Sustainability performance measurement systems: a systematic literature review and research agenda for (a better) future

Gianluca Vitale, Alberto Rosignuolo and Angelo Riccaboni

Abstract

Purpose – *This study aims to review the literature state of the art on sustainability performance measurement systems (SPMS). To this end, the authors reviewed the papers published between 2012 and 2022, providing a comprehensive overview of insights, gaps and unexplored research areas that pave the way for future research.*

Design/methodology/approach – *The authors adopted a systematic research strategy and relied on two main data sets: "ISI Web of Science" and "Google Scholar". The analysis resulted in 5,405 papers published in 53 different journals. Of these, only 58 were found to be relevant for this review purposes. The authors checked for both internal and external validity of the review. Using "VOSviewer", the authors also developed a bibliometric analysis.*

Findings – *The study articulates the literature on SPMS into four categories: the strategic adoption of SPMS; the development of comprehensive SPMS; dynamic SPMS for sector-specific performance; and SPMS for supply chain evaluation. The authors identified gaps in current knowledge and suggested directions for future research.*

Research limitations/implications – *The paper identifies several research trajectories. Future studies could investigate the role of stakeholders in SPMS design and implementation; the relationship between (uncertain) future, societal Grand Challenges and SPMS; the role of SPMS in including and making visible sustainability tensions and paradoxes; and SPMS development and adoption in small and medium enterprises. Lastly, the authors suggest improving SPMS theorization and to further investigate its role in affecting businesses' social dynamics.*

Originality/value – *This study, by identifying the main research areas developed in this field, supports practitioners and academics in understanding how SPMS has evolved over the last decade and the possible future developments.*

Keywords *Corporate sustainability, Performance measurement systems, Systematic literature review*

Paper type *Literature review*

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1. Introduction

Nowadays, businesses and society are experiencing an era of significant sustainability challenges. In this context, companies have a crucial role since they are responsible for many sustainability-related problems and, simultaneously, can be the potential solution to them (e.g. George *et al.*, 2016; Grimes and Vogus, 2021; Gümüsay *et al.*, 2022).

Accordingly, companies have embarked on a process of managing and measuring their social and environmental performance, which has gradually attracted the interest of scholars. Studies concerning sustainability performance measurement and evaluation tools have widely spread in the last two decades.

Over the years, the literature on sustainability performance measurement systems (SPMS) has evolved into numerous streams which analyze the phenomenon from multiple points of

view. Accordingly, SPMS acquired a multidisciplinary feature, becoming a core topic in several management disciplines.

The multifaceted nature of SPMS fostered the rise of several definitions. To frame the concept, the authors define SPMS as the overall set of indicators, metrics, narratives and calculation practices that provide management with information necessary to assist in the planning and control of corporate activities, thus helping companies translate their sustainability motivations into improved performance (Searcy, 2012; Lisi, 2015).

The multiple perspectives that characterize SPMS have made the reference literature broad, varied and sometimes confusing (e.g. Negri *et al.*, 2021). Indeed, the literature on SPMS produced heterogeneous, mixed and controversial results in the last 10 years (e.g. Parisi, 2013; Silva *et al.*, 2019).

Due to these arguments and the growing attention on the management/measurement of corporate sustainability issues, scholars recently underlined the need to make order in the varied literature through a systematic review (e.g. Mio *et al.*, 2022; Negri *et al.*, 2021). To the best of the authors' knowledge, the last literature reviews on SPMS are those of Searcy (2011, 2012). Twelve years later, there is a need to make a new literature state of the art considering the countless advancements produced in the last decade and the recent calls for literature systematization (e.g. Mio *et al.*, 2022; Negri *et al.*, 2021). Furthermore, the current turbulent environment and the growing uncertainty about the future are changing the role of SPMS in business administration (e.g. Beckert, 2021; Norreklit and Cinquini, 2024). Therefore, many research opportunities are rising on the future role of SPMS in this era of complexity, uncertainty and grand challenges (e.g. Vitale, 2024). Consequently, starting from the current literature, the authors aim to identify and make explicit new research trajectories guiding scholars in studying the role of SPMS in the renewed economic and business scenario.

Accordingly, in systematizing the vast amount of literature on SPMS, the authors aim to address the following research questions:

RQ1. How has the literature on SPMS evolved over the last decade?

RQ2. What are the main focuses on which the scholars based their research?

RQ3. What are the future research trajectories and opportunities for SPMS?

Since this paper is in continuity with Searcy (2011, 2012), the present SLR is performed on 10 years, namely 2012–2022. The authors relied on Massaro *et al.* (2016) and Lombardi *et al.* (2022) to articulate the SLR. In particular, the authors identified a specific literature review protocol according to which they identified the queries, the databases and the types of articles for the literature review; established the literature review reliability; tested the literature review validity; measured the literature impacts; coded the data; developed insights and critiques; and, lastly, proposed future research opportunities.

