMS, rather than relying on consultants who tend to offer standardised solutions to environmental management.[5]

[5] Although this paper is not empirical, this point is a reflection of a concurrent empirical cross-case study that is ongoing which finds that consultancies tend to offer standardised solutions to EMS for all firms. This is the primary perspective of the auditor, however, and SMEs appear to value the help of consultants in the initial

4.1.3 EMS performance measures and outcomes

Few of the reviewed studies are orientated towards performance outcomes in the sample. Nevertheless, Valdez-Juarez et al. (2019) find that ISO 14001 improves business image (i.e. symbolic performance) and its consequent level of profitability in financial terms. The wider literature base problematises the environmental performance construct as multidimensional (see Henri and Journeault, 2010; Trumpp et al., 2015). This is because 'environmental' performance entails *operational* (i.e. improved process effectiveness and efficiency), financial (i.e. short and long-term profit), *environmental* (i.e. environmental impacts at the firm-level) and *social* (i.e. the firm's relationship with society [Baird et al., 2015]) elements that are embraced under the construct. As such, the financial, social and environmental performance implications of EMS in SMEs are interconnected through improved operating procedures. This suggests that performance is not only an 'outcome', but also a process that is evolutionary over time and space. It also suggests that separating the dimensions of environmental performance (i.e. as operational, financial, environmental or social) in this discussion is unnecessary given the multidimensional nature of the construct both in research and practice. Notwithstanding, there are a few areas for attention which have been drawn out from the analysis based on this problematic construct.

First, there is inherent *difficulty in defining 'environmental performance'.* It becomes difficult to separate the core performance dimensions in terms of how 'environmental performance' is considered in the reviewed articles which are orientated towards the performance effects of EMS in SMEs. Interestingly, these studies are primarily qualitative in nature and rarely explicitly define environmental performance. For example, environmental performance can be based on discrete performance measures and outcomes such as waste reduction or energy management (see Singh et al., 2015; Shahedul Quader et al., 2016; Laskurain et al., 2017) which regard both operational performance and environmental impacts. It also regards long-term financial and environmental returns over time (Burke & Gaughran, 2007; White et al., 2014), as well as social externalities such as legislative compliance and stakeholder expectations which essentially define the construct (Sieffert, 2008; White et al., 2014; Shahedul Quader, Kamal and Hassan, 2016; Valdez-Juarez et al., 2019). In the broader review sample, performance is also considered in terms of employee wellbeing, pride, environmental routines and awareness (Granly and Welo, 2014). Therefore, the definition of what constitutes successful environmental performance through EMS implementation is decided by the SME in case. These findings accord with the broader literature base that suggests environmental performance is multidimensional; embracing operational improvements, financial outcomes, environmental impacts and social expectations.

Second, it is often *difficult for SMEs to make sense of EMS*, which subsequently hinders understandings of performance (Voukkali et al., 2017). Not only does

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set-up of EMS. Further, in this systematic review, Witjes et al. (2017) imply that consultancy tools *can* be adapted to the organisation in case.

environmental performance in SMEs constitute an array of dimensions which make it difficult to define, it is contingent on the design of an internal system of controls to meet EMS certification. This design is tailored to the firm in question, leaving some SMEs looking for guidance in the form of consultants, especially after the initial adoption stage (see Witjes et al., 2017). Particularly, there is *ambiguity regarding how best to set targets* to achieve performance outcomes for certification. ISO 14001 does not state how performance should be measured, even if EMAS is moving towards performance recommendations (Laskurain et al., 2017). This lack of 'mandatory performance indicators' (ibid.) complicates understandings for the SMEs. As target-setting directly drives internal operational effectiveness and efficiency (i.e. operational performance), it indirectly affects performance output in environmental, economic and social terms. Zopas (2010) implies that creating performance indicators through target-setting acts as a 'verification mechanism' that allows for benchmarking, measuring and monitoring. Nevertheless, only EMAS requires external reporting to allow evaluation to a wider stakeholder group beyond the auditors. As such, there remains the question of whether SMEs should set realistic targets, which are possible to meet on an annual basis, or high ones to gain, for example, customer approval (White et al., 2014).

Third, there is *conflict regarding pay-back length for environmental investments*. The assumed operational performance benefits of EMS in terms of improved processes and procedures, which can lead to better (long-term) environmental and financial outcomes, are often juxtaposed against the perceptions of "budgetary and/or human resource limitations" (Seiffert 2008; see also Granly and Welo 2014), especially in the short-term (Santos et al., 2016). This makes for a complex theoretical and practical reality as financial performance outcomes are contingent on the various other performance dimensions. While Sieffert (2008) recognises that costs can be reduced through a cooperative model to environmental management within SMEs, he proposes that this is contingent on broader social forces in terms of organisational learning and support through EMS planning and implementation. White et al. (2014) also suggest that financial benefits are received through operational improvements, yet further that EMS involve significant costs in terms of technological investments and human resources (see also Shahedul Quader, Kamal and Hassan, 2016). Moreover, Singh et al. (2015) comment that SMEs are likely to make investments decisions more carefully, and Campos (2012) suggests that economic performance is better realised in larger firms. This is because SMEs have smaller turnovers and returns on certification costs. Hence, there appears to be ambiguity or tension over the short and long-term 'financial' performance benefits of EMS implementation.

Finally, there appears to be *external influences on performance measures and outcomes for SMEs*. Not only are the above concerns tied to the external audit process, Graafland (2018) finds that network involvement mediates the relationship between ISO 14001 certification and environmental performance outcomes. This suggests that improvements in internal operating procedures and subsequent environmental and financial outcomes is contingent on network guidance or cooperation.

4.2 Second-stage findings

The adoption and implementation of EMS in SMEs can be viewed as a formalised, strategic approach for better environmental management in terms of performance effects. This builds on previous sustainability MAC research that emphasises the connection between strategic and operational levels for improved sustainability performance over temporal and spatial horizons (e.g. Guenther et al., 2016; Johnstone, 2019b). Although many of the reviewed articles provide a very general discussion on the antecedents, processes and outcomes of EMS in SMEs, the following section aims to connect these areas in relation to MAC research, thus offering a baseline for future studies to move forward from. Therefore, this section culminates with recommendations for future SME and sustainability MAC research.

