

Systematic Review

Drivers, Challenges and Outcomes of Environmental Management System Implementation in Public Sector Organizations: A Systematic Review of Empirical Evidence

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Abstract: Our research objectives were to conduct a systematic literature review of the empirical articles on the drivers, challenges and outcomes of environmental management system (EMS) implementation in public sector organizations (PSOs) in the Scopus database, published in English. Following the PRISMA guidelines, we identified, reviewed and analyzed 11 selected articles. We used content analysis to identify important themes and concepts. First, we mapped the selected literature. We then identified four main categories of drivers (environmentally strategic, social/stakeholders, regulatory and organizational efficiency), five categories of challenges (budgetary, human resource, technical, managerial and regulatory) and five categories of outcomes (improvement in environmental management practices, environmental performance, awareness of environmental issues, image and organizational efficiency). Finally, we identified important avenues for future research that should be explored further. This article synthesizes the knowledge on EMS implementation in PSOs and offers new insights. It will help EMS scholars and practitioners develop a broader and more critical understanding of the issues specific to EMS implementation in PSOs.

Keywords: environmental management systems; ISO 14001; EMAS; drivers; motives; barriers; challenges; outcomes; benefits; public administration; public institutions; systematic review



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1. Introduction

Environmental management (EM) is the “management of those activities of a firm that have or can have an impact on the environment” ([1], p. 12). Environmental management systems (EMSs) are designed to help organizations systematically “identify, manage, monitor and control their environmental issues in a holistic manner” [2]. An EMS is a systematic process to improve environmental performance through a continuous cycle, using the basic “plan-do-check-act” model. EMSs can be in-house, informal or formally certified. Several standards have been developed. The European Union’s Eco-Management and Audit Scheme (EMAS), established in 1993, and the ISO 14001, launched in 1996, are the most important standard EMSs used in the world today. EMSs can improve the environmental performance of various industries in different sectors [3–5], and international institutions and governments around the world have supported or even required their implementation [6,7].

EMS implementation is important for public sector organizations (PSOs) because PSOs have significant sustainability-related impacts on environmental, social and economic issues that need to be managed [8]. Some authors argue that PSOs can serve as “role models”

and can play an important role in leading the transition to a more sustainable society [9] and that they must serve as examples of good practice [10,11]. PSO managers usually consider corporate social responsibility (CSR), including improved EM, as strategically important for their organizations [12]. The implementation of an EMS can also be part of public sector reform to improve the governance and accountability of the administrative system, particularly in the areas of environmental practices and responsibilities [13].

There are several types of PSOs. PSOs include local, state and national governmental entities, public sector healthcare organizations, universities and other educational institutions, intergovernmental organizations (IGOs), such as the United Nations and the European Union, and a wide variety of scientific and trade organizations [14]. Additionally, PSOs include hybrid organizations, such as business enterprises where the government retains a majority of ownership.

PSOs are distinct from private organizations in many ways and may have different drivers, challenges and outcomes associated with EMS implementation. PSOs' strategic goals are often different from those of private sector organizations. PSOs often pursue multiple complex political and social goals rather than simple commercial objectives [15]. Some PSOs, such as municipalities, have numerous, complex and often conflicting goals, including goals related to justice, equitability and accountability [16]. Private sector organizations may be more concerned with improving profitability and competitiveness, whereas PSOs may be more concerned with societal "well-being" and development. PSOs tend to produce services, facilitate resource reallocation and undertake policy development [17] rather than manufacturing products [10,15]. Most of the literature on EMSs has focused on private industrial organizations, however, and the results documented in these articles may not be directly applicable to PSOs because of these differences. This is why this review article is important.

Understanding the drivers, challenges and outcomes of EMS implementation is critical for PSOs' leaders and managers so they are able to employ evidence-based practices in order to implement effective strategies, develop useful policies and promote meaningful activities. Challenges to EMS implementation are not as well documented in the academic literature compared with the drivers [18,19]. The outcomes of EMS implementation have been widely studied [4] and include a variety of significant benefits, both for organizations and the environment. A better understanding of the drivers, challenges and outcomes of EMS implementation in PSOs can play a role in promoting a wider adoption of EMSs in these organizations.

There are several reasons why a systematic review (SR) on the drivers, challenges and outcomes of EMSs in PSOs is justified. First, most of the research on the drivers, challenges and outcomes of EMS implementation has been conducted on private sector organizations, and there is a lack of research on PSOs [5,19,20]. Second, the relevant literature on EMSs in PSOs is scattered between different journals, and the main findings of the empirical literature on the drivers, challenges and outcomes of EMS implementation in PSOs have not been analyzed systematically. Third, although systematic reviews (SRs) are increasingly used in the medical and social sciences, they are still uncommon in the field of management, where most review papers are based on narrative or traditional literature reviews [4,21]. Unfortunately, these reviews often ignore some of the previous research on the review topic. SRs provide a comprehensive summary and synthesis of the relevant studies for scholars and managers; they provide an overview of the relevant literature, including its main characteristics and results, and they can reveal research gaps and topics that warrant further study.

Our research questions are (1) what are the main drivers for EMS implementation in PSOs? (2) what are the main challenges for EMS implementation in PSOs? and (3) what are the main outcomes of EMS implementation in PSOs? Our research objectives are to conduct an SR to (1) map the empirical literature on these topics, (2) identify the main drivers, challenges and outcomes and (3) suggest a research agenda to address important knowledge gaps.

2. Methodology

We conducted an SR of the English language empirical studies published in peer-reviewed journals listed on the Scopus database and then used content analysis to identify themes and important concepts in the selected studies. SRs are “attempts to minimize bias using systematic and explicit methods to identify, select, critically appraise and summarize relevant research” ([22], p. 6). An SR “locates existing studies, selects and evaluates contributions, analyses and synthesizes data, and reports the evidence in such a way that allows reasonably clear conclusions to be reached about what is and is not known” ([23], p. 671). An SR presents two key advantages over narrative or traditional literature reviews. First, it minimizes bias related to the identification and analysis of the selected studies [22]. Second, it ensures the reproducibility of results and improves the quality of the review process [24]. SRs also have certain drawbacks. The SR approach requires a purposive and selective sampling of articles [25], but because of the specific selection criteria, some potentially interesting papers may be ignored, and content analysis is restricted to the selected set of studies. Further, as SRs focus on recurring themes, they mostly reflect the results of the extant mainstream literature [4]. We conducted our SR according to the “preferred reporting items for systematic reviews and meta-analyses” (PRISMA) guidelines [26,27].