The paper is structured as follows: Section 2 presents the research method; Section 3 shows the main literature impacts; Section 4 contains the bibliometric analysis; Section 5 discusses the main literature review insights; Section 6 includes a critique of the current literature insights and proposes new trajectories for future research; finally, Section 7 presents the concluding remarks.

2. Research method

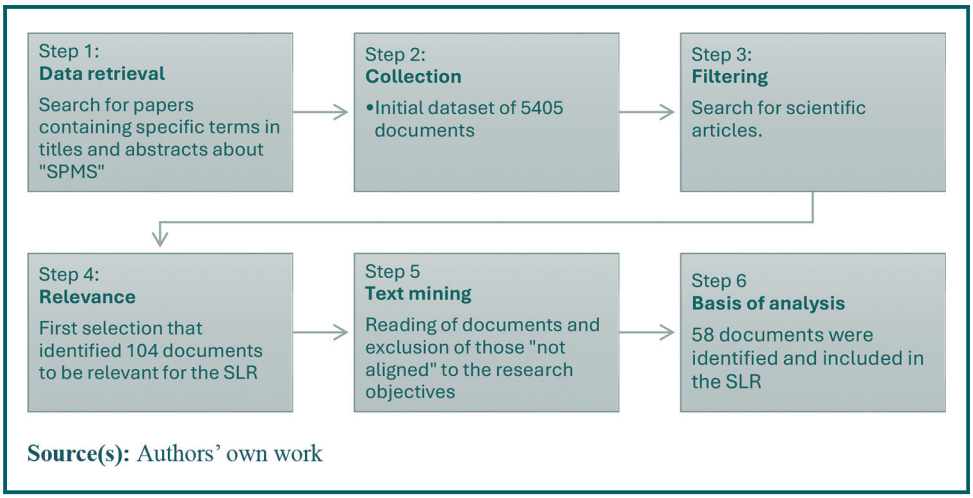
In this paper, the authors developed a systematic literature review to retrace the literature evolution on SPMS. The systematic literature review is an appropriate research solution when a researcher wants to sort out the literature that has developed over the years on a given topic, proposing possible future research trajectories starting from the current knowledge (e.g. Massaro *et al.*, 2016; Lombardi *et al.*, 2022). In the last decade, the

research on SPMS has widely grown due to an increasing interest by managers fostered by a strong institutional endorsement (e.g. Vitale *et al.*, 2023). Scholars focused on several facets of the SPMS producing heterogeneous, mixing and sometimes controversial results (e.g. Parisi, 2013; Searcy, 2012; Silva *et al.*, 2019). Bearing in mind this background, we need to put an order in the complex and varied literature on the topic and then propose opportunities for future research considering the new challenges that companies will face in the future and the role that SPMS could play in this regard. This motivated the authors to carry out the present systematic literature review. Such research acquires greater importance considering that, to the best of the authors' knowledge, the last literature reviews on this topic are those of Searcy (2011, 2012). Accordingly, in continuity with Searcy (2011, 2012), the SLR timeframe is 2012–2022.

The authors identified the basis for the systematic literature review through multiple screening steps. The first step concerns data retrieval. In this context, the authors considered multidisciplinary peer-reviewed journals due to the multidisciplinary nature of sustainability. In the data retrieval step, the authors relied on the "ISI Web of Science" and "Google Scholar" databases since they are widely recognized as the most consistent archives of business and management articles (Martín-Martín *et al.*, 2018). The databases were queried looking for "Sustainable" OR "Sustainability" AND "Performance" OR "Performance Management" OR "Performance Indicators" OR "Performance Evaluation" OR "Performance Monitoring" OR "Performance Measures" OR "Performance Measurement," in the titles, abstracts and keywords of articles published between 2012 and 2022. In the second step, the authors collected the documents found through the database queries. The analysis resulted in 5,405 papers published in 53 different journals. In the third step, the authors filtered the collected documents only considering peer-reviewed academic journals, contextually discarding all nonscientific sources such as magazines, private repositories and conference papers. In the fourth step, the authors read titles, keywords and abstracts. This step allowed the authors to exclude papers on non-business measurements (such as chemical analysis or products' environmental impacts) or that were not aligned with business issues. As a result of these two steps, only 104 papers were found to be relevant for the review. In the fifth step, the authors read the 104 documents to verify their alignment with the research objectives. At the end of this process, 58 papers were consistent with the research objectives and included in the SLR.

Figure 1 synthesizes the papers' screening steps.

Figure 1 The screening steps to develop the SLR basis



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In carrying out the SLR, the authors established the literature review reliability and tested its validity. To ensure the reliability of the review (Taticchi *et al.*, 2013) the authors performed a specific analysis procedure. Two coauthors manually collected the papers and extrapolated the main information and characteristics (i.e. authors, journal, publication year, citations, region, research method, focus and main findings). Another coauthor instead carried out the analysis on his behalf following the same protocol and searching for the same information. The results found in these two different analyses were then compared and any discrepancies were resolved jointly by all the coauthors. The analysis structured in this way made it possible to strengthen the SLR reliability.