4.2.1 Thematic areas for future research into environmental MAC in SMEs

As an overview, Figure 2 summarises the first-stage findings and their connections thematically. It shows that the adoption motivations for EMS in SMEs are based on both external and internal strategic drivers, including stakeholder pressures and network involvement, as well as organisational and individual values. Meanwhile, the implementation process broadly entails formal and informal sustainability tools, as well as external collaborations as management controls. Finally, environmental performance extends beyond environmental and financial concerns to include both internal operational aspects and external social outcomes. This is reflected in the direction of the arrows which illustrate that performance outcomes feed back into operations as well as feed forward into the external operating environment. Thus, performance is not only multidimensional, it resides at different analytical levels which are interconnect and feed forward into the (re)design of internal controls.

Insert Figure 2 here

The remaining paragraphs build upon these initial findings by analysing the conclusions and future research suggestions from the reviewed articles. This outlines key overlapping areas, connected to the antecedents, processes and outcomes of EMS in SMEs, which require future research attention from a MAC stance, namely: *contextual factors, management control systems and performance outcomes*.

4.2.1.1 Contextual factors

There are various contextual factors related to SMEs that merit further research attention. Burke and Gaughran (2007) propose that the regional or sector-specific aspects of EMS in SMEs require consideration. Johnson (2017) adds the need to explore how internal capabilities and cooperation forms differ across industry and/or national context (see also Armas-Cruz, Gil-Soto and Oreja-Rodriguez, 2017). Moreover, Campos et al. (2012) comment on the need to explore how external requirements affect the design and use of internal systems. Such suggestions expand on the first-stage findings which highlight that adoption motivations are contingent on size, sector and location (e.g. Hörisch et al., 2015; Singh et al., 2015) in addition to internal strategic or personal concerns (e.g. Nawrocka, 2008). The initial findings also suggest the potential of collaborative networks for both EMS adoption and the implementation process (e.g. Chan, 2011; Halila and Tell, 2013). The broader literature base echoes this notion that the motivation to adopt EMS in SMEs entails both internal

and external aspects (e.g. Phan and Baird, 2015). Consequently, the external SME context and its characteristics influence the internal construction of MAC systems for improved sustainability performance. This suggests that EMS cannot be considered as standardised approaches to control or compliance, as previously asserted (e.g. Brunsson and Jacobsson, 2010). Furthermore, it emphasises that even though SMEs can be regarded as 'similar' in terms of size, ownership and structure (Perez-Sanchez et al., 2003), the adoption of EMS as strategic tools can yield an array of performance benefits based on contextual heterogeneity related to external and internal factors (see Heras-Saizarbitoria et al., 2011).

The importance of context for sustainable performance is increasingly emphasised in the broader sustainability MAC literature stream. First, contextual parameters have implications for the sustainability control system (SCS) as an academic construction. The design and use of SCS are contingent on case-specific external and internal drivers (e.g. customer pressures, sector, legislative context, individual sustainability values, etc. [see Qian et al., 2011; Pondeville et al., 2013; Johnstone, 2018]) which lead to different performance effects. Nevertheless, current SCS research tends to adopt mainstream MCS frameworks to frame or explain their findings (e.g. Arjaliès and Mundy 2013; Journeault et al. 2016). Such frameworks, however, assume sustainability as a firm-level, controllable phenomenon. This can be considered limited given that the analytical frame of SCS extends beyond the intra-organisational and generational context.

Second, the sustainability discourse increasingly necessitates a governance approach which recognises sustainability as the responsibility of not only organisations and governments, but also the individuals within them (Johnstone, 2018, 2019a). This stream of sustainability MAC research builds on the notion that individual sustainability values, in addition to organisational ones guide employee behaviour and ultimately sustainable performance. As such, the external operating context does not only motivate EMS adoption and the formalised construction of SCS in SMEs, it also shapes the individual employee's sustainability values and beliefs. The internal capabilities of employees (i.e. human resources) build upon a resource-based view for improved environmental performance. This may counteract the assumption that SMEs lack 'resources' to make long-term environmental improvements (Cassells and Lewis, 2011). Given that SME characteristics often mean that there is less distance between manager and employee, the internal capabilities of all employees can be utilised for improvement sustainability management control. In this sense, the *'management'* regards the management of processes in addition to people (Johnstone, 2019b).

Finally, although Graafland (2018) finds that network involvement mediates the relationship between ISO 14001 and ecological performance, network arrangements for improved sustainability performance rarely feature within MAC research. While there are studies on sustainability accounting in the supply chain (e.g. Ferreira, Moulang and Hendro 2010; Spence and Rinaldi, 2014), little is known about the use of strategic networks as an accounting phenomenon (see Johnstone, 2019a). Research attention on the contextual phenomenon of networks in SMEs indicates moving from traditional hierarchical governance arrangements based on customer or legislative pressures, to the vertical governance of and by peers.

Overall, the SME context has implications for future theorisations of sustainability MAC in SMEs. The findings suggest the need for explicating the extra-organisational influence on the internal SCS development process, in combination with internal strategic and personal drivers as contextual phenomena. This moves beyond a managerial approach to embrace more critical concerns for not only SMEs, but organisations more generally.

4.2.1.2 Management control systems

Many of the reviewed articles suggest the need for future research on what can be broadly categorised as the design and implementation of SCS in SMEs. Given that EMS require a tailored cycle of continual improvement, the iterative relationship between strategic design and operational requirements is emphasised (Santos et al., 2011). More research is needed to better define the properties of environmental innovations and their connection to EMS (Halila, 2007). There is also the need to study the processes involved in the development of internal systems (Seiffert, 2008; Heras and Arana, 2010; Santos et al., 2011) and their relation to performance outcomes (Singh et al., 2015). Finally, others suggest the need to further study learning networks in order to better understand how SMEs use their resources for environmental management (Halila and Tell, 2013; Granly and Welo, 2014).

Attention to internal aspects is important from a scholarly point of view. This is because an improved understanding of the connection between the antecedents, processes and outcomes of EMS in SMEs could help theorise the SCS as the bridge between strategic and operational levels of control. Nevertheless, there have been no attempts made within the reviewed articles to detail the specific 'controls' put in place to meet certification outcomes. Perhaps this is because the articles are not targeted towards an accounting audience. Consequently, in terms of MAC research, the above findings and recommendations are interesting for the following reasons.

First, the cycle of continual improvement through EMS implementation asserts that the conceptual and analytical distinction between system design and use (see Langfield-Smith, 1997) is less applicable when looking at the development process of *sustainability* systems (see Balzarova and Castka, 2008; Johnstone, 2019b). This is because sustainability is driven by continual improvement and subject to complex, fast-moving multi-governance architectures.