Scope of our SR and information sources. We set the literature review protocol and defined the criteria for inclusion and exclusion of papers in our SR as follows: First, we used the Scopus database to limit our search to scholarly studies published in high-quality, peer-reviewed journals. The Scopus database includes journals that rely on expert editors [21] and most of the peer-reviewed journals that publish articles on EMSs. Second, we only included empirical studies as our goal was to review and understand the actual experiences of PSOs and provide an evidence-driven foundation for future empirical studies to build upon. To ensure that only the most influential and rigorous scholarly works were included in the review, we excluded conference papers, review papers, dissertations and book chapters. Third, we only included articles written in English.

Data collection. In January 2021, we used the following key search terms to find relevant articles in the Scopus database: (“environmental management systems” OR “ISO 14001” OR “EMAS”) AND (“public administration” OR “public sector” OR “governmental organizations” OR “public institutions” OR “public authorities” OR “civil service” OR “public administration” OR “public organizations” OR “public agencies”) AND (“drivers” OR “motives” OR “challenges” OR “barriers” OR “outcomes” OR “benefits”). We used complementary keywords to avoid overlooking relevant papers. The Scopus database search using the specified keywords in titles and abstracts led to the identification of 35 potentially relevant papers.

Data selection. Information from all of the 35 references was compiled in a Microsoft Excel file. These references were independently reviewed by two authors, who selected the final list of papers to be analyzed. The authors examined the articles’ topics and content and used our criteria for inclusion and exclusion of material (Table 1) to eliminate papers whose research questions were not fully aligned with the scope of this review (i.e., drivers, challenges and/or outcomes of EMS implementation in PSOs) and papers that did not include empirical research.

Table 1. Inclusion and exclusion criteria used in the screening process.

Inclusion Criteria	
Empirical studies	
Papers with clear research questions/objectives focused on drivers, and/or challenges and/or outcomes of EMS implementation	
Papers with data collected in PSOs only or a mix of private and PSOs if the results for PSOs are reported separately	
Papers published in English	
Exclusion criteria	
Conceptual papers, conference papers, review papers, books and book chapters	
Papers focused on private/corporate organizations	
Papers that report combined results from private organizations and PSOs	
Papers not published in English	

To screen the articles, at least two researchers independently reviewed the titles and abstracts of the 35 papers to determine whether they should be included or not. In cases of disagreement, a decision was obtained by discussion until a consensus was reached. Next, at least two researchers independently read the full text of the articles, and again disagreements about inclusion were discussed until a consensus was reached. This screening resulted in the elimination of 28 articles that did not match our criteria for inclusion and in the selection of 7 articles whose topics were clearly suitable for our study. We thought that 7 articles were not enough for an SR so we examined the reference lists of the 7 selected papers and identified additional studies that could meet our eligibility criteria. We then read their abstracts to check whether they could be included in the SR. This enabled us to add 4 articles that matched our criteria [28–31]. Figure 1 shows the entire workflow that resulted in the final paper selection, and Table 2 gives information about the 11 selected papers.

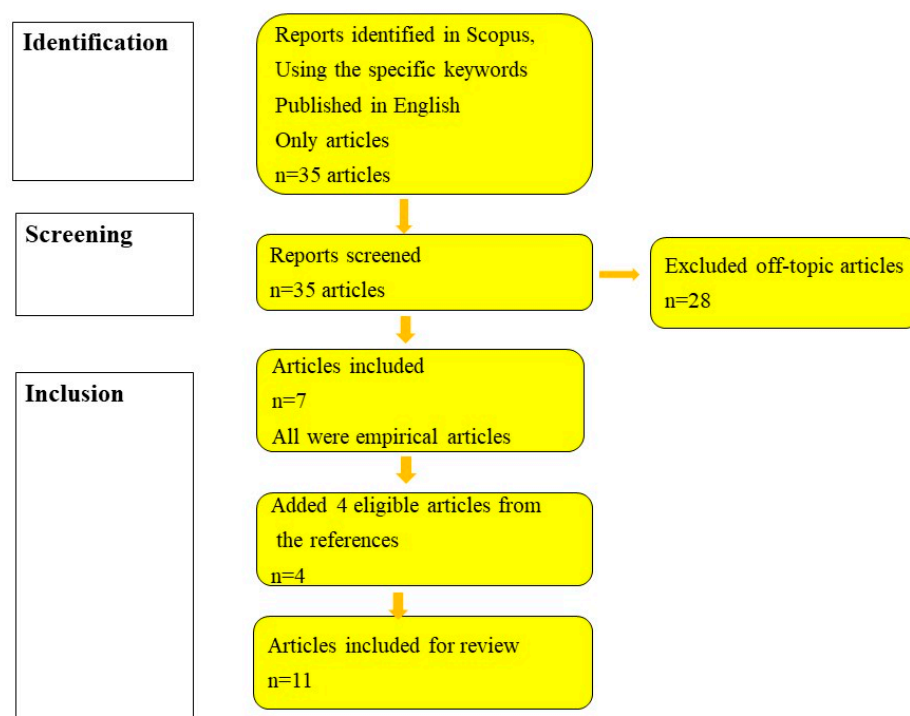
**Figure 1.** The systematic article selection process for this review.

Table 2. The 11 selected articles on drivers, challenges and outcomes of EMS implementation in PSOs.

Authors	Title	Year	Journal	Themes *
Daddi et al. [32]	The implementation of an EMS in a North-African local public administration: The case of the City Council of Marrakech (Morocco)	2011	<i>J. Environ. Plan. Manag.</i>	A,B,C
Emilsson and Hjelm [33]	Implementation of standardised EMS in Swedish local authorities: Reasons, expectations and some outcomes	2002	<i>Environ. Sci. Policy</i>	A,B,C
Huang et al. [29]	Public sector voluntary initiatives: the adoption of the EMS by public waste water treatment facilities in the United States	2014	<i>J. Environ. Plan. Manag.</i>	A
Joseph et al. [28]	Councils' EMS: an isomorphism inquiry	2019	<i>Manag. Environ. Qual.</i>	A
Lozano and Valles [34]	An analysis of the implementation of an EMS in a local public administration	2007	<i>J. Environ. Manage.</i>	B,C
Merli et al. [30]	Promoting sustainability through EMS application: A survey examining the critical factors about EMAS registration in Italian organizations	2016	<i>Sustainability</i>	A,B,C
Myszczyzyn [35]	Eco-management and audit scheme (EMAS) as an important element of the sustainable development policy on the example of public sector organizations	2017	<i>Environ. Prot. Nat. Resour.</i>	A,B,C
Norén and von Malmberg [31]	Are standardized EMSs useful in local authorities? A study of how a tool from the private sector is used in the public sector	2004	<i>Bus. Strategy Environ.</i>	C
Waxin et al. [5]	Outcomes and Key Factors of Success for ISO 14001 Certification: Evidence from an Emerging Arab Gulf Country	2020	<i>Sustainability</i>	C
Waxin et al. [19]	Drivers and challenges for implementing ISO 14001 EMSs in an emerging Gulf Arab country	2019	<i>Environ Manage.</i>	A,B
Zutshi et al. [36]	EMS adoption by government departments / agencies	2008	<i>Int. J. Public Sect. Manag.</i>	B,C

* **Themes:** (A) drivers, (B) challenges and (C) outcomes of EMS implementation in PSOs.