In this regard, the authors have not focused exclusively on certain types of journals (for example those of accounting), since the investigated subject is deepened by a large corpus of literature, involves various scientific sectors and has stimulated the interest of scholars from different managerial disciplines.

Additionally, the authors implemented an *ad hoc* procedure to verify the internal and external validity of the SLR (Lombardi *et al.*, 2022).

In searching for internal validity, the authors developed both the pattern-matching and the time series analyses (Lombardi *et al.*, 2022). First, a small "cluster" of articles (5 units) was grouped and then the analysis was extended to all the other articles contained in the database. Second, the authors compared the number of articles and citations, as reported in Table 1.

Subsequently, a content analysis was carried out using Nvivo software. This analysis allowed the authors to understand the most frequently mentioned words in literature (Figure 2), verify keywords' reliability and ensure the alignment of what was found with the real literature trend.

Finally, the bibliometric research was conducted using the VOSViewer software (van Eck and Waltman, 2017) to carry out the analysis of the keywords and the articles collected, highlighting the emerging research themes (Rompho *et al.*, 2024).

3. Measure the literature impacts

Among the several techniques that can be used in a systematic literature review, the analysis of citations or co-citations and classical bibliometric methods are the most widespread especially in management fields (Taticchi *et al.*, 2010; Taticchi *et al.*, 2012).

Using these techniques allows the researcher to be reasonably sure to cite articles that are relevant to the investigated research topic (Taticchi *et al.*, 2013). Consequently, the analysis of publications and citations makes it possible to deeply acknowledge the journals with the most publications on the topic, the most cited authors, the most influential works and the extent of the literature.

This research step was useful to define a first representation of the examined literature and to give an overview of the quantity and quality of the analyzed papers.

Figure 3 presented below contains the list of the top ten journals in which the papers identified by this research have been published. The Journals are: *Journal of Cleaner*

Table 1 Articles, citations and citations per year

	Years										
	2012	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
N° of articles	5	3	6	5	4	4	9	8	3	8	3
Citations	721	543	1069	479	490	170	379	255	91	104	27
Citations/year	0,01	0,01	0,01	0,01	0,01	0,02	0,02	0,03	0,03	0,07	0,1