Second, looking at how SMEs implement and develop their internal SCS in response to various drivers can help theorise the SCS for the SME context (see Ghosh et al., 2019). It may also contribute to studies on management accounting innovations. Currently, much research focuses on existing control typologies and their interaction effects, rather than exploring how these controls are designed and implemented from the outset (Sundin and Brown, 2017) as well as the nature of this control and new approaches for this control. The SME context offers a novel example of the construction of SCS via EMS adoption and implementation by assuming that SMEs are less formal and have less established control systems in place (Stubblefield Locks et al., 2010). This implies that it would be easier to engage employees beyond management tiers in environmental management processes in SMEs. It also suggests

that SCS can be designed as flexible from the outset, with context-specific environmental performance criteria in mind. Yet, there has been little research into social aspects of 'environmental engagement' for smaller firms (Schaefer et al., 2018).

Finally, expounding upon the potential of networks for the internal development process of management accounting practices and control systems in SMEs also has potential. Not only can such examples contribute to recent studies which emphasise a sustainability governance approach for improved performance (e.g. Johnstone, 2019a), but looking at network effects on internal system design and use can also build upon the concept of accountability. This is because network participation may yield both symbolic and substantive performance effects in a context. Nevertheless, MAC research typically exerts functionalist or managerialist approaches which rarely explicitly utilise accountability as a concept to frame or explain findings.

4.2.1.3 Performance measures, outcomes and evaluation

Performance outcomes, measures and evaluation arguably drive EMS not only in SMEs, but also larger firms. Nevertheless, there appears to be key challenges associated with defining environmental performance as a construct given that this performance not only regards financial and/or ecological outcomes, but also operational and social concerns. The first-stage findings highlight that there are issues in terms of the thematic categorisation of environmental performance. Not only is it difficult for SMEs to know exactly what to account or control for (Voukkali et al., 2017), there is ambiguity regarding the construction of environmental performance and how to capture it (Nawrocka, 2008). This is perhaps due to general nature of EMS which do not offer guidance on specific performance criteria (Stevens et al., 2012). Nevertheless, the reviewed studies rarely explicate performance aspects for future research attention. Consequently, this secondary analysis highlights possible areas in which merit future research attention based on an assessment of the preliminary findings.

First, the multidimensional nature of environmental performance as a construct merits recognition. The findings illustrate that asserting performance merely in environmental and financial terms is limited, and that more research is required on the other 'performance' effects of EMS (Graafland, 2018). This is because there are also social and operational dimensions embedded in the construct. Thus, performance regards not only financial and environmental outputs, but also inputs to the internal organisational system borne from the external operating environment. Furthermore, as indicated in the findings, environmental performance involves two connected elements: measures and evaluation. While the measures entail the internal construction of targets based on defining environmental performance for the SME in case, evaluation has both internal and external dimensions. Therefore, environmental performance is essentially a construct that is not confined to the firm as is commonly assumed in extant MAC research. This has implications for studies which only assess performance based on quantitative firm-level outputs.

Second, it is of interest to explore how EMS directly or indirectly improve environmental and financial performance outcomes in SMEs (White et al., 2014; Singh et al., 2015; Shahedul Quader, Kamal and Hassan, 2016; Laskurain et al., 2017). On the one hand, EMS are proposed as improving internal processes, rather than results (Boiral and

Henri, 2012). On the other hand, EMS improve symbolic performance, rather than internal operations (Ferrón-Vílchez, 2016). For SMEs, EMS implementation has furthermore been associated with initial losses in short-term financial performance (Epstein and Roy, 1997). However, the limited review articles that overtly discuss performance outcomes make it difficult to contribute to this debate. As such, further empirical work needs to be done in this area.

4.2.2 Overview of future research areas

The above discussion has offered both general and specific areas for future research attention regarding environmental management in SMEs from a MAC stance. By connecting the antecedents, processes and outcomes of EMS implementation in SMEs, this systematic review highlights that there are various contextual and internal aspects to be considered for improved 'environmental' performance over time and space. Although these areas have been reviewed systematically, they are neither mutually exclusive nor isolated to the SME context. Specifically, many of the issues also constitute areas for attention within the broader sustainability MAC field.

As an overview, Table 3 summarises this systematic review by consolidating the findings to offer possible research questions to guide future research. It is not intended to be an exhaustive list, but rather as a start-point which illustrates the possibilities associated with this stream of research into environmental management in SMEs from a MAC stance. Scholars should view these suggestions as inspiration to formulate their own specific research questions of sustainability MAC in SMEs. Notably, the predominance of 'how' questions suggests that qualitative methods may be more suitable. This is because the research questions are exploratory with the aim of developing understandings, conceptualisations and theorisations of MAC in SMEs. Particularly, because SMEs are heterogenic, future research would arguably benefit from case studies in order to provide a richer understanding of the role of contextual management accounting practices and SCS for affecting a sustainable change that extends beyond temporal and spatial horizons.

Table 3. Possible research questions for sustainability MAC studies in SMEs

Thematic area	***Possible research questions for future sustainability MAC studies in SMEs***
Contextual factors	What are the sustainability tools used for EMS implementation and how do they differ in SMEs? How is sustainability knowledge created and developed within SMEs? How does sustainability knowledge affect the uptake of sustainability tools in SMEs? How does sector and/or national context influence the implementation process and performance outcomes of SCS in SMEs? How are the motivations to adopt an EMS in SMEs affected by context?

	To what extent does network involvement stimulate the decision to adopt and implement an EMS in SMEs? To what extent are EMS driven by symbolic or substantive motives (in SMEs)? How do EMS drive corporate and/or individual accountability (in SMEs)?
The implementation process (system design and use)	What are the main management controls used for environmental management in SMEs? What are the interaction effects between management controls for environmental management in a SME context? When does the package of controls become a formalised system in a SME-context? How is a SCS established and developed upon the decision to adopt an EMS in SMEs? How are SCS in SME characterised? How do employees within a SME understand the SCS? What is the relationship between formal and informal control in a SME context? How are sustainability controls enforced in a SME-context? What are the properties of sustainability competence and engagement? How do sustainability competence and engagement improve performance outcomes in (EMS-certified) SMEs? How are networks utilised for the implementation of EMS in SMEs? How are networks used in the development process of SCS? How does network involvement promote corporate and individual accountability for sustainable performance?
Environmental performance	How is performance constructed in SMEs that have adopted and implemented an EMS? What is the relationship between EMS implementation and social performance (in SMEs)? What is the relationship between EMS implementation and environmental performance outcomes (in SMEs)? What is the relationship between EMS implementation and financial performance outcomes (in SMEs)? How do the dimensions of environmental performance interact through EMS implementation (in SMEs)? To what extent is the adoption and implementation of EMS motivated by the various environmental performance dimensions (in SMEs)? How do SMEs control the various environmental performance dimensions for better environmental management? What are the interaction effects between the environmental performance dimensions in SMEs via EMS implementation?

