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Research Article

A Conceptual Research on the Contribution of Integrated Management Systems to the Circular Economy

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Abstract: Companies worldwide strive to become more sustainable, and, in this context, the circular economy (CE) gains importance as alternative system as opposed to the linear economy. Since executive mangers around the world work with management systems (MSs) to guide and improve organizational operations, this work aims to explore how integrated MSs (IMS) as business tools can contribute to the adoption of CE principles at the corporate level. To achieve this objective, a systematic literature review is performed, which results in a synthesis sample of 18 academic papers. The findings reveal how MSs contribute to CE adoption and, therefore, demonstrate that managers can use IMS to foster CE implementation. In addition, the findings highlight the importance of institutional intervention in the transition from a linear towards a circular designed economy. The paper contributes to academia by linking the concepts of IMS and CE, synthesizing the current academic knowledge at hand, and proposing a comprehensive research agenda that sets the path for future academic investigations. In a practical perspective, the paper contributes also to managers since it emphasizes how IMS can be used to incorporate circular business thinking into operations management.

Keywords: circular economy; integration of management systems; research agenda; sustainability; systematic literature review

1. Introduction

In 1970, the renowned US economist Milton Friedman argued that the sole purpose of businesses is to generate profit for shareholders in his internationally renowned essay "The Social Responsibility of Business Is to Increase Its Profits" [1]. Since then, humanity experienced a worldwide economic boost that went hand in hand with the exploitation of natural resources as well as the destruction of the environment and its wildlife population (e.g., [2,3]). Further, the Earth Overshoot Day—which marks the date on which mankind's demand for ecological resources within a given year exceeds what the earth can regenerate in that year—moved from the end of December to the end of July [4]. This movement makes it abundantly clear that the current economic system, which mainly follows a "take-make-dispose" thinking [5], is not sustainable, as it does not support "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [6].

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In this context, the paradigm of the circular economy (CE) might represent a constructive solution since it rejects the take-make-dispose thinking and, instead, follows a "take-make-distribute-use-recover" approach [7]. Although there is no agreed-on definition of CE [8,9], it can broadly be described as an economic strategy that transforms the current predominantly linear production and consumption pattern (raw materials are collected, transformed into products, and after their use eventually discarded as waste; traditional waste management approaches with a focus on resource recovery are applied) into a circular one (waste becomes a resource for the next production cycle through efficient material recirculation in the form of reuse, refurbishment, remanufacturing, and recycling) [10]. Therefore, it aims to reduce both virgin materials input and waste output by closing loops of resource flows [11]. Conclusively, the concept of CE addresses multiple stakeholders by facing economic challenges and fostering social well-being as well as environmental protection [12,13]. However, translating such sustainability principles into organizational action represents a challenge as it requires commitment, leadership, and a systems approach with appropriate management tools [14,15]. Furthermore, also issues such as regulations and legislations mandating CE, the promotion of CE-related knowledge, and competitor pressure towards CE represent crucial factors for the adoption of CE principles [16].

Regarding other stakeholder needs—such as quality or safety demands—the business leaders of committed companies often rely on management systems (MSs) to address stakeholders' interests in a systematic way [17]. MSs are a set of procedures to be followed to achieve stakeholder satisfaction concerning specific demands—such as quality, environmental, or occupational health and safety (OHS)—and are aimed at the continuous improvement of operations and procedures [18]. Their adoption results in various benefits such as improved systematization, more profitability, enhanced stakeholder relationships and organizational culture improvements, depending on the type of implemented MS (e.g., [19,20]). In regard to CE, academics support the viewpoint that MSs—which represent a "process of systematizing how things are done" [21]—might lead a pathway for its successful implementation at the organizational level [22,23]. In companies that operate multiple MSs, the need emerges to integrate them into a single system to use possible synergy effects and reduce redundancies [24,25]. This integration eventually results in an integrated management system (IMS) that can provide a holistic approach for corporate sustainability management [26,27] and, according to [28], companies that invest in the integration of their MSs actually obtain better sustainable performance.

In conclusion, both IMS and CE follow a multi-stakeholder approach and, due to its systematic as well as holistic approach, IMS might be a suitable business tool to foster CE implementation within companies. Despite this derived theoretical connection, the amount of academic research focusing on IMS and its impact on CE implementation in corporations is scarce. Hence, scholars emphasize the urge for further in-detail research on MSs and their role in increasing organizations' circularity (e.g., [29,30]). In accordance with this research problem, this study aims to answer the following research questions (RQ):

RQ1: How far advanced is research about IMS' contribution to CE implementation?

RQ2: What knowledge gaps are existing?

Hence, the goal of this work is to explore how IMS as business tools contribute to the adoption of CE principles at the corporate level. To achieve this aim, a systematic literature review (SLR) is conducted. This paper's results contribute to academia mainly in two ways. On the one hand, they deliver a comprehensive overview of this specific research stream. On the other hand, they illustrate how IMS can serve as a valuable business tool for companies to foster the implementation of the CE and incorporate circular business thinking into operations management. Moreover, the issues and questions formulated in the proposed research agenda lead the pathway for future academic studies.

The paper is structured as follows: Section 2 offers extended background on IMS and CE. Section 3 explains the methodology used. Section 4 outlines the results obtained and includes the research agenda, in which the future research questions are presented. Section 5 delivers the conclusions.

2. Extended Background

In this section, the concepts of IMS and CE are briefly presented and explained by means of an exploratory literature review (LR). In addition, common elements between both concepts are outlined.

2.1. Integrated Management Systems

As companies operate in dynamic environments with continuously changing business circumstances [31,32], organizations must satisfy the needs of various stakeholder groups— such as customers, suppliers, employees, and investors—in numerous and changing areas related to quality, environment, or occupational health and safety, amongst others [33]. To deal with such needs systematically in both internal and external organizational contexts, companies implement MSs [32], whose main elements are—often, but not only—described in management system standards (MSSs). These MSSs are voluntary guidelines and codes developed and published by national as well as international bodies, the most famous one being the International Organization for Standardization (ISO) [34,35]. MSSs are used by companies to formalize and systematize managerial activities, and they govern the implementation of MSs [36]. In other words, MSSs describe the formal codes and MSs represent the outcome—i.e., the practical business tools that result when implementing these theoretical guidelines. Appendix A1 provides an overview on all MSSs mentioned in

this study. Companies that are compliant with the requirements of normative MSSs can be certified, if the standard allows it [31,37]. MSSs often focus on certain topics and, consequently, the corresponding MSs are specific in their function, such as for example quality MSs (QMS) based on ISO 9001 (an MSS published by ISO), environmental MSs (EMS) based on ISO 14001, or organizational health and safety MSs (OHSMS) based on ISO 45001. Nonetheless, many MSSs share similarities such as the management policy, planning, implementation, operation, evaluation, improvement, and analysis [38,39]. The ISO for example implemented a common structure—referred to as High Level Structure (HLS)—in its new and updated MSSs since 2015. Hence, corporations that operate multiple function-specific MSs are motivated to integrate them into a single system to reduce redundancies and use possible synergy effects [25]. This integration starts with a complete understanding of the standards and systems [39], and then subsequently puts all MSs and practices into a single system [40]. In the end, organizations can manage their business operations through a single IMS instead of multiple, parallel, function-specific MSs [39]. However, many corporations experience struggles and challenges when integrating MSs [41] due to difficulties such as a misunderstanding of the integration concept [40,42], lack of financial and human resources [38,43], or insufficient managerial and administrative support [42].