Source(s): Authors' own work

Figure 2 Frequency of keywords in the literature

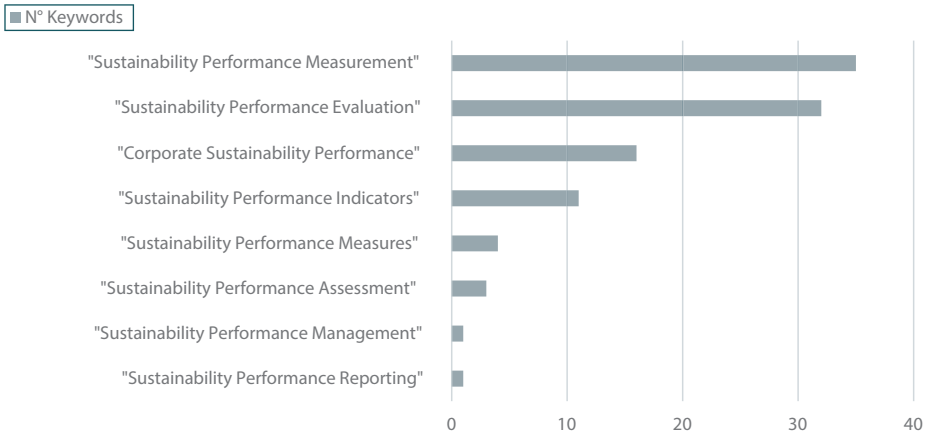

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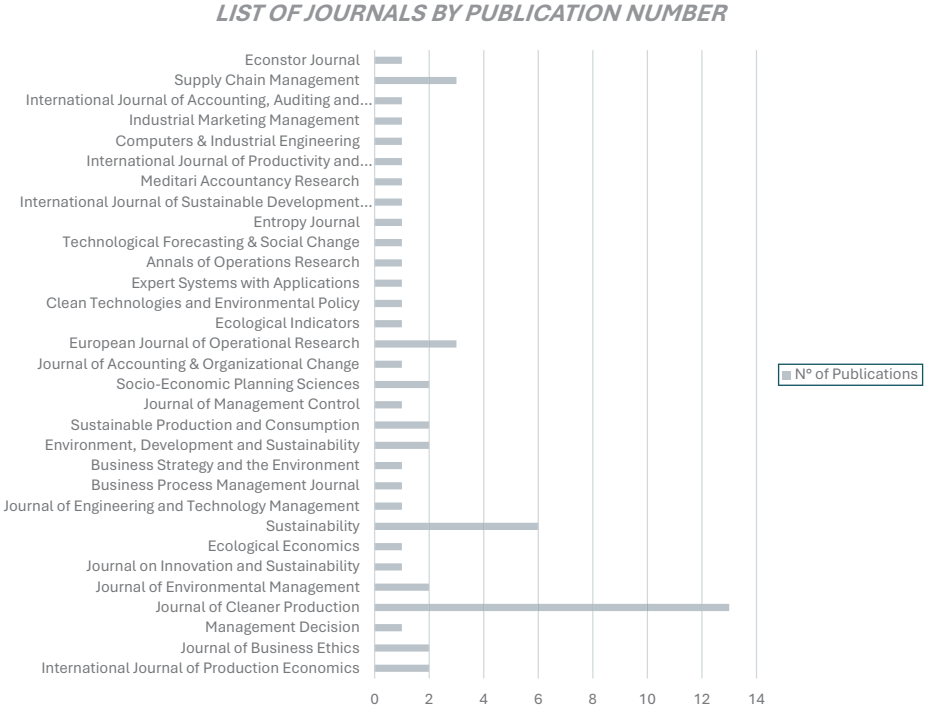
Figure 3 List of the journals



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Production (13 papers); *Sustainability* (6 papers); *Supply Chain Management* (3 papers); *European Journal of Operational Research* (3 papers); and *International Journal of Production Economics*; *Journal of Business Ethics*; *Journal of Environmental Management*; *Environment, Development and Sustainability*; *Sustainable Production and Consumption*; *Socio-Economic Planning Sciences* (2 papers each). Figure 3 shows the rest of the Journals that published relevant papers for this study (1 publication per journal).

Figure 4 presents the list of the most prolific authors who have published on SPMS. Neri A., Trianni A., Searcy C., Cagno E. and Schaltegger S., published three articles each. Bai C., Marcis J., Sarkis J., da Costa S.E. and Howard M., published two papers each. Figure 4 also shows the main authors who contributed, even with just one publication, to the research being reviewed.

Figure 5 presents the geographic diversity of scholars. In this case, it is important to note that the most frequent geographical areas are: England, China, the USA and Australia with 14, 11 and 10 academic contributions respectively on the topic of SPMS. Italy ranks immediately after, registering nine contributions on the considered topics.

Figure 5 also highlights the emerging contributions of scholars from South Asia (Iraq, Saudi Arabia, Bangladesh, Pakistan) and East Asia (Japan and Indonesia). This highlights the fact that issues relating to measuring, evaluating and monitoring corporate sustainability performance are also increasingly affecting emerging countries.

Furthermore, Figure 6 presents the frequency of publications over time, highlighting the trend and the impact that these papers have had and still have on the literature.

Going into detail, the frequency of citations for individual publications was analyzed. The 58 articles included in the data set provide 6,960 citations. The most cited authors (see Figure 7) are: S. Schaltegger (704 citations); C. Bai, and J. Sarkis (415 citations); C. Schlick e K. Hummel (412 citations); C. Searcy, M.M. Carvalho, S.N. Morioka (411 citations); V.B. Genoulaz (353 citations) e R. Burrit (352 citations).

The latter has a different disciplinary background, in fact: S. Schaltegger and R. Burrit-sustainability management (CSM), C. Bai-electronic science and technology, J. Sarkis-management engineering, C Schlick e K. Hummel- accounting reporting, C. Searcy e V.B.

Figure 4 List of authors per number of citations

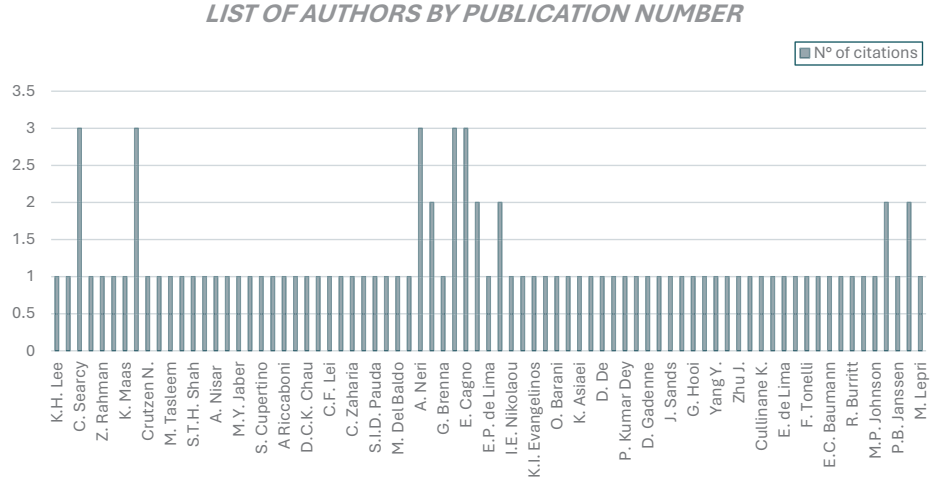

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Figure 5 Geographical distribution of the authors