Essentially, more research on the contextual, operational and performance parameters of environmental management from a MAC stance could help theorise sustainability control for the case of the SME. These areas address the antecedents, processes and

outcomes of EMS to various degrees. Regarding the contextual issues, there is the need to: *a)* the explore the relationship between firms size, and the development of sustainability tools and knowledge; *b)* assess the impact of contextual issues for environmental performance; and *c)* assess the impact of contextual issues for motivations to adopt an EMS. There is also arguably a fourth area which regards *d)* a broader accountability perspective through EMS adoption and the external context. This builds on the interaction of symbolic and substantive performance effects of EMS adoption and implementation, that are not isolated to the SME context. Regarding the internal MAC issues, there is the need to: *a)* theoretically explore the control typologies for SMEs; *b)* better understand the type (i.e. formal or informal) and nature (i.e. tight or flexible) of this control and *c)* develop understandings and conceptualisations of the properties of socio-ideological controls in relation to, for example, sustainability competence and employee engagement. Finally, regarding performance, there is the need to: *a)* develop understandings of how environmental performance is defined and the interaction between its dimensions, and *b)* explore the relationship between EMS and environmental performance for the empirical case of the SME. This builds upon the multidimensional nature of environmental performance as a construct and the need for more research that explicates the connections between the various performance elements, rather than reducing it to quantitative environmental and/or financial outputs.

5. Conclusion

The aim of this systematic review was to synthesise empirically-ground research on the adoption and implementation of environmental management systems (EMS) in small to medium-sized enterprises (SMEs). Founded upon both an empirical and theoretical gap, it serves as a first step to guide future research on environmental management in SMEs by improving theorisations from a management accounting and control stance. This review not only synthesises the antecedents, processes and outcomes of EMS adoption and use in SMEs from a limited research base, it also draws out nuanced thematic areas of relevance for future sustainability management accounting and control studies. To this end, more research is required on the contextual factors that affect the type and nature of control for effective environmental performance outcomes. This is necessary for the conceptual and theoretical development of environmental management in SMEs within the management accounting and control field.

Although the aim of this paper was primarily to guide future research, it may also help engage practitioners on the relevance of EMS for environmental management and performance that extend beyond temporal and spatial dimensions. Specifically, more empirical research in the area will arguably lead to policy improvements by lending support to governmental initiatives dealing with environmental problems, as well as help embed extra-organisational policy into action. It could also highlight potential issues for SMEs regarding the adoption and implementation of EMS. To this end, it suggests the need for SMEs to realise the benefits of engaging employees in environmental management initiatives and the long-term performance improvements that can result from this. Finally, any future empirical research on EMS in SMEs may also be helpful to auditors and consultants by offering views on how SMEs perceive

and implement EMS in practice. Consequently, it seems intuitive that more attention should be given to not only engaging SMEs in environmental management, but also to increasing theoretical understandings of the environmental tools used to control environmental performance outcomes in SMEs. This is because SMEs constitute the biggest sector of the economy and generate most of its pollution.

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REFERENCES

Airaksinen, A., Luomaranta, H., Alajääskö, P., Roodhuijzen, A., 2015. Statistics on Small and Medium-sized Enterprises. Eurostat Statistics Explained. http://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_small_and_medium-sized_enterprises (Accessed 30 January 2018)

Ahrens, T., Khalifa, R., 2015. The impact of regulation on management control: Compliance as a strategic response to institutional logics of university accreditation. *Qualitative Research in Accounting and Management*, *12*(2), 106-126. https://doi.org/10.1108/QRAM-04-2015-0041

Albelda, E., 2011. The Role of Management Accounting Practices as Facilitators of the Environmental Management – Evidence from EMAS Organisations. Sustainability Accounting, Management and Policy Journal 2 (1): 76–100. https://doi.org/10.1108/20408021111162137

Alonso-Paulí, E., André, F. J., 2015. Standardized environmental management systems as an internal management tool. *Resource and Energy Economics*, *40*, 85-106. https://doi.org/10.1016/j.reseneeco.2015.02.001

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., García-Morales, V. J., 2008. Environmental Strategy and Performance in Small Firms: A Resource-based Perspective. *Journal of Environmental Management*, 86(1), 88-103. https://doi.org/10.1016/j.jenvman.2006.11.022

Arjaliès, D.L. and Mundy, J., 2013. The use of management control systems to manage CSR strategy: A levers of control perspective. *Management Accounting Research*, *24*(4), 284-300.

Ardente, F., Beccali, G., Cellura, M., Marvuglia, A., 2006. POEMS: A Case Study of an Italian Wine-producing Firm. *Environmental Management*, 38(3), 350-364. https://doi.org/10.1007/s00267-005-0103-8

Armas-Cruz, Y., Gil-Soto, E., Oreja-Rodríguez, J. R., 2017. Environmental management in SMEs: organizational and sectoral determinants in the context of an Outermost European Region. *Journal of Business Economics and Management*, *18*(5), 935-953. https://doi.org/10.3846/16111699.2017.1373375

Baird, P. L., Geylani, P. C., Roberts, J. A., 2012. Corporate social and financial performance re-examined: Industry effects in a linear mixed model analysis. *Journal of Business Ethics*, *109*(3), 367-388. https://doi.org/10.1007/s10551-011-1135-z

Balzarova, M. A., Castka, P., 2008. Underlying mechanisms in the maintenance of ISO 14001 environmental management system. *Journal of Cleaner Production*, *16*(18), 1949-1957. https://doi.org/10.1016/j.jclepro.2008.01.007

Becker, W., Ulrich, P., Staffel, M., 2011. Management accounting and controlling in German SMEs–Do company size and family influence matter? *International Journal of Entrepreneurial Venturing*, *3*(3), 281–300. https://doi.org/10.1504/IJEV.2011.041276

Bianchi, R., Noci, G., 1998. "Greening" SMEs' Competitiveness. *Small Business Economics*, 11(3), 269-281. https://doi.org/10.1023/A:1007980420087

Boiral, O., Henri J.F., 2012. Modelling the impact of ISO 14001 on environmental performance: A comparative approach. *Journal of Environmental Management* 99, 84-97. https://doi.org/10.1016/j.jenvman.2012.01.007

Bracke, R., Verbeke, T., Dejonckheere, V., 2008. What determines the decision to implement EMAS? A European firm level study. *Environmental and Resource Economics*, 41, 499-518. https://doi.org/10.1007/s10640-008-9207-y

Brunsson, N., Jacobsson, B., 2010. *A world of standards*. Oxford University Press.