IMS adoption represents a current issue of the 21^{st} century [44] as it is considered to be both the best management practice for organizations having multiple MSs in place [45] as well as a starting point for achieving business excellence [46]. Therefore, MSs integration is a crucial strategic decision regarding an organization's competitiveness [32] that leads to numerous tangible as well as intangible advantages [39,47] such as reduced costs in management, insurance, and operations [37,48–51], or organizational culture improvements [40,42,52]. Furthermore, IMS implementation also results in multiple environmental improvements like increased environmental performance [28], better allocation and utilization of resources [52–54], or better adoption of cleaner production technologies, which leads to improved sustainable innovation [55]. In addition, companies that successfully operate an IMS can implement additional standards and systems with greater ease [56–58].

2.2. Circular Economy

The concept of the CE represents a vision for a global economy that is operating restoratively and regeneratively by intention and design [59,60]. The concept's paradigm basically focuses on preventing the depletion of resources and closing energy as well as material loops [61]—i.e., using products, components, and materials over multiple life cycles—at the micro (e.g., companies, products and consumers), meso (e.g., industrial symbiosis), and macro level (e.g., cities, regions, countries) [62,63]. It addresses environmental protection [12,13] by mitigating problems such as resource scarcity, climate change impacts, greenhouse gas emissions, waste and pollution, usage of hazardous substances, or depletion of biodiversity [64–66]. Consequently, CE practices show relevance for achieving several sustainable development goals (SDGs) of the United Nations (UN), such as promoting sustained, inclusive, and sustainable economic growth, or ensuring sustainable consumption and production patterns [67].

The CE approach is based on numerous ideas and concepts such as performance economy, industrial ecology, industrial ecosystems, industrial symbiosis, eco-efficiency, cleaner production, and cradle-to-cradle [66,68, 69]. Moreover, the 6R principles of material and energy—namely reduce, reuse, recycle, recover, redesign, and remanufacture—play dominant roles in the practical application of the CE [70]. At the organizational level, the transition from the current linear to a possible future circular economy relies on companies adopting and incorporating CE principles in their business models. This forces them to rethink their current business models and design strategies [71,72] as they must transform the way they create, deliver, and capture value [73,74]. Further, existing studies highlight that in particular environmental innovation in the design of sustainable products and services is crucial [75,76].

Since the steps required for the transition towards the CE are still poorly understood, the implementation of circular business models represents a huge challenge [73]. Especially, because tools and criteria for circularity measurement are not based on a common set of standards [11,61] but rather a huge diversity of existing approaches [69] and a lack of standard indicators to track progress prevail [77,78]. In other words, the diffusion of the CE is burdened by the existence of multiple diverging approaches [69] and it is difficult to assist companies in their transition from a linear to a circular business model, because there is no uniform methodology to benchmark or assess the progress [61].

First attempts have been made to tackle these obstacles related to missing uniformity. For example, MSSs that focus on the CE have been developed at the national level, such as the British BS 8001:2017 or the French XP X 30-901. The creation of these MSSs aligns with academics' opinion that institutional leadership is pivotal for CE implementation in terms of organizing governance, promoting CE, defining legislations and voluntary standards, as well as recognizing CE-compliant companies [16,76,79,80].

2.3. Common Elements between IMS and CE

Based upon the exploratory LR on IMS and CE, six common elements can be identified, which are displayed in Table 1. In view of these common elements, it is likely that both concepts share certain connections that might reveal synergy potential, of which companies should take advantage of. Hence, researching in-detail the relationships between IMS implementation and CE adoption at the corporate level represents an academic imperative, which this work follows.

Based on the extended background about IMS and CE as well as the identified common elements between both concepts, this paper aims to answer the following two questions:
RQ1: How far advanced is research about IMS' contribution to CE implementation?
RQ2: What knowledge gaps are existing?

3. Methodology

With impetus to answer the RQs formulated in Section 1, this study adopts a SLR as methodology. In general, LRs enable academics to summarize, evaluate, and progress the current state of scientific knowledge in a certain field of interest [81–84]. Further, they ultimately unravel still existing research gaps and allow to present respective future research opportunities in an organized way [85]. Thus, performing a LR appears to suit the research objective best.

Since a LR's quality strongly depends on the applied literature search process [86], it is recommended to follow a systematic procedure to increase the validity, reliability, and relevance of the LR [84,86]. This is because non-systematic review processes might fail to provide a sufficient set of scientific articles, leading to a weak assessment base [85], whereas a systematic approach contains a high degree of transparency and therefore ensures the opportunity to replicate and validate the findings through its thoroughness in documenting the literature search and review process [82,86]. Hence, this study answers RQ1 and RQ2 based upon a SLR. Despite the multiplicity of existing methodologies for conducting SLRs (e.g., [87–89]), this work follows the approach elaborated by [86] due to its clear and recipe-alike structure that consists of five phases, namely (I) scope definition, (II) topic conceptualization, (III) literature search process, (IV) literature analysis and synthesis, and (V) synthesis of future research questions. As visualized in Figure 1, steps (I), (II), and (III) are depicted in the following paragraphs, and steps (IV) and (V) are performed in Section 4.1 and 4.2, respectively.

3.1. Scope Definition

In this first phase, the range of the review is defined. This represents "a necessary first step of clarification in any literature review, which bears implications for the later search process" [86]. Therefore, the structure and taxonomy as proposed by [90] and visualized in Table 2 is applied.

Table 1. Common Elements between Circular Economy and Integrated Management Systems.

Elements	IMS	CE	References
1. Multi-Stakeholder Approach	Both concepts are rooted in the multi-stakeholder approach		E.g., [17,59]
2. Systematization	IMS represents a management tool for systematically satisfying needs	CE implementation demands uniformity and processes of how things are done	E.g., [19,39,69]
3. Institutional Guidance	MSSs are developed by normalization institutions and help organizations to improve their way of working. IMS are mainly based on these MSSs	CE promotion and implementation requires institutional guidance	E.g., [76,80]
4. Adopting new Ways of Working	Companies with IMS have greater ease to adopt new standards and management systems, that guide their way of working	Companies must adopt CE principles and rethink their business models and way of working	E.g., [57,58,71,72]
5. Sustainable Innovation	IMS fosters continuous improvement including sustainable innovation	CE implementation demands sustainable innovation	E.g., [45,55,76]
6. Environmental Dimension Improvements	IMS are business tools that enable companies to achieve numerous environmental benefits	CE aims at achieving positive environmental impacts	E.g., [12,13,52]

Table 2. Scope Definition Taxonomy. Adapted from [90].