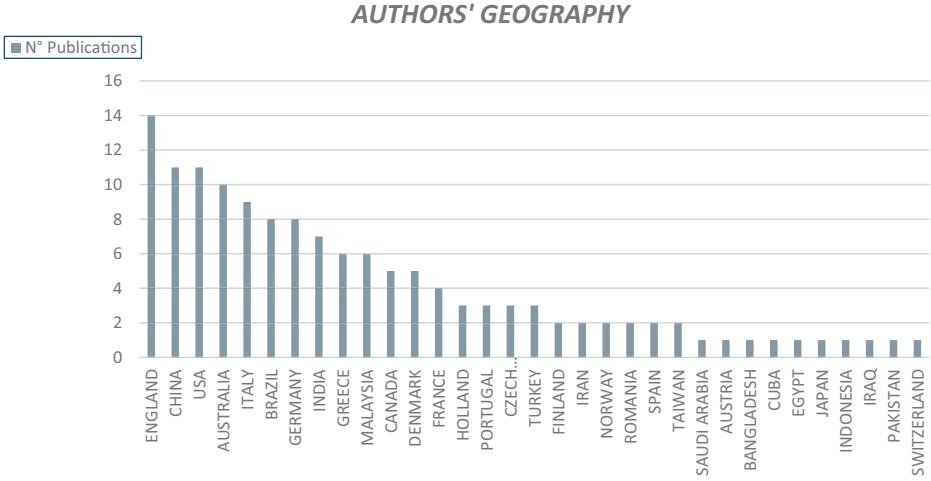

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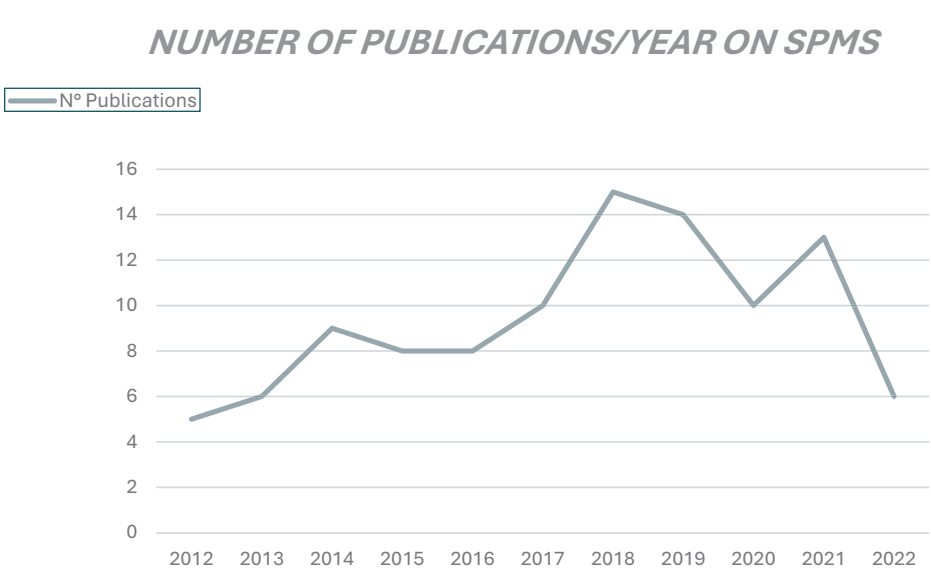
Figure 6 Number of publications per year



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Genoulaz- mechanical and industrial engineering, M.M. Carvalho e S.N. Morioka- production engineering. This demonstrates the multidisciplinary nature of the investigated topics.

Considering the most cited journals, Figure 8 distinguishes: *Journal of Cleaner Production* (1,902 citations), *International Journal of Supply Chain Management* (1,058 citations), *Journal of Accounting and Public Policy* (412 citations), *Sustainability* (298 citations), *International Journal of Productivity and Performance Management* (289 citations), *International Journal of*