Burke, S., Gaughran, W. F., 2006. Intelligent Environmental Management for SMEs in Manufacturing. *Robotics and Computer-Integrated Manufacturing*, *22*(5), 566-575. https://doi.org/10.1016/j.rcim.2005.11.008

Campos, L. M., 2012. Environmental Management Systems (EMS) for Small Companies: A Study in Southern Brazil. *Journal of Cleaner Production*, *32*, 141-148. https://doi.org/10.1016/j.jclepro.2012.03.029

Cassells, S., Lewis, K., 2011. SMEs and environmental responsibility: do actions reflect attitudes? *Corporate Social Responsibility and Environmental Management*, *18*(3), 186-199. https://doi.org/10.1002/csr.269

Castka, P., Balzarova, M. A., Bamber, C. J., Sharp, J. M., 2004. How Can SMEs Effectively Implement the CSR Agenda? A UK Case Study Perspective. *Corporate Social Responsibility and Environmental Management*, 11(3), 140-149. https://doi.org/10.1002/csr.62

Chan, E. S., 2011. Implementing environmental management systems in small-and medium-sized hotels: Obstacles. *Journal of Hospitality and Tourism Research*, *35*(1), 3-23. https://doi.org/10.1177/1096348010370857

Crutzen, N., Zvezdov, D., Schaltegger, S., 2017. Sustainability and Management Control: Exploring and Theorizing Control Patterns in Large European Firms. *Journal of Cleaner Production*, 143, 1291–1301. https://doi.org/10.1016/j.jclepro.2016.11.135

Curkovic, S., Sroufe, R., Melnyk, S., 2005. Identifying the Factors which Affect the Decision to Attain ISO 14000. *Energy*, 30(8), 1387-1407. https://doi.org/10.1016/j.energy.2004.02.016

Daddi, T., Testa, F., Frey, M., Iraldo, F., 2016. Exploring the link between institutional pressures and environmental management systems effectiveness: an empirical study. *Journal of Environmental Management*, *183*, 647-656. https://doi.org/10.1016/j.jenvman.2016.09.025

Davila, A., Foster, G., 2005. Management Accounting Systems Adoption Decisions: Evidence and Performance Implications from Early-stage/startup companies. *The Accounting Review*, *80*(4), 1039-1068. https://doi.org/10.2308/accr.2005.80.4.1039

Davila, A., Foster, G., 2007. Management Control Systems in Early-stage Startup Companies. *The Accounting Review*, *82*(4), 907-937. https://doi.org/10.2308/accr.2007.82.4.907

Dekker, J., Lybaert, N., Steijvers, T., Depaire, B., 2015. The effect of family business professionalization as a multidimensional construct on firm performance. *Journal of Small Business Management*, *53*(2), 516–538. https://doi.org/10.1111/jsbm.12082

de Oliveira Neves, F., Salgado, E. G., & Beijo, L. A. (2017). Analysis of the Environmental Management System based on ISO 14001 on the American continent. *Journal of environmental management*, *199*, 251-262. https://doi.org/10.1016/j.jenvman.2017.05.049

Duréndez, A., Ruíz-Palomo, D., García-Pérez-de-Lema, D., Diéguez-Soto, J., 2016. Management control systems and performance in small and medium family firms. *European Journal of Family Business*, *6*(1), 10-20. https://doi.org/10.1016/j.ejfb.2016.05.001

ECAP., 2011 *First Assessment of the Environmental Compliance Assistance Programme for SMEs (ECAP).* Ref: ENV.C.1/ETU/2010/0032r. http://ec.europa.eu/environment/archives/sme/pdf/First%20assessemnt%20of%20the%20ECAP%20for%20SMEs.pdf (Accessed 29 January 2018)

Epstein, M. J., Roy, M. J., 1997. Using ISO 14000 for Improved Organizational Learning and Environmental Management. *Environmental Quality Management,* 7(1), 21-30. https://doi.org/10.1002/tqem.3310070103

Ferreira, A., Moulang, C., Hendro, B., 2010. Environmental management accounting and innovation: an exploratory analysis. *Accounting, Auditing & Accountability Journal*, 23(7), 920–948. https://doi.org/10.1108/09513571011080180

Ferenhof, H. A., Vignochi, L., Selig, P. M., Lezana, Á. G. R., Campos, L. M., 2014. Environmental Management Systems in Small and Medium-sized Enterprises: An Analysis and Systematic Review. *Journal of Cleaner Production*, 74, 44-53. https://doi.org/10.1016/j.jclepro.2014.03.027

Ferrón-Vílchez, V., 2016. Does symbolism benefit environmental and business performance in the adoption of ISO 14001? *Journal of Environmental Management*, *183*, 882-894. https://doi.org/10.1016/j.jenvman.2016.09.047

Ghosh, B., Herzig, C., Mangena, M., 2019. Controlling for sustainability strategies: findings from research and directions for the future. *Journal of Management Control*, *30*(1), 5-24. https://doi.org/10.1007/s00187-019-00279-8

Gibassier, D., & Alcouffe, S., 2018. Environmental management accounting: the missing link to sustainability? *Social and Environmental Accountability Journal,* 38(1), 1-18. https://doi.org/10.1080/0969160X.2018.1437057

Graafland, J., Smid, H., 2016. Environmental Impacts of SMEs and the Effects of Formal Management Tools: Evidence from EU's Largest Survey. *Corporate Social Responsibility and Environmental Management*, *23*(5), 297-307. https://doi.org/10.1002/csr.1376

Graafland, J. J., 2018. Ecological impacts of the ISO14001 certification of small and medium sized enterprises in Europe and the mediating role of networks. *Journal of Cleaner Production*, *174*, 273-282. https://doi.org/10.1016/j.jclepro.2017.10.322

Granly, B. M., Welo, T., 2014. EMS and Sustainability: Experiences with ISO 14001 and Eco-Lighthouse in Norwegian Metal Processing SMEs. *Journal of Cleaner Production*, *64*, 194-204. https://doi.org/10.1016/j.jclepro.2013.08.007

Groen, B.A., van de Belt, M., Wilderom, C.P., 2012. Enabling Performance Measurement in a Small Professional Service Firm. *International Journal of Productivity and Performance Management*, 61(8), 839-862. https://doi.org/10.1108/17410401211277110