Characteristics	Categories			
a. Focus	Research Outcomes	Research Methods	Theories	Applications
b. Goal	Integration	Criticism	Central Issues	
c. Organization	Historical	Conceptual	Methodological	
d. Perspective	Neutral Representation	Espousal of Position		
e. Audience	Specialized Scholars	General Scholars	Practitioners/ Politicians	General Public
f. Coverage	Exhaustive	Exhaustive & Selective	Representative	Central/Pivotal

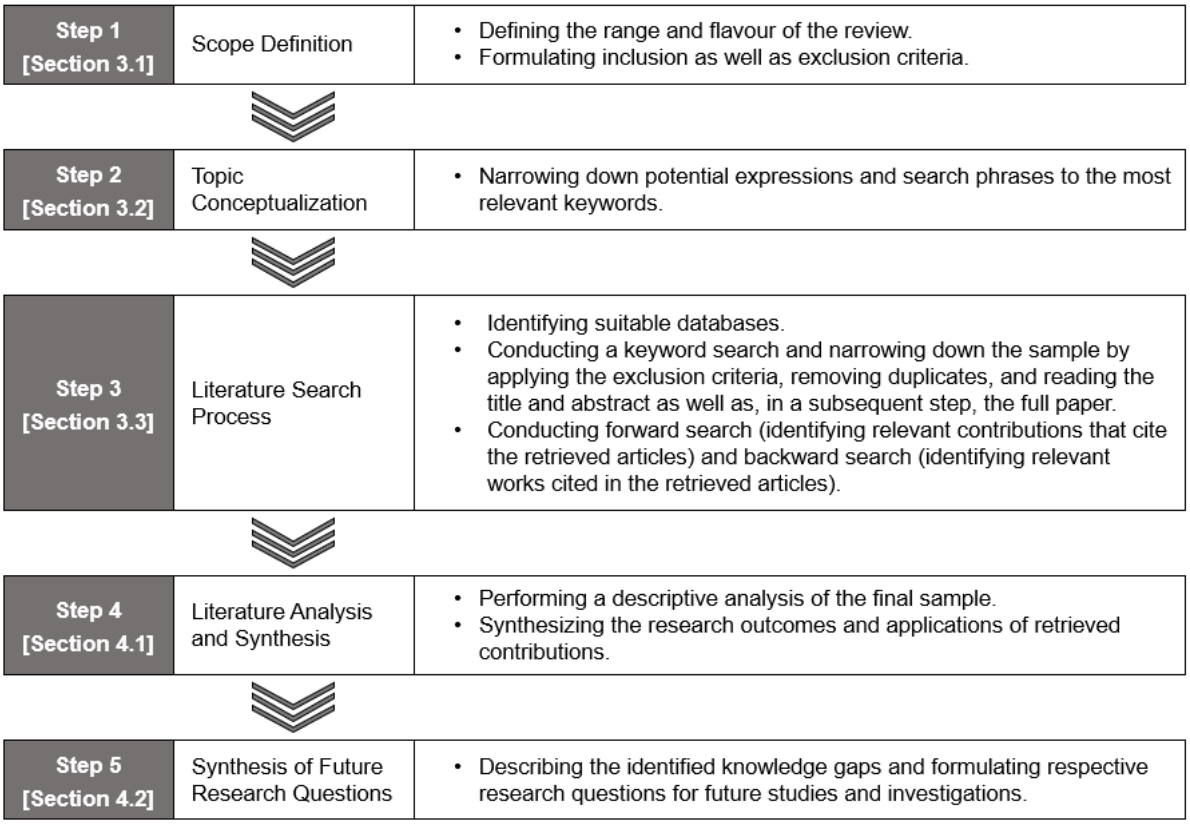

Figure 1. Applied Research Methodology (own elaboration with adaptations from [86]).

Due to the nature of the research questions covered—i.e., 'what has been done yet' (RQ1) and 'what has still to be done' (RQ2)—this study's SLR will focus on the categories 'research outcomes' and 'applications', as they are the most promising in view of the underlying context. Considering the goal, this study's objective demands to synthesize the existing set of literature as well as to examine central issues regarding the relationships between IMS and CE. Regarding the organization, the synthesis sample in this paper is organized historically, as can be seen in Table 4. Nonetheless, also the methodologies applied (see Table 4, column 'research characteristics'), and the conceptual perspective (see Table 4, column 'research focus') have been considered carefully and, therefore, also these categories play a certain role in the organization of this study's SLR. The perspective of the reviewer can be either neutral or espoused to a certain position [90]. In this paper, the literature and findings are presented in a neutral way without any prejudiced positions. This is also due to the targeted audience, which are both specialized as well as general scholars and, in addition, practitioners. The audience represents the fifths characteristic in Table 2 and determines the writing style. Regarding the last characteristic, the degree of coverage of the literature, this study adopts an 'exhaustive & selective' approach. It is exhaustive in the sense that it aims to include the entirety of academic literature (or at least almost all of it) that connects MSSs and MSs—as basis of IMS—and IMS adoption itself to CE implementation and, therefore, the SLR is not limited to certain time periods, document types, or methodologies. However, it is also selective since the SLR considers certain language constraints (English).

3.2. Topic Conceptualization

The second phase as proposed by [86] deals with narrowing down potential expressions and search phrases to the most relevant keywords. In other words, researchers must discover and select search phrases that are commonly used in the field of interest [85]. This represents a complicated step, since too loose search phrases can lead to too many results—which makes it hard for reviewers to identify the relevant ones—and, in contrast, too narrow search phrases bear the risk of excluding important publications [91]. Further, the selection of keywords has a strong impact on the review's completeness and quality [92]. Suitable keywords around the concepts of IMS and CE are derived based upon the extended background in Section 2 as well as the authors' existing vocabulary. The used keywords and consolidated in the string displayed in Table 3. General terms such as 'sustainability' or 'sustainable development' are not used in the string, since these terms are too broad, and this study intends to focus on CE. To the best of the authors' knowledge, these combined keywords and a following forward as well as backward search should be suitable and sufficient to retrieve an adequate assessment base of contributions that cover the scope of this SLR.

Table 3. Overview Systematic Literature Review.

Scope Definition		
Inclusion Criteria	All publication years, all document types, all methodologies	
Exclusion Criteria	Only contributions in English are considered	
Topic Conceptualization		
String	[[["management system*" OR "integrated management system*" OR "standardized management system*" OR "normalized management system*"] AND ["ISO" OR "QMS" OR "EMS" OR "OHSAS" OR "ISMS" OR "EnMS" AND]] ["circular economy" OR "circle economy" OR "industrial ecology" OR "circularity" OR "circle" OR "closed loops" OR "circular"]]]	
Literature Search Process		
Time Frame of Search	1991[1] - July 2021	
Databases	Scopus	Web of Science
Fields	Title abstract, keywords	Topic
Results of String	97 Papers	30 Papers
Baseline Sample[2]	108	
Reading Title & Abstract	29	
Reading Full Paper	14	
Forward/Backward Search	4	
Synthesis Sample	18	

[1] The oldest paper detected dates back to 1991.

[2] After applying inclusion/exclusion criteria and removing duplicates.