Figure 7 Most cited authors

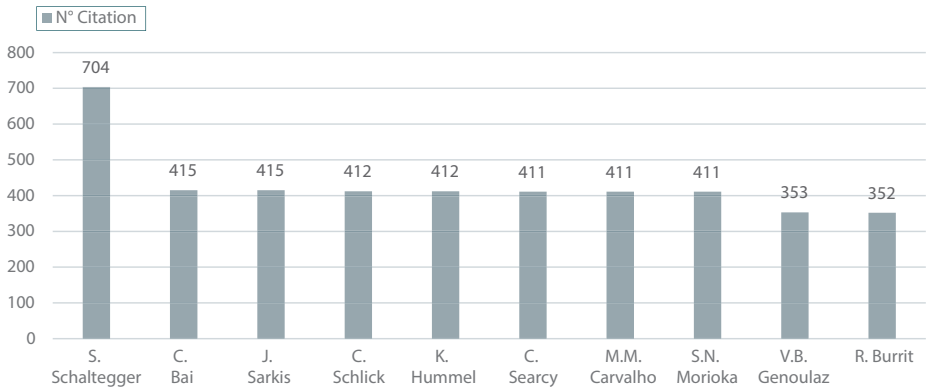

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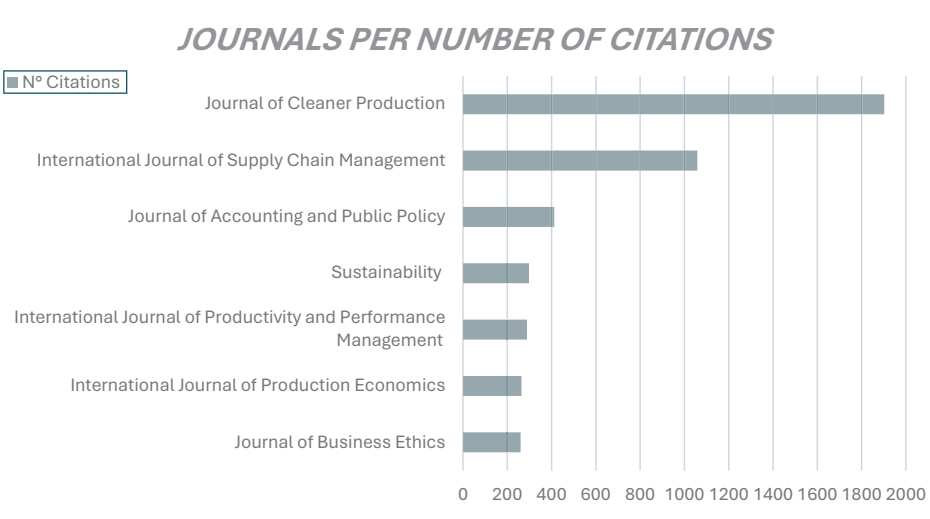
Figure 8 Journals per citations

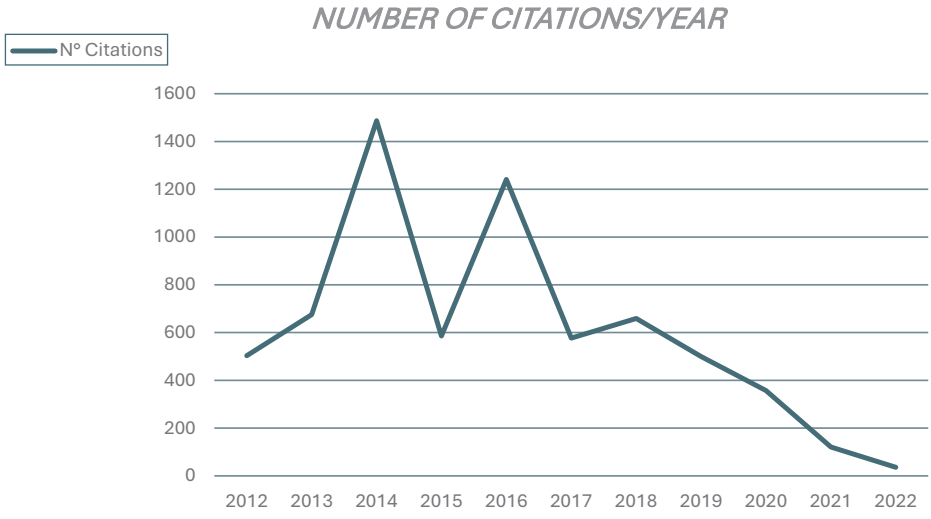


Source(s): Authors' own work

Production Economics (264 citations) and *Journal of Business Ethics* (260 citations). All the most cited journals are very different in terms of disciplinary focus covering topics like supply chain management, productivity and performance, sustainability in the broad sense and business ethics. All this demonstrates once again the broad and multidisciplinary interest in the investigated topics.

An interesting observation is that citations (Figure 9) and publications (see Figure 6) show a general downward trend from 2017 to 2022. A possible reason why citations decreased is that there was less time and opportunity to cite the most recent papers. Conversely, the papers published between 2013 and 2016 supported the research paths for the following studies, resulting in more citations. On the publications side, instead, under the worldwide

Figure 9 Citations trend over the years



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institutional pressures on sustainability disclosure (e.g. Vitale *et al.*, 2023), in the last 5 years, scholars shifted their interests toward the reporting tools, exponentially feeding the related literature (e.g. Minutiello and Tettamanzi, 2022). During the years between 2015 and 2017, we saw a surge in publications on SPMS. This result can be mainly related to the launch of Agenda 2030 and the consequent great interest that arose in SPMS in those years.