Data extraction and analysis. The next step of an SR is to extract and analyze the relevant data from the selected papers. We categorized the selected articles in terms of their publication characteristics, and then we analyzed their findings and thematically categorized them based on the drivers, challenges and outcomes of EMS implementation. To do this, we used the content analysis method, in which selected items of qualitative data are systematically coded in order to consolidate information around key themes or recurring concepts [37]. This coding allows researchers to systematically synthesize essential data from various articles and quantify certain trends [38]. Our content analysis of data had three steps: (1) development of a categorization/coding grid, (2) extraction of information according to the grid and (3) interpretation of results.

In the first step, the research team developed four categorization/coding grids or data extraction forms and iteratively developed and refined them as the analysis progressed. We developed a grid to record the selected studies' characteristics: journal, year of publication,

topics addressed and research design features (country of data collection, type of PSO, type of EMS, level of analysis, data collection method, respondent type and number, and data analysis methods). We also developed three other grids to record the selected studies' empirical results in terms of (1) drivers, (2) challenges and (3) outcomes of EMS implementation in PSOs. In the second step, at least two researchers worked independently to extract the relevant information from the selected papers, according to the coding grids. Co-coding allowed us to check for consistency of themes and subthemes. In cases of disagreement, consensus was reached by frequent discussion. Researchers working independently limit biases related to the subjective interpretation of some results and increase reliability. In the third step, we analyzed the results of the coding process, which we present and discuss in the following sections of this paper.

3. Results and Discussion

3.1. Mapping the Empirical Literature on Drivers, Challenges and Outcomes of EMS Implementation in PSOs

In the following paragraphs, we analyze the key characteristics of the selected articles (Tables 3 and 4).

Table 3. The selected articles' research design characteristics.

Authors	Themes *	Research Design **	Country	Type and Number of Respondents (If Mentioned)	Sampling, Data Collection Methods	Data Analysis Methods	Type of EMS
Daddi et al. [32]	A,B,C	3, Mixed method	Morocco	EMS officials in the city of Marrakech 1500 citizens answered a survey	Interviews of officials Questionnaire survey: 32 closed questions administered to citizens	Case study Mixed methods Narrative and descriptive statistics	ISO 14001
Emilsson and Hjelm [33]	A,B,C	1	Sweden	107 environmental managers in local authorities Response rate: 81%	Qualitative survey with open-ended questions sent via postal mail	Content analysis	Not specified
Huang et al. [29]	A	2	USA	126 specialists in government wastewater treatment facilities Response rate: 36%	Online national survey of public wastewater treatment facilities Random and stratified samples	Logistic regression	Not specified
Joseph et al. [28]	A	3	Malaysia	7 officers involved in the EMS process in 3 city councils	Semi-structured interviews	Case study Qualitative, thematic analysis	ISO 14001
Lozano and Valles [34]	B,C	3, Mixed method	Spain	Relevant officers and citizens from local authorities in the area of Ohanes	Interviews Questionnaire survey Official database	Case study Mixed methods SWOT analysis	ISO 14001
Merli et al. [30]	A,B,C	2	Italy	562 Italian EMAS-registered private and PSOs Response rate: 58%	Survey sent to all EMAS-registered Italian organizations. Survey with multiple-choice questions and Likert scale	Descriptive statistics Comparison private/PSOs	EMAS
Myszczyzyn [35]	A,B,C	1	Poland	19 EMAS representatives in PSOs Response rate: (19 PSOs +13 private/71 organizations)	Survey sent to 71 EMAS-registered PSOs and private organizations Qualitative survey of 14 questions (not provided)	Qualitative analysis Thematic analysis	EMAS

Table 3. Cont.

Authors	Themes *	Research Design **	Country	Type and Number of Respondents (If Mentioned)	Sampling, Data Collection Methods	Data Analysis Methods	Type of EMS
Norén and von Malmberg [31]	C	3	Sweden	14 (7 officers in relevant roles from 2 municipalities)	Purposeful sampling Semi-structured interviews	Qualitative analysis: combination of partial and overall comprehensive analysis	Mixed (ISO 14001 and EMAS)
Waxin et al. [19]	A, B	1	UAE	11 EMS managers (6 private, 5 PSOs)	Purposeful sampling Semi-structured interviews	Content analysis Comparison private/PSOs	ISO 14001
Waxin et al. [5]	C	1	UAE	14 EMS managers (7 private, 7 PSOs)	Purposeful sampling Semi-structured interviews	Content analysis Comparison private/PSOs	ISO 14001
Zutshi et al. [36]	B, C	1	Australia	EMS coordinators in government departments/agencies 1 consultant	Semi-structured interviews	Not specified	Not specified

* **Themes:** (A) drivers, (B) challenges and (C) outcomes of EMS implementation in PSOs. ** **Research design:** (1) qualitative study, (2) quantitative study and (3) case study.

Table 4. Mapping of the 11 selected empirical articles on drivers, challenges and outcomes related to EMS implementation in PSOs.

Journals

Journal of Environmental Planning and Management (2)
Sustainability (2)
Business Strategy and the Environment (1)
Environmental Management (1)
Environmental Protection and Natural Resources (1)
Environmental Science and Policy (1)
Journal of Environmental Management (1)
International Journal of Public Sector Management (1)
Management of Environmental Quality (1)

Publication years

2002 (1), 2004 (1), 2007 (1), 2008 (1), 2011 (1), 2014 (1), 2016 (1), 2017 (1), 2019 (2), 2020 (1)

Study region and country

Europe: Sweden (2), Italy (1), Poland (1), Spain (1)
North America: USA (1)
Australia (1)
Asia: Malaysia (1)
Middle East: UAE (2)
Africa: Morocco (1)

Types of PSOs

Local administrations, local councils, municipalities (5)
Regional, state or national/federal governmental agencies, ministries, departments (2)
Mixed private and public sector organizations (4)

Research design

Qualitative design based on interviews or questionnaires with open-ended questions (5)
Quantitative design (2)
Case study (4), including 2 using interviews and 2 using mixed methods (interviews and questionnaires/surveys and/or databases)

Types of respondents (Note: some articles use more than 1 type of respondent)

EMS coordinators, environmental specialists (or equivalents) or officers related to EMSs (11)
Citizens (2)
External consultant (1)

Table 4. Cont.