3.3. Literature Search Process

[86] suggests performing a literature search process consisting of four sub-steps, namely (i) accumulating relevant journals that cover the academic field of interest, (ii) identifying databases that contain these journals, (iii) conducting a keyword search, and (iv) using the derived articles as starting point for conducting forward and backward search. However, regarding (i) and (ii), the authors also "would agree that it rather makes sense to query scholarly databases allowing for a topic-based search" [86]. Since there are many journals worldwide that considers sustainability-related topics such as CE and/or management-related topics such as IMS, this SLR follows this comment of directly starting with sub-step (ii). Therefore, the scientific databases Web of Science and Scopus are used. Regarding sub-steps (iii) and (iv), [86] emphasizes to evaluate the retrieved sample continuously to limit the amount of literature identified to only those publications that are relevant to the topic at hand. This study follows this advice by removing duplicates, reading the title as well as abstract and, in a subsequent step, also reading the full paper.

Table 3 summarizes the SLR. As visible, after applying the exclusion criteria and removing duplicates, the (iii) keyword search resulted in 108 papers. Reading the title and abstract reduced the baseline sample to 29 papers. This phase excluded many papers, as they did not consider the keywords used in the string in the sense of this study—e.g., EMS as abbreviation for environmental management systems—but rather concerned topics such as "closed-loop control of shipboard integrated power system" [93], "electromagnetic wave shielding (EMS)" [94], or "phenomena in the electromechanical systems (EMS)" [95]. Such 'abbreviation duplicates' are common in academia and cannot be fully prevented by the choice of keywords. Reading the full articles in a subsequent step further reduced the sample to 14 papers. The (iv) forward and backward search added up 4 papers that have not been in the baseline sample, thus leading to the final synthesis sample of 18 papers. The retrieved contributions will be thoroughly analyzed and discussed in the following results chapter.

4. Results

In this section, steps (IV) 'literature analysis and synthesis' as well as (V) 'synthesis of future research questions' are presented [86]. Therefore, the final synthesis sample of 18 contributions is analyzed descriptively as well as synthesized thematically in a first step. In a second step, future RQs are derived, whereby further academic papers surrounding the topics of IMS and CE are taken into account to ensure that this work aligns with current research.

4.1. Literature Analysis and Synthesis

4.1.1. Descriptive Analysis

The SLR concluded in July 2021 resulted in 18 papers, which are listed in Table 4. The papers have been published from 2016 onwards, which underlines that this field

of research is still a relatively young research branch. As visible in Figure 2, which visualizes the descriptive analysis, the recently increasing number and positive trendline of reported contributions emphasize the importance of the area. The 18 works have been published by 12 different journals, which underlines that the topic at hand is of great interest to a broad range of audience.

Regarding the research characteristics, most papers are based on empirical research. As shown in Figure 2, a total of 14 papers (78%) relies on empirical methods such as surveys (n = 7), case studies (n = 3), and qualitative data gathering like workshops, expert panels, and mixed approaches (n = 4). As visible in Table 4, most empirical research has been conducted in Europe (n = 9) and Asia (n = 4). The four conceptual articles (22%) are review papers, one of them is even a systematic one. [30] performed a SLR on the CE and EMS, resulting in 19 papers. However, the research focus differed from the RQs investigated in this study, because [30] focused on the level of integration between sustainable consumption and production (SCP) tools and CE. Thereby, EMS represented only one of several SCP tools. In addition, these authors considered contributions at the micro, meso, as well as macro level, whereas this study explores relationships in the organizational context. Therefore, only five articles from the synthesis sample of [30] are also included in this work's final sample.

Regarding the research focus, most papers investigate EMS (n=14). Further 3 papers deal with special circular economy MSSs, which actually also result in kind of environmental MSs but due to this study's focus on CE have been separately marked as CE-MSs. Only one paper does not involve EMS or CE-MSs but, instead, focuses on IT service management (ITSM). Further, it is important to point out that only 5 papers out of 18 (28%) considered multiple types of standards and systems, thereby combining EMS with QMS, OHSMS, energy MSs (EnMS), or corporate social responsibility (CSR) MSs.

In conclusion, the analysis visualized in Figure 2 allows to derive that the current state of research in this young, important, and emerging area calls for more academic studies that connect and combine various multiple management systems and standards to the concept of CE, preferably in the framework of an IMS (e.g., [29]). Further, as empirical studies represent the dominating approach in this developing research branch, a conceptual study that synthesizes the dotes of previous research outcomes and lays out the path for future investigations appears to be a valuable addition to the existing literature.