Finally, Table 2 shows the most cited papers and authors that, consequently, represent the most influential contributions/contributors in the reference literature.

4. The bibliometric analysis

A different analysis can be developed by studying the network of keywords that characterize the selected documents (Rompho *et al.*, 2024). In particular, the bibliometric analysis provides a more macro-oriented, objective and systematic overview of the literature and it is suitable to be adopted in combination with other techniques for reviews in research fields with clear definitions and boundaries (Rompho *et al.*, 2024). Then, the analysis was performed by considering the keywords contained in the titles or abstracts of the reference literature. After that, using the VOSViewer software, the authors built a network of the most frequently repeated keywords. The results, shown in Figure 10, present the visual network obtained and highlight the centrality of six keywords: "Sustainability Performance," "Social Responsibility," "Sustainability," "Impact," "Framework" and "Indicators."

By setting the software with a threshold (satisfied) on keywords recurring at least 5 times, the analysis allowed the authors to obtain 4 Clusters as shown in Cluster of keywords. The results from the clusters and keywords are represented in Figure 10. The size of the spheres represents their relative importance (i.e. larger circles have connections to more items).

CLUSTER OF KEYWORDS

CLUSTER 1: Sustainability, model, indicators, growth, efficiency, sustainability assessment, social sustainability, metrics, methodology, sustainability indices, supply chain management

Table 2 Most cited articles

Authors	*Article title*	*Year*	*Citation*
Maas K., Schaltegger S., crutzen N.	Integrating corporate sustainability assessment, management accounting control and reporting	2016	475
Zhou H., Yang Y., Chen Y., zhu J.	Data envelopment analysis application in sustainability: the origins development and future directions	2018	356
Baumann E.C. and Genoulaz V.B.	A framework for sustainable performance assessment of supply chain management practices	2014	353
Schaltegger S. and Burrit R.	Measuring and managing sustainability performance of supply chains	2014	352
Bai C. and Sarkis J.	Determining and applying sustainable supplier key performance indicators	2014	327
Janssen P., Johnson M. P. and Schaltegger S.	20 years of performance measurement in sustainable supply chain management – what has been achieved?	2015	291
Taticchi P., Tonelli F. and Pasqualino R.	Performance measurement of sustainable supply chains: a literature review and a research agenda	2013	289
Rashidi K. And Cullinane K.	A comparison of fuzzy DEA and fuzzy TOPSIS in sustainable supplier selection: Implications for sourcing strategy	2019	256
Wolf J.	The relationship between Sustainable Supply Chain Management, Stakeholder Pressure and Corporate Sustainability Performance	2014	245
Searcy C.	Corporate sustainability performance measurement systems: a review and research agenda	2012	218

Source(s): Authors' own work

CLUSTER 2: Sustainability performance, management, smes, sustainable development, eco-innovation

CLUSTER 3: corporate sustainability, performance, performance evaluation, innovations, cooperatives, environmental management

CLUSTER 4: social responsibility, corporate performance, impacts, quality, content analysis, women, gender diversity

Source(s): Authors' own work

Relying on the different analysis options of VOSViewer, the authors were also able to represent, through a chromatic scale, the temporal frequency of keywords recurring over the years (see Figure 11).

From the above figure, the most recurring keywords in recent years concern many issues on which there is a strong institutional endorsement. Indeed, among the most repeated keywords in the last 2 years, we find: "Leadership," "Women," "Gender Diversity" and "Environmental" demonstrating how studies on SPMS strongly considered matters regarding, social issues, natural environment and human values and behaviors.

5. Literature insights

While in the previous paragraphs the authors showed the evolution of the literature on SPMS, in this section, they proceed to discuss the results. In particular, considering the insights of our analysis, the literature can be divided into four main research areas:

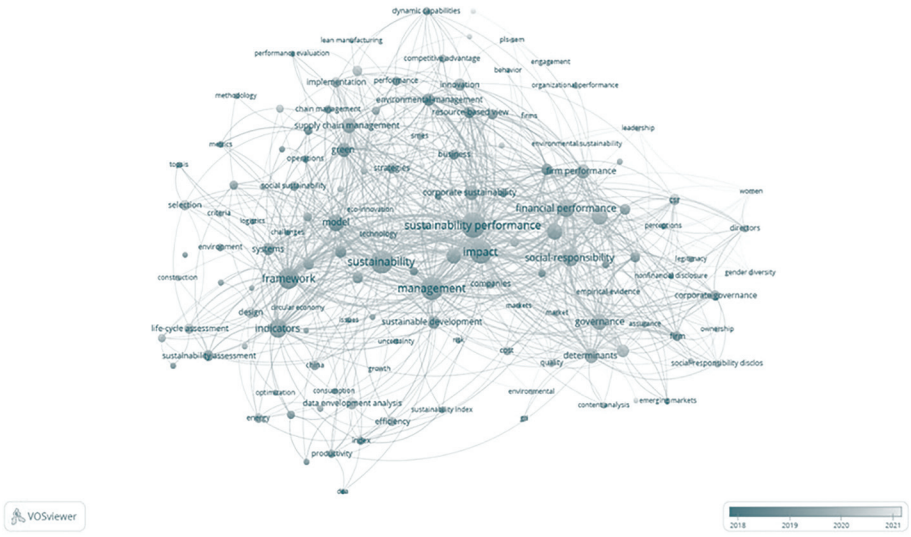
5.1 Research area a – the strategic adoption of sustainability performance measurement systems