Guenther, E., Endrikat, J., Guenther, T. W., 2016. Environmental Management Control Systems: A conceptualization and a Review of the Empirical Evidence. *Journal of Cleaner Production*, 136, 147-171. https://doi.org/10.1016/j.jclepro.2016.02.043

Hahn, T., Pinkse, J., Preuss, L., Figge, F., 2015. Tensions in corporate sustainability: towards an integrative framework. J. Bus. Ethics 127, 297e316. http://dx.doi.org/10.1007/s10551-014-2047-5

Halila, F., 2007. Networks as a Means of Supporting the Adoption of Organizational innovations in SMEs: The Case of Environmental Management Systems (EMSs) based on ISO 14001. *Corporate Social Responsibility and Environmental Management*, *14*(3), 167-181. https://doi.org/10.1002/csr.127

Halila, F., Tell, J., 2013. Creating synergies between SMEs and universities for ISO 14001 certification. *Journal of Cleaner Production*, *48*, 85-92. https://doi.org/10.1016/j.jclepro.2012.11.014

Henri, J. F., Journeault, M., 2010. Eco-control: The Influence of Management Control Systems on Environmental and Economic Performance. *Accounting, Organizations and Society*, 35(1), 63-80. https://doi.org/10.1016/j.aos.2009.02.001

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. https://doi.org/10.1016/j.jclepro.2010.01.005

Heras-Saizarbitoria, I., Arana Landín, G., Molina-Azorín, J. F., 2011. Do Drivers Matter for the Benefits of ISO 14001? *International Journal of Operations and Production Management*, 31(2), 192-216. https://doi.org/10.1108/01443571111104764

Heras-Saizarbitoria, I., Boiral, O., 2013. ISO 9001 and ISO 14001: Towards a Research Agenda on Management System Standards. *International Journal of Management Reviews*, 15(1), 47-65. https://doi.org/10.1111/j.1468-2370.2012.00334.x

Hillary, R., 2004. Environmental Management Systems and the Smaller Enterprise. *Journal of Cleaner Production*, *12*(6), 561-569. https://doi.org/10.1016/j.jclepro.2003.08.006

Hosoda, M., 2018. Management control systems and corporate social responsibility: perspectives from a Japanese small company. *Corporate Governance: The International Journal of Business in Society*, *18*(1), 68-80. https://doi.org/10.1108/CG-05-2017-0105

Hörisch, J., Johnson, M. P., Schaltegger, S., 2015. Implementation of Sustainability Management and Company Size: A Knowledge-based View. *Business Strategy and the Environment*, *24*(8), 765-779. https://doi.org/10.1002/bse.1844

Ilomäki, M., and Melanen, M. (2001). Waste Minimisation in Small and Medium-sized enterprises—Do Environmental Management Systems Help? *Journal of Cleaner Production*, *9*(3), 209-217. https://doi.org/10.1016/S0959-6526(00)00053-6

ISO 14001: 2015 (2015). *ISO 14001: Environmental Management Systems – Requirements with Guidance for Use.* The International Standards Organisation: Geneva, Switzerland.

Jenkins, H., 2004. A Critique of Conventional CSR theory: An SME perspective. *Journal of General Management,* 29(4), 37-57. https://doi.org/10.1177/030630700402900403

Johnson, M. P., 2017. Knowledge acquisition and development in sustainability-oriented small and medium-sized enterprises: Exploring the practices, capabilities and cooperation. *Journal of Cleaner Production*, *142*, 3769-3781. https://doi.org/10.1016/j.jclepro.2016.10.087

Johnson, M. P., Schaltegger, S., 2016. Two Decades of Sustainability Management Tools for SMEs: How Far Have we Come? *Journal of Small Business Management*, *54*(2), 481-505. https://doi.org/10.1111/jsbm.12154

Johnstone, L., 2018. Theorising and Modelling Social Controls in Environmental Management Accounting. *Social and Environmental Accountability Journal,* 38(1), 30-48. https://doi.org/10.1080/0969160X.2017.1422778

Johnstone, L., 2019a. Temporal Strategic Knowledge-sharing Nets as Instances of Sustainability Governance in Practice. *Social and Environmental Accountability Journal, 39*(1), 23-43. https://doi.org/10.1080/0969160X.2019.1568275

Johnstone, L., 2019b. Theorising and conceptualising the sustainability control system for effective sustainability management. *Journal of Management Control 30*(1), 25-64. https://doi.org/10.1007/s00187-019-00277-w

Journeault, M., De Rongé, Y., Henri, J. F., 2016. Levers of eco-control and competitive environmental strategy. *The British Accounting Review*, *48*, 316–340. https://doi.org/10.1016/j.bar.2016.06.001

Kearins, K., Collins, E., Tregidga, H., 2010. Beyond corporate environmental management to a consideration of nature in visionary small enterprise. *Business and Society* 49(3): 512-47. https://doi.org/10.1177/0007650310368988

Langfield-Smith, K., 1997. Management Control Systems and Strategy: A Critical Review. *Accounting, Organizations and Society*, 22(2), 207-232. https://doi.org/10.1016/S0361-3682(95)00040-2

Laskurain, I., Ibarloza, A., Larrea, A., Allur, E., 2017. Contribution to energy management of the main standards for environmental management systems: The case of ISO 14001 and EMAS. *Energies*, *10*(11), 1758. https://doi.org/10.3390/en10111758

Lavia López, O., Hiebl, M. R., 2014. Management Accounting in Small and Medium-sized Enterprises: Current Knowledge and Avenues for Further Research. *Journal of Management Accounting Research*, 27(1), 81-119. https://doi.org/10.2308/jmar-50915

Lueg, R., Radlach, R., 2016. Managing Sustainable Development with Management Control Systems: A Literature Review. *European Management Journal*, 34, 158–171. https://doi.org/10.1016/j.emj.2015.11.005

Moore, G., Spence, L., 2006. Responsibility and Small Business. *Journal of Business Ethics*, 67, 219–226. https://doi.org/10.1007/s10551-006-9180-8

Nandan, R., 2010. Management Accounting needs of SMEs and the Role of Professional Accountants: A Renewed Research Agenda. *Journal of Applied Management Accounting Research*, 8(1), 65.