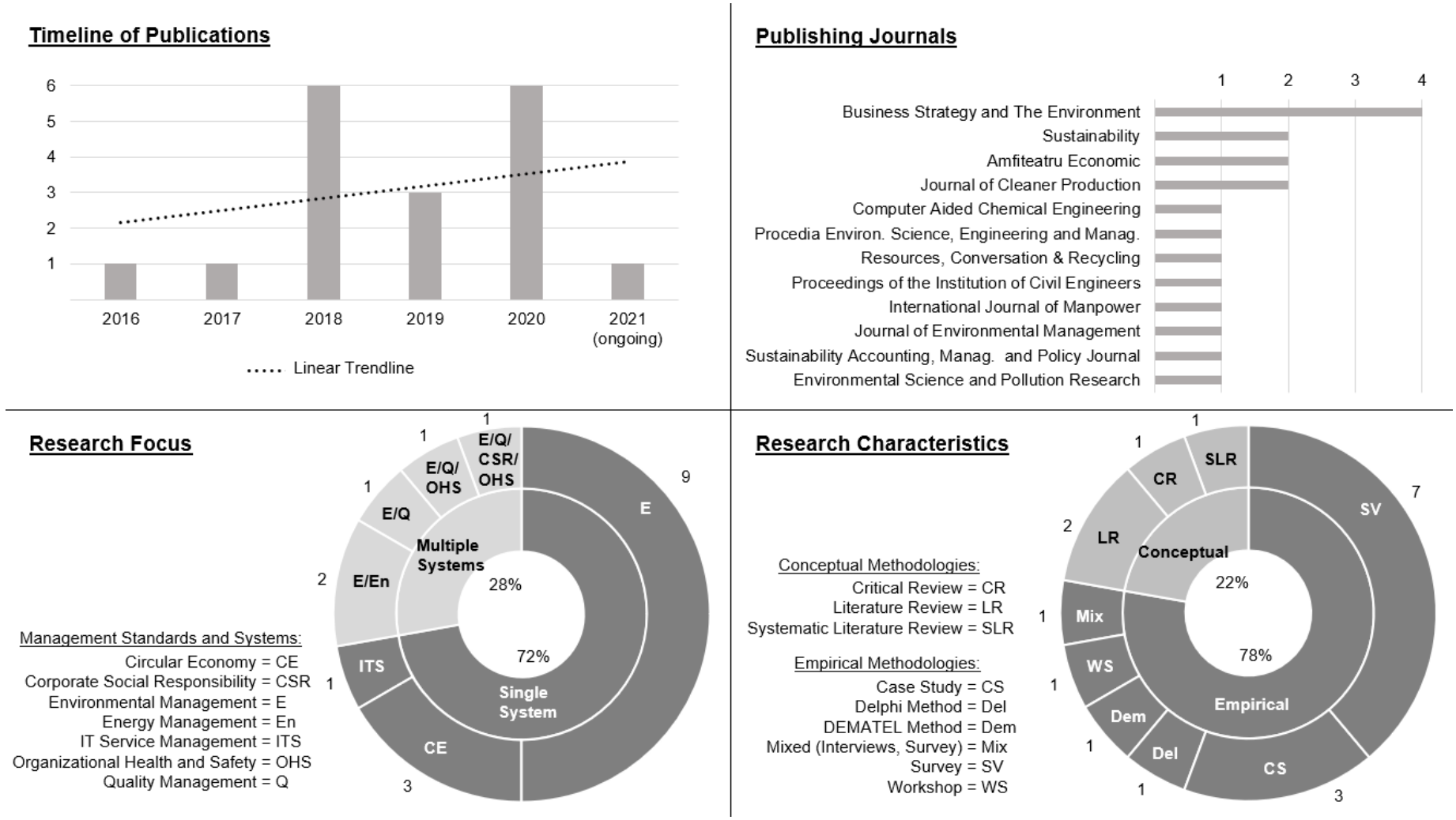

Figure 2. Overview Descriptive Analysis.

Table 4. Synthesis Sample.

Author[s]	Publication Characteristics		Research Characteristics					Research Focus	
	Year	Journal	Type[2]	Sample Size	Method[3]	Country	Type of MS	Main Topic	Thematic Tendency
Petek, Glavič and Kostevšek	2016	Computer Aided Chemical Engineering	E	n=1	CS	Slovenia	EMS, QMS, CSRMS, EnMS	Total site resource efficiency system	Environmental benefits
Milazzo, Sgandurra, Matarazzo, Grassia and Bertino	2017	Procedia Environmental Science, Engineering and Management	E	n=1	CS	Italy	EMS	ISO 14001 certification as approach to the CE and industrial sustainability	Environmental benefits
Fonseca, Domingues, Pereira, Martins and Zimon	2018	Sustainability	E	n=99	Survey	Portugal	EMS	Assessment of CE adoption within companies	Environmental benefits
Kiefer, Del Rio Gonzalez and Carrillo-Hermosilla	2018	Business Strategy and The Environment	E	n=197	Survey	Spain	EMS	Drivers and barriers of eco-innovation	Sustainable innovation
Pamfilie, Firoiu, Croitoru and Ionescu	2018	Amfiteatru Economic	E	n=74	Survey	Romania	EMS, QMS, OHSMS	CE implementation in the hotel industry	Environmental benefits
Pauliuk[1]	2018	Resources, Conversation & Recycling	C	n/a	LR	n/a	CE-MS	Critical review of the BS8001:2017	Institutional guidance
Pesce, Shi, Critto, Wang and Marcomini	2018	Sustainability	E	n=72	Workshop	China	EMS	SWOT analysis for ISO 14001 certifications	Environmental benefits
Prieto-Sandoval, Ormazabal, Jaca and Viles[1]	2018	Business Strategy and The Environment	E	n=11	Delphi Method	Spain	EMS	Key elements for CE implementation in companies	Mix, incl. institutional guidance and sustainable innovation
Marrucci, Daddi and Iraldo	2019	Journal of Cleaner Production	C	n=35	Systematic LR	n/a	EMS	Sustainable consumption and production tools for CE implementation	Environmental benefits
Muradin and Foltynowicz	2019	Amfiteatru Economic	C	n/a	LR	n/a	CE-MS	Overview on the BS8001:2017 and XP X 30-901	Institutional guidance
Pomponi and Moncaster[1]	2019	Proceedings of the Institution of Civil Engineers	C	n/a	Critical Review	n/a	CE-MS	Critical review of the BS8001:2017 in the construction industry	Institutional guidance
Ahmad, Rabbany and Ali	2020	International Journal of Manpower	E	n=1	CS	Bangladesh	ITSM	Challenges for ISO 20000 certifications	Environmental benefits
Jabbour, Seuring, Jabbour, Jugend, Firorini, Latan and Izeppi[1]	2020	Journal of Environmental Management	E	n=86	Survey	Brazil	EMS, QMS	Relations among stakeholder pressure, CE business models, and firms' sustainable performance	Environmental benefits
Jain, Panda and Choudhary	2020	Business Strategy and The Environment	E	n=280	Survey	India	EMS	Effects of institutional pressures on CE performance through EMS	Institutional guidance
Scarpellini, Marín-Vinuesa, Aranda-Usón and Portillo-Tarragona	2020	Sustainability Accounting, Management and Policy Journal	E	n=87	Survey	Spain	EMS, EnMS	Environmental capabilities applied for CE implementation in companies	Environmental benefits
Scarpellini, Valero-Gil, Moneva and Andreaus	2020	Business Strategy and The Environment	E	n=89	Survey	Spain	EMS, EnMS	Management capabilities for eco-innovation	Sustainable innovation
Sharma, Joshi and Kumar	2020	Environmental Science and Pollution Research	E	n=15	DEMATEL Method	India	EMS	Electronic waste management in a circular economy	Environmental benefits
Kristensen, Mosgaard and Remmen	2021	Journal of Cleaner Production	E	1] n=25, 2] n=277, 3] n=2	1] Interview, 2] Survey, 3] Focus Group	Denmark	EMS	Opportunities for integrating CE initiatives into the EMS	Environmental benefits

[1] Paper selected through backward/forward search. [2] E = Empirical, C = Conceptual, [3] CS = Case Study, LR = Literature Review

4.1.2. Thematic Results

The synthesis sample reveals thematic tendencies that are in accordance with some of the common elements identified between IMS and CE in Section 2. Hence, the contributions mainly deal with institutional guidance to define common definitions, sustainable innovation to introduce CE-related business activities, and benefits in the environmental dimension.

The pivotal role of institutions in CE implementation by developing new standards as well as recognizing CE-compliant companies and products [76] is supported by [23], who highlight the importance of creating an agreed-on global vision on CE to transit from the linear to a circular economy. In view of the current multiplicity of CE definitions and measurement indicators, they underline the need for global standardization and, furthermore, they do see MSSs as a potential solution. By presenting and comparing the British BS 8001:2017 and French XP X 30-901 MSSs, the authors show that there have been first movements regarding standardizing the CE definition at a national level, but they emphasize the urge for creating globally valid CE standards. [96] critically analyses the BS8001:2017 and lists clarification of terms, CE principles formulation and their integration into business development processes, as well as the description of necessary changes as strengths. However, the author sees a lack of linkage between CE and sustainability as well as the vague guidance on monitoring CE strategy implementation as weaknesses. In conclusion, the author presents a dashboard of quantitative CE indicators. In addition, [97] reviewed the BS8001:2017 in the context of the construction industry and declared it to have "limited application" in the built environment. Due to the standard's inclusiveness, the authors question its suitability for promoting "real change" and conclude—in regard to the context of buildings—that the standard fails to deal with the complexity and does not offer effective approaches for the reduction of waste and environmental impact. [98] investigate the effect of external institutional pressures and internal motivation on CE performance. Thereby, the authors explore the mediating role of environmental MSs and state that they can be used as business tool to effectively deal with coercive as well as mimetic institutional pressures. To conclude, academics emphasize the importance of institutional guidance when it comes to fostering CE adoption and recommend the development of suitable MSSs that can be integrated by organizations.