Analysis level
Organizational (11)
Type of EMS
ISO 14001 (5), EMAS (2), mixed: ISO 14001 and EMAS (1), not specified (3)
Key Themes
Drivers (7), challenges (6) and outcomes (8)

Journals. The eleven selected papers were published in nine different journals. Two articles were published in *Sustainability*, and two others were published in the *Journal of Environmental Planning and Management*. The rest of the articles were published in seven different journals. The variety of journals indicates the interdisciplinary nature of the EMS research field.

Publication dates. The eleven articles were published between 2002 and 2020, with five of them published between 2016 and 2020.

Countries. Seven of the studies were performed in Western countries. Three studies came from Arab countries (UAE, Morocco) and one from Asia (Malaysia). This reveals a significant gap in geographical coverage: non-Western countries, especially Asian and African countries, are underrepresented, and there are no studies from developing countries. It is important to note that the countries included in this review do not fully represent the distribution of EMS implementation in the world.

Organizations. Five articles focused on local administrations and two on governmental departments or agencies, and four articles used mixed samples, which included information from both private and public sector organizations.

Type of EMS implemented. Five articles studied organizations that had implemented ISO 14001, two articles studied organizations that implemented EMASs, three articles did not mention the type of EMS used by the organizations they studied, and one used both ISO 14001 and EMASs.

Research design. Only two articles adopted a quantitative research design. Five articles adopted qualitative research designs (including three based on semi-structured interviews and two based on qualitative question surveys). Four articles used a case study approach, among which two used semi-structured interviews and two used a mixed method approach (interviews and simple descriptive statistics). Altogether, eight articles used interviews and qualitative surveys, and only two articles used an official database or national survey.

Data analysis methods. Among the quantitative articles, one used descriptive statistics, and one used logistic regression. Among the qualitative articles, three used content analysis, one used thematic analysis, and the last one did not describe its data analysis method. Among the case studies, two used qualitative thematic analysis, one used SWOT analysis, and one used a mix of narrative analysis and descriptive statistics.

Respondents. Most of the respondents were environmental managers or specialists in EMS implementation within the participating organization, so their answers may be significantly influenced by social desirability bias [39]. Only two articles included information collected from citizens, and one article interviewed a consultant. The studies we reviewed do not contain data from a wide variety of stakeholders involved with or affected by EMS implementation. Even though employees are considered to be key actors in the successful adoption of EMSs [40,41], the studies we reviewed did not collect data from them. There is a crucial lack of data from employees and a wide variety of external stakeholders, such as citizens and consultants.

Level of analysis. All the selected research was conducted at the organizational level.

3.2. Drivers for EMS Adoption in PSOs

Seven articles discussed drivers for EMS adoption [19,28–30,32,33,35]. We found that drivers for EMS adoption in PSOs are divided into four themes: (1) environmentally strategic, (2) social/stakeholder, (3) regulatory and (4) organizational efficiency (Table 5). We discuss each theme below and identify subthemes.

Table 5. Main themes and subthemes for the drivers for EMS adoption in PSOs (n = 7 articles).

Drivers/Main Themes (# of Articles)	Subthemes (# of Articles)
Environmentally strategic drivers (6)	<ul style="list-style-type: none"> Improving environmental performance: improving EM structuring and coordination, better follow-up, reduced negative environmental impacts (6), improving commitment to sustainability (5) Improving the image/reputation/prestige of the organization and relationships with stakeholders (5), setting a good example (2)
Social/stakeholder drivers (6)	<ul style="list-style-type: none"> Community/society: public pressure, citizens, environmental organizations (5) Leadership, senior management and employees (5) Political pressure (2)
Regulatory drivers (5)	<ul style="list-style-type: none"> Compliance with local, national and/or international regulations (5) Compliance with national/international industry standards (2)
Organizational efficiency drivers (4)	<ul style="list-style-type: none"> Improving efficiency and/or quality of organizational processes, including encouraging innovation (3) Improving financial situation, by reducing costs (3) and increasing access to funding opportunities (2)

1. Environmentally Strategic Drivers. We identified two strategic drivers: improving the PSOs' environmental performance and improving their image/reputation. First, the desire to improve environmental performance was mentioned as a driver for EMS implementation in six articles [19,28,30,32,33,35]. PSOs commonly adopt EMSs in order to improve their overall environmental performance and achieve specific environmental goals. Municipalities can adopt EMSs to improve their environmental performance in several ways, including improving EM structuring across the municipality, mapping their environmental impacts, increasing and updating their environmental data, decreasing their negative environmental impacts, improving the coordination of environmental efforts within the municipality and better follow-up. For example, Malaysian cities adopted EMSs to improve internal policies, action plans and structures, as well as enhance internal communication within the cities' departments to improve the delivery of environmental services [28]. In another example, in the UAE, increasing environmental performance, including reducing pollution, better waste management and more efficient resource use, were important drivers for most PSOs [19]. The desire to improve environmental performance was associated with an organization's commitment to sustainability, which was identified as a driver in five articles [19,28,32,33,35].

Second, the desire to improve a PSO's image/reputation/prestige was mentioned as a driver in five articles [28,30,32,33,35]. Improving the image of a city or municipality could help to attract and retain more tourists, residents, government employees, businesses and international partners and is an important driver for EMS adoption by municipalities,

particularly in developing countries [28,32]. Image enhancement and receiving external recognition for environmental achievements were important drivers for ISO 14001 adoption in Malaysian local councils [28]. Two articles found that an important driver for PSOs to adopt certified EMSs is to “set a good example” for private organizations, which would encourage them to enact greener management practices and become certified themselves [32,33].

2. Social/Stakeholder Drivers. We identified three main stakeholders as drivers for EMS adoption in PSOs: (1) the public/community, (2) organizational leadership, management and employees and (3) politicians/government officials.

First, public/community pressure and the best practices of other organizations were mentioned as external drivers for EMS implementation in six articles [19,28,29,32,33,35]. Citizen pressure is an important external driver for municipalities and PSOs to implement EMSs [19,28,29,32,33]. Public pressure, including from environmental organizations, was a key driver for EMS adoption in US wastewater treatment facilities [29]. Individuals within the social network of Malaysian city leaders were drivers for EMS adoption and that these city leaders imitated the best practices of local and international organizations [28].