McKeiver, C., Gadenne, D., 2005. Environmental Management Systems in Small and Medium Businesses. *International Small Business Journal*, *23*(5), 513-537. https://doi.org/10.1177/0266242605055910

Moores, K., Mula, J., 2000. The salience of market, bureaucratic, and clan controls in the management of family firm transitions: Some tentative Australian evidence. *Family Business Review*, *13*(2), 91-106. https://doi.org/10.1111/j.1741-6248.2000.00091.x

Nawrocka, D., 2008. Environmental Supply Chain Management, ISO 14001 and RoHS. How are Small Companies in the Electronics Sector Managing? *Corporate Social Responsibility and Environmental Management*, *15*(6), 349-360. https://doi.org/10.1002/csr.176

Norris, G., O'Dwyer, B., 2004. Motivating socially responsive decision making: the operation of management controls in a socially responsive organisation. *The British Accounting Review*, *36*(2), 173-196. https://doi.org/10.1016/j.bar.2003.11.004

Pelz, M., 2019. Can Management Accounting Be Helpful for Young and Small Companies? Systematic Review of a Paradox. *International Journal of Management Reviews*, *21*(2), 256-274. https://doi.org/10.1111/ijmr.12197

Perez-Sanchez, D., Barton, J. R., Bower, D., 2003. Implementing Environmental Management in SMEs. *Corporate Social Responsibility and Environmental Management*, 10(2), 67-77. https://doi.org/10.1002/csr.37

Phan, T. N., Baird, K., 2015. The comprehensiveness of environmental management systems: The influence of institutional pressures and the impact on environmental performance. *Journal of Environmental management*, *160*, 45-56. https://doi.org/10.1016/j.jenvman.2015.06.006

Pondeville, S., Swaen, V., De Rongé, Y., 2013. Environmental Management Control Systems: The Role of Contextual and Strategic Factors. *Management Accounting Research*, 24(4), 317-332. https://doi.org/10.1016/j.mar.2013.06.007

Prencipe, A., Bar-Yosef, S., Dekker, H. C., 2014. Accounting research in family firms: Theoretical and empirical challenges. European Accounting Review, 23(3), 361-385. https://doi.org/10.1080/09638180.2014.895621

Quinn, M., Hiebl, M. R., Moores, K., Craig, J. B., 2018. Future research on management accounting and control in family firms: suggestions linked to architecture, governance, entrepreneurship and stewardship. *Journal of Management Control,* 28(4), 529-546. https://doi.org/10.1007/s00187-018-0257-1

Salim, H. K., Padfield, R., Hansen, S. B., Mohamad, S. E., Yuzir, A., Syayuti, K., ... and Papargyropoulou, E., 2018. Global Trends in Environmental Management System and ISO14001 Research. *Journal of Cleaner Production*, 170, 645-653. https://doi.org/10.1016/j.jclepro.2017.09.017

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), 1965-1974. https://doi.org/10.1016/j.jclepro.2011.06.017

Santos, G., Rebelo, M., Lopes, N., Alves, M. R., Silva, R., 2016. Implementing and certifying ISO 14001 in Portugal: motives, difficulties and benefits after ISO 9001 certification. *Total Quality Management and Business Excellence*, *27*(11-12), 1211-1223. https://doi.org/10.1080/14783363.2015.1065176

Scapens, R. W., 2006. Understanding Management Accounting Practices: A Personal Journey. *The British Accounting Review*, 38(1), 1-30. https://doi.org/10.1016/j.bar.2005.10.002

Schaefer, A., Williams, S., Blundel, R., 2018. Individual Values and SME Environmental Engagement. *Business and Society.* https://doi.org/10.1177/0007650317750134

Seiffert, M. E. B., 2008. Environmental Impact Evaluation Using a Cooperative Model for Implementing EMS (ISO 14001) in Small and Medium-sized Enterprises. *Journal of Cleaner Production*, *16*(14), 1447-1461. https://doi.org/10.1016/j.jclepro.2007.10.001

Senftlechner, D., Hiebl, M. R., 2015. Management accounting and management control in family businesses: past accomplishments and future opportunities. *Journal*

of Accounting and Organizational Change, 11(4), 573-606. https://doi.org/10.1108/JAOC-08-2013-0068

Shahedul Quader, M., Kamal, M. M., Hassan, A. E., 2016. Sustainability of Positive Relationship between Environmental Performance and Profitability of SMEs: A Case Study in the UK. *Journal of Enterprising Communities: People and Places in the Global Economy*, *10*(2), 138-163. https://doi.org/10.1108/JEC-05-2014-0008

Singh, M., Brueckner, M., Padhy, P. K., 2015. Environmental Management System ISO 14001: Effective Waste Minimisation in Small and Medium Enterprises in India. *Journal of Cleaner Production*, *102*, 285-301. https://doi.org/10.1016/j.jclepro.2015.04.028

Spence, L. J., Jeurissen, R., Rutherfoord, R., 2000. Small Business and the Environment in the UK and the Netherlands: Toward Stakeholder Cooperation. *Business Ethics Quarterly*, 945-965. https://doi.org/10.2307/3857841

Spence, L. J., 2016. Small Business Social Responsibility: Expanding Core CSR Theory. *Business and Society*, 55(1), 23-55. https://doi.org/10.1177/0007650314523256

Spence, L. J., Rinaldi, L., 2014. Governmentality in accounting and accountability: A case study of embedding sustainability in a supply chain. *Accounting, Organizations & Society*, 39(6), 433–452. https://doi.org/10.1016/j.aos.2012.03.003

Stubblefield Loucks, E., Martens, M. L., Cho, C. H., 2010. Engaging Small-and Medium-sized Businesses in Sustainability. *Sustainability Accounting, Management and Policy Journal*, 1(2), 178-200. https://doi.org/10.1108/20408021011089239

Sundin, H., Brown, D. A., 2017. Greening the Black Box: Integrating the Environment and Management Control Systems. *Accounting, Auditing and Accountability Journal,* 30(3), 620-642. https://doi.org/10.1108/AAAJ-03-2014-1649

Trumpp, C., Endrikat, J., Zopf, C., Guenther, E., 2015. Definition, conceptualization, and measurement of corporate environmental performance: A critical examination of a multidimensional construct. *Journal of Business Ethics*, *126*(2), 185-204. https://doi.org/10.1007/s10551-013-1931-8

Valdez-Juárez, L. E., Gallardo-Vazquez, D., Ramos-Escobar, E. A., Limon-Ulloa, R. 2019. ISO 14001 and 26001, Agents of Change in the SME. *Journal of Management & Sustainability*, *9*, 32. https://doi.org/10.5539/jms.v9n1p32

White, G., Lomax, M., Parry, G., 2014. The implementation of an environmental management system in the not-for-profit sector. *Benchmarking: An International Journal*, *21*(4), 509-526. https://doi.org/10.1108/BIJ-11-2012-0073

Witjes, S., Vermeulen, W. J., Cramer, J. M., 2017. Exploring corporate sustainability integration into business activities. Experiences from 18 small and medium sized enterprises in the Netherlands. *Journal of Cleaner Production*, *153*, 528-538. https://doi.org/10.1016/j.jclepro.2016.02.027

Won Kim, N. K., Matsumura, E. M., 2017. Managerial Accounting Research in Corporate Social Responsibility: A Framework and Opportunities for Research. *Advances in Management Accounting*, 28, 31-58.