Furthermore, eco-innovation is seen as an important part of CE [76] and several eco-innovation inputs as well as outcomes are directly or indirectly related to CE implementation [99]. [99] conclude that environmental MSs can play "an important role in the implementation of eco-innovation" and affirm that they help to develop the right circumstances under which "environmental capabilities can be deployed to implement CE-related activities in businesses". However, the authors point out that there is an ongoing debate whereas environmental MSs really positively affect eco-innovation or not. Exemplarily, [100] investigate how resources, competences, and dynamic capabilities drive or hinder eco-innovation in Spanish industrial SMEs and state that ecological certification, such as ISO and EMAS (Eco-Management and Audit Scheme), acts as a barrier for eco-innovation. In conclusion, despite sustainable innovation is seen as crucial, there is no universal consensus on the impact of integrating environmental MSs on companies' eco-innovation capabilities.

Regarding achieving environmental benefits connected to the CE, multiple authors highlight the importance of environmental MSs. [22] emphasize the need to transform into a CE in regard to electrical products and, therefore, perform a literature review to identify key enablers for electronic waste management. By applying the decision-making trial and evaluation laboratory (DEMATEL) methodology—a method to identify cause-effect chain components in complex systems—with 11 participants, the authors rank ten identified key enablers and show that EMS is the most important one to influence the others. Conclusively, management systems are the most significant driver and enabler for creating electronic waste management in the CE. In addition, [30] investigate linkages between CE and SCP tools—such as EMS, green public procurement, eco-design directive, ecolabel, energy label, and environmental technology verification—based on a literature review and conclude that environmental MSs and eco-design have the "highest level of integration with CE". This positive relationship between EMS and CE is validated by [29], who also state that environmental MSs can be used to align and manage CE principles at the organizational level to strengthen the systematic implementation of the CE. Further, [101] consider the ISO 14001 standard as the closest standard from the ISO family when it comes to the CE and, in conclusion, see the adaption of the ISO 14001 as "an indicator of the degree of preparation for the circular economy". [102] even declare ISO 14001 to be "a useful tool for implementing the circular economy in the perspective of industrial sustainability, with the adoption of new business models" after performing a case study in an Italian steel producing company.

Based on a survey among 87 companies in Spain, [103] confirm relationships between the circular scope of firms and (i) the adoption of EMS in accordance to ISO 14001, EMAS, ISO 50001, and ISO 14006 standards (guidelines for incorporating eco-design), (ii) the environmental accounting and management capabilities, (iii) the levels of CSR and accountability, and (iv) the level of stakeholders' pressure. The authors consider the adoption of EMS as a specific business capability and reveal a positive impact of EMSs on the adoption of CE-related practices and, therefore, on the level of CE in companies. Another survey among 86 Brazilian companies performed by [104] confirms that both QMS and EMS "have an influence on the adoption of CE principles". [105] use a survey among 99 Portuguese corporations to map the motivations and potential actions for promoting the circular economy. They conclude that the level of CE adoption is impacted in a positive way by the status of EMS certification.

However, MSSs for environmental MSs such as the widely spread ISO 14001 do not represent a fast-track for achieving CE in their current form. In fact, [106] revealed during a workshop with 72 representatives from Chinese companies that there are concerns about the possibility to integrate the ISO 14001 with sustainability tools such as life cycle assessment, CSR, and CE.

Moreover, not only environmental MSs are said to contribute to the CE but also further MSs, such as IT service management systems. [107] support the view that electronics waste generation and energy consumption are crucial, and the authors conclude that ISO 20000 helps to manage CE issues. Although most studies found in the SLR only tried to connect environmental MSs to CE, [107] showed that also other MSSs can positively affect CE and, therefore, are worth investigating. Consequently, it can be concluded that not only environmental MSSs such as ISO 14001 have CE-compliant or CE fostering points, but even MSs such ITSM, QMS or OHSMS might positively impact CE implementation to a certain extent. Exemplarily, [108] created a total site resource efficiency system that aims at developing the CE and that integrates ISO 14000, EMAS, and ISO 500001 for the environmental dimension, but also ISO 9000 for the economic and ISO 26000 (social responsibility) for the social dimension of sustainability.

In sum, existing academic literature highlights that various MSs and their integration are positively connected to CE-related benefits in the environmental pillar, whereas the social and economic components of sustainability find less attention in the context of the circular economy.

4.2. Synthesis of Future Research Questions

Based upon the literature analysis outlined in the previous section, it can be concluded that by now academics have not explicitly focused on how the integration of MSs can contribute to adopting the CE at the corporate level. In fact, despite a few academics that connected multiple MSs to the CE (e.g., [101,108]), research rather focused on single MSSs or MSs and their connection to CE principles. As demonstrated above, these systems and standards positively impact CE adoption in companies (e.g., [22,30,102]), and since their integration bears multiple additional benefits—such as greater ease to adopt new standards (e.g., [58]), fostering sustainable innovation (e.g., [55]), and environmental improvements (e.g., [52])—this present paper concludes that IMS represents a business tool that contributes to CE adoption and that more studies directed at the integration impact are needed. Moreover, contributions on CE-specific MSSs appear to be underrepresented in the literature. To pave the way for further research in such direction, in the following knowledge gaps are synthesized and respective future RQs (FRQs) are formulated. Figure 3 summarizes all these FRQs in a research agenda, which is designed in accordance with the common elements identified in Section 2.