Second, leadership, management and employee commitment to sustainability were internal drivers for EMS adoption in five articles [19,28,32,33,35]. Third, political pressure is a social driver mentioned in two articles [29,33]. Political attention to environmental sustainability can lead to EMS implementation [33], which can be considered an important step in the local EM agenda [33]. Generally, PSOs with greater publicness respond more to political pressure [33].

3. Regulatory Drivers. Regulatory drivers include compliance with local, national and international governmental regulations and industry standards. First, the need to comply with state or national environmental laws and commitments was a driver for EMS implementation in five articles [19,28–30,32]. For example, stricter governmental regulations caused wastewater treatment facilities in the US to adopt EMSs [29]. Second, the desire to comply with industry standards was mentioned in two articles [19,28]. Compliance with national and international regulations, as well as industry standards, was the most commonly reported driver for ISO 14001 certification in UAE PSOs [19].

4. Organizational Efficiency Drivers. The desire to improve the efficiency or quality of organizational processes and improve an organization’s finances are mentioned as drivers in four articles. First, PSOs may implement EMSs to improve organizational processes’ efficiency, effectiveness and quality, and this was mentioned in two articles [19,30,33]. EMS implementation is an incentive to innovate, which can be important for improving efficiency [30]. Second, PSOs may implement EMSs to improve their financial situation by increased access to funding opportunities [30,32] and implementing changes that lead to cost savings [19,30,33]. Cost reductions associated with more efficient resource use, better waste management and reduced non-compliance fees were important drivers for a minority of PSOs [19].

Discussion of Drivers. Most of the published research on drivers for EMS implementation was conducted on private sector organizations. The main categories of drivers for EMS implementation in the private sector include improving corporate image, leadership commitment to environmental sustainability, increasing efficiency/profitability and competitiveness, compliance with national and international regulations and standards, customers, competitors and the local community [19,42].

We found that the main categories of drivers are generally similar for private organizations and PSOs, with some differences. Our results suggest that drivers related to pressures from the community/society, leadership’s commitment to sustainability, and politicians are more important to PSOs, whereas drivers related to increased competitiveness, market pressures, customers and competitors are more important to private sector organizations. PSOs provide for the needs of society rather than focusing on profit maximization, although drivers, such as cost reduction and increased efficiency, may still be important. Most PSOs provide services rather than produce products, so government regulations related to re-

duced pollution and hazardous material are less likely to be important drivers for most PSOs if they do not produce industrial pollutants [43]. EMSs can enhance market competitiveness for private organizations, but PSOs are often not in a competitive market for their services, so economic drivers are less important for EMS adoption [29]. Cost savings or earning more profits are not major drivers for PSOs when they decide to adopt an EMS, although a sufficient organizational budget seems to be a fundamental requirement for public wastewater facilities to consider adopting an EMS [29].

It is important to note that the drivers for EMS adoption might change over time. In Swedish universities, the most important drivers were faculty, management, staff and students. Later on, faculty pressure continued to be an important driver, but a lack of management support and interest instead became a barrier to EMS implementation [43]. Specifically, inadequate management support led to inadequate resource allocation for an EMS, which was the most important barrier to implementation in their study.

3.3. Challenges to EMS Implementation in PSOs

Seven articles [19,30,32–36] discussed challenges/barriers to EMS adoption in PSOs, and these are divided into five themes: (1) budgetary, (2) human resource, (3) technical, (4) managerial and (5) regulatory challenges (Table 6). We discuss each theme below and identify subthemes.

Table 6. Main themes and subthemes for the challenges to EMS implementation in PSOs (n = 7 articles).

Challenges/Main Themes (# of Articles)	Subthemes (# of Articles)
Budgetary (5)	<ul style="list-style-type: none"> • High implementation/maintenance costs (3) • Inadequate resources: budget, time, external funding opportunities (5)
Human resources (5)	<ul style="list-style-type: none"> • Lack of employee competence, knowledge, experience (3) • Lack of employee awareness and commitment (3) • Understaffing (2)
Technical (5)	<ul style="list-style-type: none"> • Difficulty in understanding and meeting EMS requirements: process design and implementation, data acquisition, identification of benefits, reporting, monitoring (5)
Managerial (4)	<ul style="list-style-type: none"> • Inability to manage change in organizational culture (4), including communication/coordination (1) • Inability to manage change in organizational structure and assign responsibilities (2) • Weak management support and commitment (2)
Regulatory (2)	<ul style="list-style-type: none"> • Lack of clear regulations (2) • Lack of enforcement and monitoring (1) • Inadequate support and recognition by government authorities (1)

1. Budgetary Challenges. We identified two budgetary challenges: a lack of budgetary resources and the high cost of EMS implementation and maintenance. First, a lack of adequate budget, funding and time was identified as a barrier in five articles [19,30,33,35,36]. For example, a lack of a budget specifically dedicated to an EMS was the most important barrier to implementation in the departments of an Australian state [36]. Second, high EMS implementation and maintenance costs were mentioned as a challenge in three articles. EMS implementation requires substantial up-front costs in order to realize long-term benefits, and PSOs have many immediate competing demands for their limited budgetary resources. Despite the fact that the EMS process reveals various ways to reduce costs and become more efficient, the initial costs may be an important barrier for some PSOs [30,35].

High EMS implementation costs were a barrier to implementation for a minority of UAE PSOs [19]

2. Human Resource Challenges. Various human resource challenges are mentioned as barriers to EMS implementation in five articles. First, implementing EMSs requires knowledgeable staff to lead the process, and a lack of employee competence, knowledge and experience related to environmental issues and management were identified as serious barriers to EMS implementation in three articles [19,30,32]. There are practical challenges in each step of EMS implementation, and a lack of qualified staff with EMS experience certainly makes the implementation process more difficult. Human resource challenges were the most frequently mentioned challenges for public and private UAE organizations and lack of qualified staff with environmental knowledge and awareness made EMS implementation more difficult [19]. A lack of knowledge about EMS processes among upper managers can also be a barrier to implementation [36]. Second, a lack of staff awareness and commitment, and difficulty getting all employees involved were identified as serious barriers to EMS implementation in three articles [19,30,36]. Understaffing [30,35] and a lack of in-house experts and administrative time [32] were also mentioned as human resources challenges;