Wu, G. C., 2017. Effects of Socially Responsible Supplier Development and Sustainability-Oriented Innovation on Sustainable Development: Empirical Evidence from SMEs. *Corporate Social Responsibility and Environmental Management*, *24*(6), 661-675. https://doi.org/10.1002/csr.1435

Yin, H., Schmeidler, P. J., 2009. Why do Standardized ISO 14001 Environmental Management Systems Lead to Heterogeneous Environmental Outcomes? *Business Strategy and the Environment*, *18*(7), 469-486. https://doi.org/10.1002/bse.629

Zobel, T., 2007. The 'Pros' and 'Cons' of Joint EMS and Group Certification: A Swedish Case Study. *Corporate Social Responsibility and Environmental Management*, *14*(3), 152-166. https://doi.org/10.1002/csr.125

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. https://doi.org/10.1016/j.biortech.2009.10.022

Declaration of interests

☒ 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.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

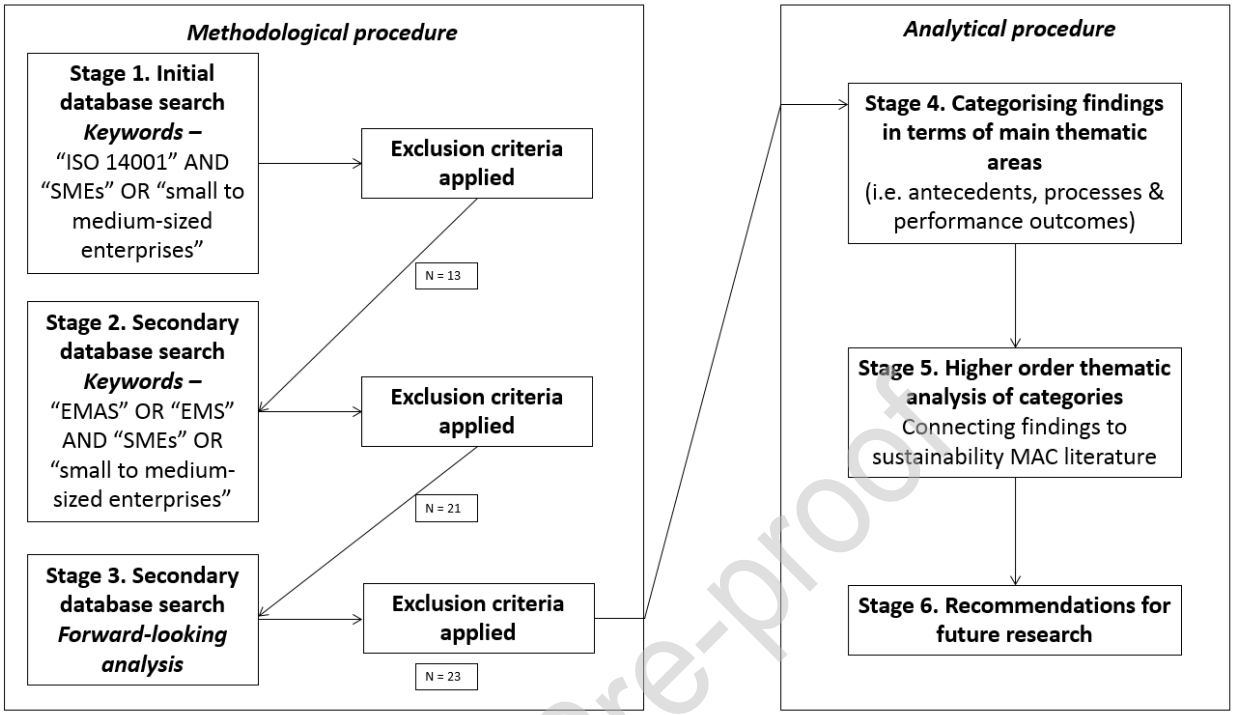

Figure 1. Summary of the systematic review process

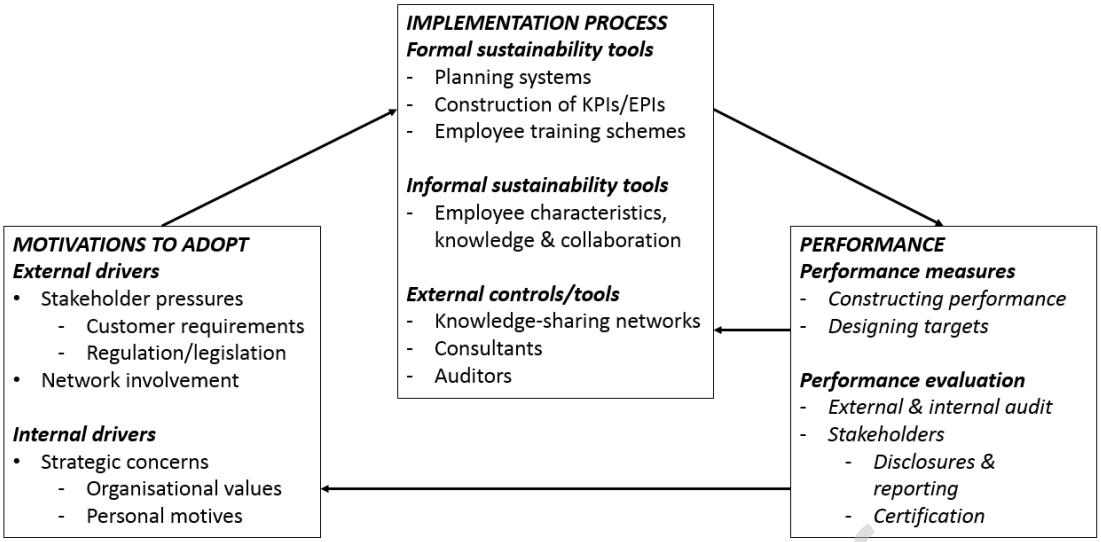

Figure 2. Summative model of the key areas research areas regarding EMS in SMEs

Highlights

- Overviews the antecedents, processes and outcomes of EMS in SMEs
- Proposes more research on sustainability management accounting and control in SMEs
- Emphasises environmental performance as a multidimensional construct