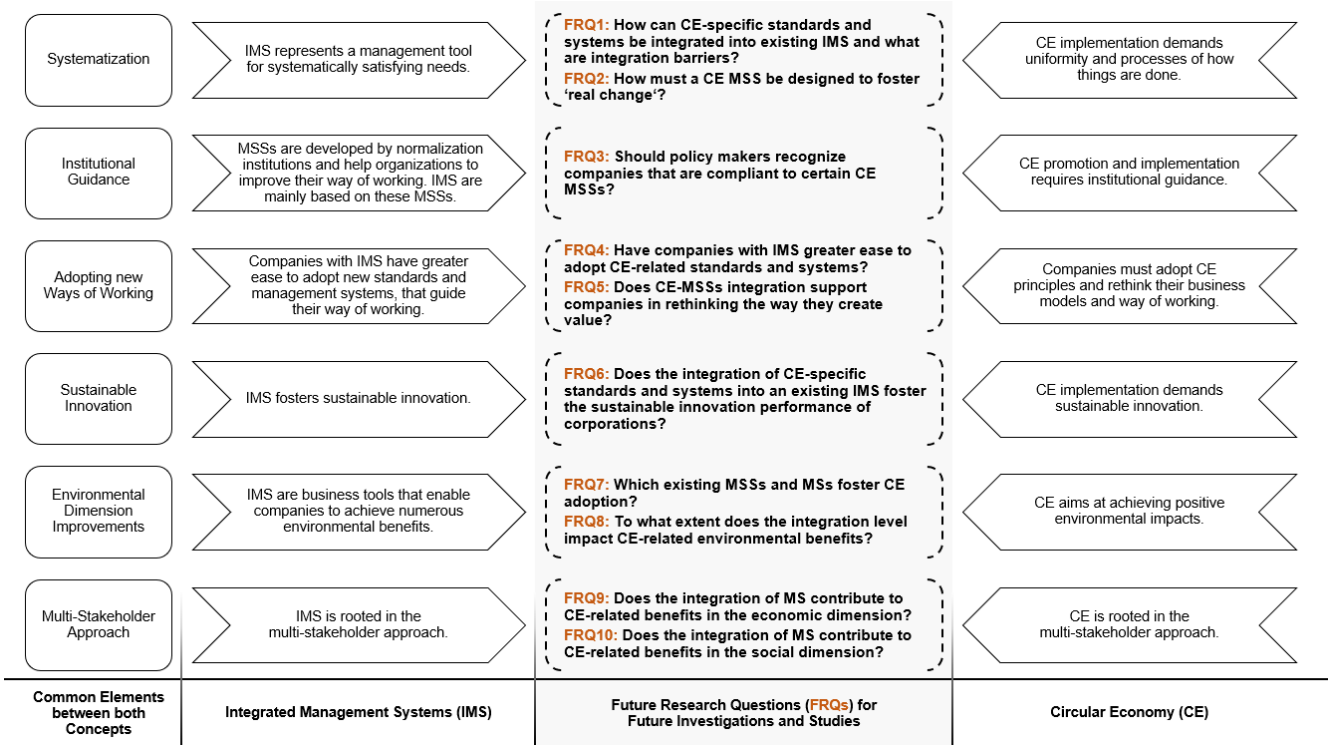

Figure 3. Proposed Future Research Agenda clustered by Common Elements between IMS and CE.

4.2.1. Systematization

Whereas the implementation of CE principles at the organizational level is hampered by a lack of uniformity and concrete processes (e.g., [69,73,78]), integrated management systems—which are based on MSSs and MSs—enable executive managers to satisfy stakeholder needs systematically (e.g., [17,32]). Concluding, CE-specific standards might represent a potential solution (e.g., [23]). Thus, the question emerges how existing CE MSSs such as the British BS 8001:2017 and French XP X 30-901 MSSs can be integrated into existing IMS. While answering this question, focus should be laid on integration barriers that might appear. Since the concept of the CE requires companies to rethink their business models (e.g., [71,72,74]), the implementation and integration of CE-specific MSs might be even more impeded by known barriers such as obstacles related to the corporate culture (e.g., [109,110]) (see Figure 3):
FRQ1: How can CE-specific standards and systems be integrated into existing IMS and what are integration barriers?

Furthermore, considering the various critics for the existing national CE standards (e.g., [96,97]), it represents an academic imperative to explore how CE-specific voluntary MSSs must be designed to ensure feasibility, broad applicability, and—in particular—"real change" [97].

Investigating this issue could help satisfying the need for a global agreed-on vision of CE and a common set of standards for its implementation within companies [23]. For answering this complex question, researchers might consider reviews and critical assessments of existing MSSs (see Figure 3):
FRQ2: How must a CE MSS be designed to foster 'real change'?

4.2.2. Institutional Guidance

The creation of CE-related MSSs by standardization bodies aligns with the demand for institutions to organize governance and develop voluntary standards (e.g., [76]). But creating such standards is only half of the solution, because also their diffusion plays a crucial role. Statistics on the most widely spread ISO standards reveal that there are only few standards that spread on a global scale. In 2019, the three most common standards were ISO 9001 for QMS with 883,521 valid certificates, ISO 14001 for EMS with 312,580 certificates, and ISO/IEC 27001 for information security management systems (ISMS) with 36,362 certificates. The standard at the end of top ten—ISO 28000 as specification for security management systems for the supply chain—only counted 1,874 valid certificates [35]. Albeit this might partially be due to the specific scope of most standards as well as their perceived usefulness by companies, these figures underline the difficulty to foster the international diffusion of standards. Further, they support the call for institutional guidance to promote the CE at the micro level (e.g., [79]). Regarding this promotion, the question evolves if policy makers should recognize companies' compliance with certain CE MSSs, for example by awards or grants. Such recognition could lead to competitive advantages for compliant companies and, consequently, work as an incentive for the adoption and diffusion of such voluntary standards. Thus, specific standards and systems for the circular economy could help to deal effectively with coercive as well as mimetic institutional pressure, such as other MSs do (e.g., [98]). Both the implications of standards for global governance and their international diffusion are topics with several knowledge gaps and open discussions (e.g., [111]) and this paper raises attention to the urge of connecting these issues related to institutional guidance with standards that are explicitly directed at the CE (see Figure 3):
FRQ3: Should policy makers recognize companies that are compliant to certain CE MSSs?

4.2.3. Adopting New Ways of Working

Implementing the CE concept at the corporate level requires companies to rethink their business models and, therefore, their way of working—i.e., the firms' approaches for how to create, deliver, and capture value (e.g., [71,72,74]). Since companies that are already operating an IMS tend to have greater ease to adopt new systems and standards (e.g., [56,57]), there is potential for synergy effects—such as strategic synergy, organizational structural-resource-cultural synergy, and documentation synergy [54]—and competitive benefits. However, there are no academic studies at hand that prove or disprove this relationship for CE-specific standards. Hence, it is of interest to explore if CE MSSs such as the British BS 8001:2017 or the French XP X 30-901 can be easier adopted and implemented by companies with IMS as opposed to firms that operate all their systems separately (see Figure 3):
FRQ4: Have companies with IMS greater ease to adopt CE-related standards and systems?

Further, there is prove needed whether and how standards for CE can support companies in rethinking their way to create value. In this context, operating an IMS might help organizations to incorporate such fundamental change in business thinking at all organizational layers. In fact, multiple academics perceive IMS as efficient business tool to pave the way towards sustainable development (e.g., [112]) as it provides a structure for integrating sustainability-related concepts into business practices (e.g., [26,113]). Thus, the IMS as holistic approach for corporate sustainability management [26,27] might become a powerful business tool for managers to retrieve real change out of CE-specific standards and systems (see Figure 3):
FRQ5: Does CE MSSs integration support companies in rethinking the way they create value?

4.2.4. Sustainable Innovation

Despite the believe that sustainable innovation and its outcomes are pivotal for the CE, there is an ongoing debate if management systems, standards, and certifications are positively connected to such innovation or not (e.g., [76,99,100]). Since multiple researchers declare QMS

(e.g., [114,115]), EMS (e.g., [116,117]), and OHSMS (e.g., [118]) to support sustainability-related innovations, academic curiosity demands to also research if CE systems increase such innovation. Some authors already proposed innovation-related models that contain multiple MSs (e.g., [119,120]) and, in this context, the question can be derived if adding CE MSs—based on standards like BS 8001:2017 or XP X 30-901—to an existing IMS can foster the sustainable innovation performance in companies (see Figure 3):
FRQ6: Does the integration of CE-specific standards and systems into an existing IMS foster the sustainable innovation performance of corporations?