3. Technical Challenges. PSOs face technical difficulties in understanding and implementing EMS requirements, and this was identified as a challenge in five articles [19,30,32,35,36]. Practical challenges exist at each step in the implementation of a complex EMS certification process: design, implementation, identification of key performance indicators, collection of relevant, accurate data, reporting, monitoring, correction of problems and inefficiencies, and obtaining and maintaining certification. Technical difficulties in implementing EMSs included, for example, difficulties in identifying suitable environmental performance indicators [19,32], collecting environmental data [36] and communicating across organizations from different countries [32]. The environmental effects of PSOs, including municipalities, are often indirect and associated with the delivery of social services, and the benefits of EMS implementation may be difficult to identify [32]. Overall, practical difficulties related to implementing ISO 14001 were the most commonly identified challenge for EMS implementation in UAE PSOs and the lack of EMS experience amongst employees contributed to these problems [19]. A lack of external input or feedback can be a challenge to maintaining an effective EMS after certification has been achieved [32];

4. Managerial Challenges. We identified two categories of managerial challenges: a lack of change management abilities and a lack of management support and commitment. First, adopting an EMS requires substantial organizational changes, and a lack of effective change management was mentioned as a significant barrier to implementation in four articles. Difficulties in changing organizational cultures [19,32,33,36] and structures [32,33] were identified as significant barriers. Effective communication is critical for change management, but poor communication by managers was mentioned as a challenge to EMS implementation [32]. Second, management's commitment and support have been identified as the most important key factors of success for EMS implementation, but inadequate management support can be a significant barrier that was mentioned in two articles. A lack of support and cooperation between middle managers was a significant barrier to implementation in UAE PSOs [19]. Challenges in maintaining the long-term effectiveness of an EMS in a municipality include a lack of sustained support after EMS certification has been achieved and a lack of recognition by administrators at higher levels of government [32];

5. Regulatory Challenges. Regulatory challenges are mentioned in two articles [19,35]. Implementing an EMS in the absence of comprehensive pro-environment national policies is a challenge [35]. UAE private and PSOs complained about a lack of clear government regulations, a lack of government enforcement and monitoring, and inadequate governmental support [19].

Discussion of Challenges. Most of the research on challenges to EMS implementation has been performed on private, industrial organizations in developed countries. In these studies, challenges include high implementation costs, lack of qualified and motivated

human resources, lack of management support and difficulty understanding the technical issues associated with implementation [18,19]. A lack of clear environmental regulations and engagement with government regulators are also challenges in some countries with emerging economies [19]. Our review shows that PSOs face similar challenges as private sector organizations.

Budgetary challenges are important to PSOs, and the high cost of EMS implementation and maintenance has been reported in the literature. The costs of EMAS registration in different types of organizations and found that the average cost of implementing and maintaining EMAS varies according to the organizational size and year of implementation. The first-year costs are more than the annual costs in subsequent years, with larger organizations paying around EUR 30,000 more than smaller organizations in the first year. First-year costs and renewal costs were slightly lower for PSOs compared with private sector companies. ISO 14001 certification has lower costs than EMAS registration, and companies that do not fully understand the costs and value of EMAS registration may opt for ISO 14001 certification alone [44]. A study surveyed Italian PSOs that failed to renew EMS certification and found that implementation costs and inadequate funding to support EMSs were important reasons that they did not renew, especially for smaller organizations [45]. Costs may be a less significant barrier to implementation in PSOs compared with private companies in countries that provide strong governmental financial support for EMS implementation [19].

The lack of qualified human resources is also a serious challenge for EMS implementation in PSOs, and this is consistent with results in the private sector literature. Employees' and managers' skills and knowledge are important not only for the initial implementation and adoption of an EMS but also for its maintenance [46]. Studies have found that smaller PSOs with fewer employees are more likely to face challenges with a lack of employee competence and knowledge [47,48]. Hillary (2004) A literature review on barriers to EMS adoption for small and medium-sized enterprises found that a lack of human resources was a more important barrier to successful implementation and maintenance of the EMS than a lack of financial resources [49].

PSOs, particularly large municipalities, may face significant managerial and technical challenges implementing EMSs compared with a single, private organization. First, PSOs have numerous and often conflicting goals compared with private organizations, including goals related to social and cultural development, justice, equitability and accountability [16]. Second, municipalities are often larger than private organizations and have authority over the entire area they govern, not just their specific premises [48]. Municipalities have numerous departments that deliver services, such as the police, firefighters, schools, road and infrastructure, waste disposal, parks and recreation, etc. Third, municipalities also have a greater variety of stakeholders as they include everyone within the municipality's territory [34,48]. Greater involvement of municipality stakeholders may be required for successful EMS implementation compared with private companies [50]. Fourth, organizations must identify their various effects on the environment when implementing an EMS. Unlike private sector organizations that usually have direct effects on the environment that are easy to identify, PSOs often have important indirect effects on the environment, including land use planning, enacting and enforcing regulations and indirect effects associated with the services they deliver. These indirect effects are much more difficult to identify and measure [32,43]. Some municipalities initially have no clear idea of what their indirect environmental impacts are [32]. A lack of clear benefits from an EMS is a barrier to adoption, and the benefits for municipalities may be less clear, indirect, social benefits compared with clearer, direct, economic benefits for private organizations [34]. Finally, PSOs often have rigid hierarchical structures compared with private sector organizations [16], which may make it more difficult to implement organizational changes.

3.4. Outcomes of EMS Implementation in PSOs

Eight articles discussed the outcomes of EMS adoption in PSOs. These outcomes are organized into five themes. They are improved (1) EM practices, (2) environmental performance, (3) awareness of environmental issues, (4) image and (5) organizational efficiency and performance (Table 7). In some cases, PSOs did not realize the positive outcomes that they anticipated, however. We discuss each theme below and identify subthemes.

Table 7. Main themes and subthemes for the positive outcomes of EMS implementation in PSOs (n = 8 articles).