4.2.5. Environmental Dimension Improvements

When it comes to benefits in the environmental dimension, most research detected in the SLR focused on environmental MSs (e.g., [102,105,106]). However, academics call for more in-detail research (e.g., [76,99]). Since other MSs such as ITSM (e.g., [107]) also positively affect CE implementation, there is the urge to identify which particular MSs and MSSs—besides EMS based on ISO 14001 or EMAS—have an impact on CE adoption in companies. Here, some less adopted sustainability-themed niche-standards such as ISO 20400 (sustainable procurement), IWA 19 (guidance principles for the sustainable management of secondary materials), or ISO 14009 (guidelines for incorporating material circulation in design and development) might bear potential. Further, considering environmental threats companies increasingly face—such as the climate change and its consequences—also risk management standards like ISO 31000 could be of severe and increasing importance (see Figure 3):
FRQ7: Which existing MSSs and MSs foster CE adoption?

Moreover, in view of the environmental benefits arising from MSs integration (e.g., [52,54]), particular focus should be on the question to what extent the integration level impacts CE-related benefits. In this context, investigations should explore if companies with multiple MSs in place might reveal improved environmental performance solely due to benefits of certain MSs (e.g., [20]), due to synergy effects that appear when having multiple MSs in place (e.g., [121]), or if the reason is based on the integration of these multiple, function-specific MSs (e.g., [19,122]) (see Figure 3):
FRQ8: To what extent does the integration level impact CE-related environmental benefits?

4.2.6. Multi-Stakeholder Approach

The synthesis of the thematic results of the SLR's final sample revealed that previous studies on MSs and their integration have focused especially on CE-related benefits in the environmental pillar. However, also economic actors and the society benefit from CE adoption [65]. Thus, extending the research focus seems reasonable and aligns with the multi-stakeholder approach, on which both IMS and CE are rooted (see introduction). Reducing waste, closing material loops, and increasing product longevity—basic concepts of the CE—will influence economic indicators such as profitability, revenue generation, and cost reduction [123], thereby impacting stakeholders such as suppliers, shareholders, and distributors. In addition, social changes are essential for CE transition [124] and circularity indicators related to job creation and cultural change [123] show that employees and communities are further important stakeholders. Hence, the CE concept does not only address environmental protection, but also social well-being and economic challenges [12,13]. Moreover, also the concept of IMS is not only connected to environmental but also social and economic benefits (e.g., [19]). In conclusion, future CE-related research on management systems, standards, and their integration should include the social and economic dimension (see Figure 3):
FRQ9: Does the integration of MS contribute to CE-related benefits in the economic dimension?
FRQ10: Does the integration of MS contribute to CE-related benefits in the social dimension?

5. Conclusions

This study seeks to connect the concept of IMS to the CE. Since such a connection seems to be absent in literature, this work aims firstly to assess the current state of academic research and secondly to pave the way for more detailed future studies by proposing a comprehensive research agenda that is designed in accordance with common elements between both concepts.

The findings of this work are based upon a SLR on the relationship between the concept of IMS—which is based on MSSs and MSs—and the CE. The review results in a synthesis sample of 18 academic contributions, which mainly deal with institutional guidance to define common definitions, sustainable innovation to introduce CE-related business activities, and benefits in the environmental dimension. The literature analysis shows that MSSs can help to overcome many adoption difficulties that the CE faces, such as hampered diffusion due to numerous diverging approaches (e.g., [69]), the lack of standard indicators for circularity measurement (e.g., [77]), and missing uniform transition support for companies (e.g., [61]).

Hence, it comes as no surprise that the most famous normalization body, the ISO, has standards for the CE under development [125]. Moreover, increased sustainable innovation capabilities (e.g., [55,99]) and various benefits in regard to CE-related environmental performance (e.g., [28,53,104]) are important aspects that the concept of IMS contributes to transitioning from a current linear to a future circular economy.

Further, this work reveals that this particular field of research is still a relatively young research branch, whose importance is underlined by the increasing number of recently published contributions. Multiple knowledge gaps are still existing, which are tackled in the proposed research agenda by formulating ten RQs in regard to (i) systematization, (ii) institutional guidance, (iii) adopting new ways of working,

(iv) sustainable innovation, (v) environmental dimension improvements, and (vi) multi-stakeholder approach. Regarding the latter one, this paper urges future investigations to not only focus on environmental benefits of CE adoption but also to consider economic and social impacts on stakeholders when fostering CE-principles implementation by integrating MSs. Further, a certain focus lays on CE-specific standards such as the British BS 8001:2017 or the French XP X 30-901 as well as on the integration of MSs.

The main contribution of this research to academia is the theoretical elaboration of the link between the integration of MSs and the CE concept. By retrieving and synthesizing the state-of-the-art academic knowledge at hand, the paper provides an unbiased and comprehensive overview on this particular research stream that can serve as starting point for other researchers. Further, the proposed research agenda sets a concrete path for future academic investigations and studies.

Regarding practical implications, the findings reveal how management systems contribute to CE adoption and, therefore, demonstrate that executive managers can use IMS as business tools to foster CE implementation at the corporate level. Due to the blurred understanding of CE principles, especially primary stakeholder groups such as employees, suppliers, and customers might benefit from the high degree of systematization that goes along with IMS implementation—as well as with IMS' ability to guide the way of working. In addition, the study outlines the importance of institutional guidance as well as the development of globally valid CE-focused MSSs, thus providing policy makers with valuable insights.

This work is limited by the databases used in the SLR, as they might not entail all relevant contributions on the topic under investigation. In addition, the inclusion/exclusion criteria crafted as well as the string applied, and, consequently, the number of papers available for analysis represent limitations.

Future research should be directed at the knowledge gaps and research questions outlined in the research agenda. However, the list is not exclusive. Moreover, further empirical research is needed to prove or disprove the conclusions made in previous conceptual and empirical studies. Therefore, the consistency of findings should be checked by using different data generation methods, both qualitative as well as quantitative ones (methods triangulation).

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Appendix

Table A1. Appendix A

Management System Standard	Standardization Body	Function
BS 8001:2017	British Standards Institution (BSI)	Framework for implementing the principles of the circular economy in organizations
EMAS	European Commission	Eco management and audit scheme
ISO 9001	International Organization for Standardization (ISO)	Quality management
ISO 14001	International Organization for Standardization (ISO)	Environmental management
ISO 14006	International Organization for Standardization (ISO)	Guidelines for incorporating eco-design
ISO 14009	International Organization for Standardization (ISO)	Guidelines for incorporating material circulation in design and development
ISO 20000	International Organization for Standardization (ISO)	Information technology service management
ISO 20400	International Organization for Standardization (ISO)	Guidance for sustainable procurement
ISO 26000	International Organization for Standardization (ISO)	Guidance on social responsibility
ISO/IEC 27001	International Organization for Standardization (ISO)	Information security management
ISO 28000	International Organization for Standardization (ISO)	Specification for security management systems for the supply chain
ISO 31000	International Organization for Standardization (ISO)	Risk management
ISO 50001	International Organization for Standardization (ISO)	Energy management
IWA 19	International Organization for Standardization (ISO)	Guidance principles for sustainable management of secondary metals
XP X 30-901	Association française de normalization (AFNOR)	Circular economy project management system