Outcomes/Main Themes (# of Articles)	Subthemes (# of Articles)
Improved EM practices (8)	<ul style="list-style-type: none"> Improved management of environmental activities: planning of EM activities, internal structuring and procedures, incorporation of environmental issues into daily decision-making processes, documentation, quicker response to problems and continuous improvement (8) Improved coordination, cooperation and communication between different departments (4) Greater regulatory compliance (4)
Improved environmental performance (6)	<ul style="list-style-type: none"> Reduced use of non-renewable resources and energy (6) Reduced waste generation, increased recycling (5) Reduced air, water and land pollution, reduced carbon footprint (4) Improved working conditions and fewer environmental accidents (3)
Improved awareness of environmental issues (6)	<ul style="list-style-type: none"> Improved knowledge, awareness and motivation of employees and managers and increased participation in environmental projects at work (5) Improved knowledge and awareness of employees and managers outside the work context (4) Improved community awareness (3)
Improved image (6)	<ul style="list-style-type: none"> Improved image, reputation (5) Improved relationships with stakeholders (5)
Improved organizational efficiency and performance (6)	<ul style="list-style-type: none"> Reduced costs: reduced energy, resource and waste management costs, reduced non-compliance fees (3) Increased revenues due to economic diversification and eligibility for more external funding opportunities; municipalities may attract more tourism, residents and businesses (2) Clearer accounting (1)

1. Improved EM Practices. Eight articles found that EMS implementation in PSOs resulted in improved EM practices and regulatory compliance. First, all eight articles found that PSOs benefited from EMSs due to the improved management of environmental activities. This included better organizational structures and procedures for environmental work [19,30,33,34], better planning of environmental projects [31] and improved documentation of EM practices [32]. Municipalities changed their decision-making processes, incorporated environmental aspects into their daily decisions [31,34] and responded to environmental problems they experienced more quickly [34]. Second, four studies found that EMS implementation allowed PSOs to improve coordination, cooperation and communication between departments [31–33,36]. These can be especially important outcomes of EMS implementation for municipalities that have different departments in multiple

locations that deliver very different services [33]. For example, Daddi et al. [32] reported that EMS implementation created communication between different municipality offices that were previously uncoordinated and close cooperation between several governmental departments in order to achieve certification. Third, EMS implementation requires that organizations know all of the environmental laws that are applicable to them, which allows them to better anticipate legal risks and reduce penalties and fines. Four articles found that PSOs improved their EM practices through improved regulatory compliance [5,30,32,34];

2. Improved Environmental Performance. In six articles, EMS adoption by PSOs led to improved environmental performance (EP) by improving resource and waste management, reducing negative environmental impacts and improving employees' working conditions. First, PSOs improved their resource management use by reducing the use of non-renewable resources and energy in six studies and second by reducing waste generation and increasing recycling in five studies [5,30,33–36]. For example, Lozano and Valles [34] found that the EMS certification of a rural Spanish town led to better wastewater treatment, modification of the local dump and new recycling initiatives. Third, EMSs require organizations to identify all of their impacts on the environment and then design and implement plans to reduce their negative environmental impacts to improve their environmental performance. Four articles reported that PSOs decreased their negative environmental impacts, including reduced air, water and land pollution, and a reduced carbon footprint [5,30,34,36]. Fourth, EMS implementation also led to fewer environmental accidents and improved working conditions for employees in three studies [33–35];

3. Increased Awareness of Environmental Issues. Six articles found that EMS implementation increased the awareness of environmental issues by employees, managers and/or the wider community. First, five articles found that EMS implementation increased employee and/or manager environmental awareness and knowledge, as well as their motivation and participation in environmental activities at work [5,31,33,35,36]. For example, EMS-certified municipalities reported improved employee environmental awareness and knowledge of environmental issues, as well as increased enthusiasm for environmental projects [33]. In Australia, Staff awareness and education programs were successful in raising employee awareness of the EMS requirements and getting them to address organizational environmental issues [36]. A majority of the Polish PSOs [35] and a minority of the UAE PSOs [5] mentioned improved employee environmental awareness as an outcome of EMS adoption. Second, four studies also reported a spillover effect, with increased employee awareness and environmentally friendly behavior outside of work [5,34–36]. Third, EMS implementation also led to improved community awareness of environmental issues in three studies [5,34,35]. For example, municipal promotional campaigns about the environment and environmental policy associated with EMS implementation increased the awareness of environmental issues by the municipality's inhabitants [34];

4. Improved Image. Six articles found that EMSs improved the image of PSOs and improved relations with stakeholders. First, five studies found that EMS implementation improved the image and reputation of PSOs [5,30–32,34]. Second, five studies found that EMS implementation improved the organization's relationships with various stakeholders, including local residents, staff, partners, suppliers and government regulators [5,30,32,34,35]. EMS certification tended to improve relations with customers for private organizations, whereas PSOs tended to mention improved relations with community and industrial partner stakeholders more frequently [5]. EMS implementation requires the publication of reports, and this tends to improve communication with the public and other key stakeholders. This increased communication can be particularly important for municipalities, and it can improve community relations because citizens and other stakeholders can see how municipalities are addressing their environmental concerns and problems;

5. Improved Organizational Efficiency and Performance. Six articles found that EMS implementation led to improved organizational structure, efficiency and performance by adopting a more systematic approach to management, reducing costs and/or increasing revenues. First, the implementation of EMSs helped PSOs to reduce costs in three

studies [5,30,36]. Most of the UAE PSOs reported better organizational efficiency, reduced costs due to more efficient energy and resource use, and reduced non-compliance costs [5]. Small, simple changes in individual employee behavior in areas such as reducing energy use and better waste management can collectively add up to create substantial cost savings for PSOs [36]. Second, two studies found that EMS implementation can lead to increased revenues by opening up new business opportunities and collaborations and generating new sources of income. EMS certification of a municipality improved its image amongst its own citizens and external stakeholders, which may lead to increased tourism, residents, business activity and investment and help in attracting and retaining municipality employees and residents [32,34]. EMS certification can also result in opportunities for national and international collaborations, make municipalities eligible for more external funding opportunities and generate new income through the sale of recovered waste materials [30,32]. In some cases, EMSs may allow municipalities to discover innovative new ways to diversify their economy, increase their economic output and even reduce unemployment [34]. Third, EMS implementation led to clearer accounting [31];

6. Unrealized Anticipated Benefits. We note that in five of the reviewed articles, PSOs did not observe some of the expected benefits of EMS implementation. First, private organizations in Poland reported financial benefits from EMS certification, whereas PSOs did not [35]. Second, some Swedish local authorities implemented an EMS but did not realize the reduced environmental impacts and better structuring of their environmental activities that they expected [33]. Third, for some PSOs, the financial and administrative costs of EMSs, including costs associated with employee time, are higher than the benefits [31]. For other PSOs, EMS implementation significantly interfered with their normal organizational activities [36]. Finally, some benefits of EMS implementation, such as cost reductions, better environmental performance management and improved image amongst citizens may take a long time to be realized [32].

Discussion of Outcomes. In the literature on private sector organizations, the main EMS implementation outcomes include improved (1) EM practices, (2) environmental performance, (3) environmental awareness, (4) image and stakeholder relationships and (5) business performance [4,5].

The benefits of EMS implementation in PSOs are similar to those reported by private companies in the literature. We note that the results for PSOs are quite consistent because six to eight articles cite the same five main themes of outcomes (Table 7). Large municipalities may derive different positive outcomes from EMS certification compared with private organizations and smaller PSOs. Municipalities have multiple departments in different locations that deliver very different services. Due to this, large municipalities may particularly benefit from the improved EM practices associated with EMSs, which would encourage greater coordination, cooperation and communication between these disparate departments. Improved image due to EMS certification may be particularly important for municipalities too, as it may help them attract more businesses, residents and tourists. EMSs may help municipalities diversify their economy as well, which is less likely to occur in a small PSO. Most of the articles we reviewed were qualitative and did not contain precise quantitative information about improved environmental performances or reduced costs as examples. It is important to note that EMS adoption does not always lead to measurable positive outcomes [51], however. There were instances in which PSOs failed to achieve some of the anticipated benefits of EMSs, but in some cases, studies were conducted soon after implementation, and the benefits may have taken longer to realize. Usually, respondents only mention negative outcomes, problems or ineffectiveness of EMS implementation if they are asked about them, but generally, the studies we reviewed did not ask these sorts of questions.

4. Proposed Agenda for Future Research

This review reveals a variety of research gaps, as well as limitations with the research methodologies commonly employed in EMS studies that should be corrected in future

research in order to better understand the field. Below, we propose several avenues of research to improve the understanding of issues related to EMS adoption in PSOs.

First, there is not enough research on EMS issues in PSOs, especially in non-Western, developing countries and emerging economies. The growth of ISO 14001 certification in developed countries has entered the mature stage, whereas its implementation in developing countries is in its early stages and needs further investigation [5,52]. Most of the papers we reviewed were conducted in developed, Western countries that do not fully represent the international scope of EMS adoption.

Second, respondents in the studies we reviewed were mainly environmental managers or officers in charge of EMS implementation, and the data collected were based on their perceptions. The reliability and independence of the collected information may be suspect because of the possibility of social desirability bias. Managers in charge of implementing or maintaining EMSs may exaggerate the positive outcomes that they achieved. Information about employees' awareness and commitment generally comes from managers' perceptions as well, rather than interviewing the employees themselves or observing their behavior directly. The perceptions of external stakeholders about EMS implementation issues also remain underexplored. Future research should survey a wider spectrum of internal and external stakeholders, such as employees, managers, citizens and consultants and use databases for objective information about environmental and financial performances when possible.

Third, there is a lack of quantitative, comparative and longitudinal research in the field. There are not enough articles that compare issues related to EMS implementation in PSOs in different countries and between private and public organizations. Moreover, we also note the lack of longitudinal studies that would explore the impact of the EMS over time, although these data are more difficult to collect and analyze. Data collected both before and after EMS implementation would help researchers better assess the impact of the EMS and whether the realized outcomes correspond to the initial drivers for adoption. Data collected multiple times after implementation would help researchers determine the evolution of the drivers, challenges and outcomes related to EMS implementation.

Fourth, negative outcomes of EMS implementation or instances when EMS implementation did not achieve the anticipated positive outcomes are underexplored and underreported. Most researchers do not ask questions about negative outcomes or the possible ineffectiveness of EMS implementation. Future research could explore the negative and neutral impacts of EMS implementation and their antecedents.

Finally, other contextual factors and key factors of success could be explored. Various factors of success and contextual factors that can influence EMS implementation in PSOs are under-researched, including national culture, the degree of environmental awareness in the society, the size of the organization and the duration of certification [53]. The cultural and institutional causes of certain issues, such as the lack of capabilities, are rarely explored [4]. Relationships between EMS implementation challenges, the methods used for implementation and the outcomes of implementation are generally overlooked in the literature.

5. Conclusions

Limitations. Our study has several limitations. First, this SR includes only 11 empirical papers, which highlights the lack of academic research on our topic. The results of our SR are based on the results and biases of these 11 papers, so our results reflect their potential biases. Many of the studies we reviewed were limited by the nature of their research designs, respondents and small sample sizes. These studies are also limited because of a lack of identification of precise environmental indicators. The papers included in the SR are mostly based on interviews with the people in charge of EMS implementation, and their perceptions may be influenced by social desirability bias. In addition, despite the use of a comprehensive search strategy, the studies included in our SR include an over-representation of Western and high-income countries, highlighting the lack of EMS studies in low-income countries. The absence of research in Africa and Asia makes it difficult to make general conclusions about EMS implementation in PSOs worldwide.

Other limitations relate to our review process. The terms we used in our search were broad enough to capture the most significant literature on PSOs on our topic, but some interesting studies might have been missed. For example, we only reviewed articles written in English, so interesting studies published in other languages might have been overlooked. Moreover, we did not differentiate between EMS implementation and certification, and we did not differentiate between the different kinds of EM systems (ISO 14001, EMAS or others), but this could be considered in future research. We do not claim that this review is exhaustive, but it is an indicative sample of the knowledge on the drivers, challenges and outcomes of EMS implementation within PSOs at this point in time. Finally, this SR focused on recurring themes, so it mostly reflects the results of the mainstream literature.

Contributions. Theoretically, our paper makes several contributions to EMS research in PSOs. First, this paper maps the literature on the drivers, challenges and outcomes of EMS implementation in PSOs, identifying the main features, results, limitations and knowledge gaps. Second, our research contributes to the development of SRs in the field of EM. To our knowledge, no systematic review has been conducted on EMS implementation in PSOs before. The development of SRs in the field of organizational studies and EMS, where many research papers address similar research questions, could help to clarify the state of existing knowledge and focus future studies on addressing questions that have not been adequately explored previously. Third, our SR of 11 papers provides a comprehensive picture of the drivers, challenges and outcomes of EMS implementation in PSOs for managers and academics from a larger body of empirical research. Fourth, the paper provides a research agenda for the future to stimulate further work in this field.

Practically, our results have implications for managers, academics, consultants and policymakers in EMSs. For policymakers, we recommend a holistic approach to designing, communicating, implementing and monitoring regulations and policies that effectively promote the protection of the environment in PSOs. Policymakers should put more emphasis on raising awareness of environmental issues and the benefits of adopting EMSs. They could also provide supportive initiatives to help PSOs develop the capabilities to adopt EMSs. Our research also has implications for EM education and training for employees and managers. The results of this study highlight the importance of education, training and experience in EMSs for successful EMS implementation. The successful implementation of EMS programs requires the support of highly involved and knowledgeable managers equipped with effective change management competencies. Universities can play a role in the development of future EM leaders. Academic institutions should include more EM components in their curricula, and organizations implementing EMSs should plan their training programs carefully.

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