Of the four research areas identified, this one is the richest in content as it is linked to the redefinition of business purpose, changes in corporate operations and sustainability measurement systems implementation. These topics reflect the companies' willingness to

Figure 10 Keywords network

undertake a clear change toward sustainability and, for this reason, scholars largely explored this area (Ahi *et al.*, 2018; Pádua and Jabbour, 2015). The strategic adoption of SPMS often lies in a company's ability to integrate sustainability concerns into corporate strategy. This integration requires a rethinking of management practices, as well as an alignment between corporate goals and sustainability objectives, emphasizing the role of SPMS in linking assessment, management accounting, control and reporting systems (Maas *et al.*, 2016; Vitale *et al.*, 2019). However, a concrete shift in corporate management toward sustainability is not easy. Indeed, holistically addressing corporate sustainability is challenging and requires the alignment of all management phases toward the pursuit of appropriate sustainability performance (Nigri and Del Baldo, 2018; Wijethilake, 2017). Therefore, SPMS must be strategically designed to support long-term sustainability goals and, at the same time, be adaptable to the evolving corporate needs (Searcy, 2012). The adoption of SPMS has also significant managerial and commercial implications (Ngai *et al.*, 2014). Research suggests that the adoption of SPMS can enhance the sustainable

Figure 11 Keywords temporal frequency



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performance of an organization and improve the relations with stakeholders (Goyal *et al.*, 2013; Tasleem *et al.*, 2017). Moreover, by providing a comprehensive view of sustainability performance, SPMS can inform strategic decision-making processes (Marcis *et al.*, 2019a), promoting sustainability across various organization functions and levels (Malesios *et al.*, 2021), enabling managers to identify areas for improvement, set specific sustainability goals and align sustainability objectives with strategic goals (Cagno *et al.*, 2019; Morioka and Carvalho, 2016).

However, the adoption of SPMS can also pose challenges, including data collection and analysis, cost and resource allocation and resistance to change (Trianni *et al.*, 2019; Asiaei *et al.*, 2021). Managers have a key role in overcoming these challenges. To foster the strategic SPMS adoption they should invest in data management systems, communicate the relevance of sustainability and promote a sustainability culture within the organization (Nikolau *et al.*, 2019; Lee and Saen, 2012). Furthermore, addressing the SPMS challenges demands proactive managerial leadership and a systematic approach to address the technical, organizational and cultural barriers associated with SPMS adoption (Pádua and Jabbour, 2015; Ahi *et al.*, 2018).

Considering the above literature background, little efforts have been made in SPMS theorization. Social theories have been little used to interpret the role of SPMS in organizations' dynamics, and scholars have mostly focused on conceptual issues (e.g. Nicolaescu *et al.*, 2015) or technical aspects (e.g. Wijethilake, 2017; Cagno *et al.*, 2019). Future research can deepen the SPMS-related phenomena relying more on social theories (e.g. actor-network theory, institutional logics, performativity and socio-materiality) to strengthen the understanding of the social (and sociological) features of SPMS design and adoption within companies.

5.2 Research area b – the development of comprehensive sustainability performance measurement systems

The second research area highlights the role that specific metrics, measurement methodologies or Sustainability Performance indices have in improving the assessment of

corporate sustainability performance. The literature has largely focused on the development of tools and practices for measuring sustainability performance that are as aligned as possible with businesses' needs. This resulted in the development of Composite Sustainability Performance Indexes that are easy to interpret and capable of simplifying communication with stakeholders (Dočekalová and Kocmanová, 2016; González *et al.*, 2016). Most of the studies relating to the assessment of corporate sustainability are characterized by the use of statistical methodologies, such as DEA (Data Envelopment Analysis) or "Fuzzy Logic," which, due to their transversal application between multi-criteria models and composite evaluation methods, guarantee a fair performance measurement (Zhou *et al.*, 2012; Rashidi and Cullinane, 2019; Zhou *et al.*, 2018). Gadenne *et al.* (2012) highlighted how sustainability performance measurement practices can directly influence organizational sustainability performance, emphasizing the practical relevance of adopting structured systems. To achieve business sustainability, it is widely agreed that companies should balance economic growth with environmental protection and social equity. Accordingly, the SPMS should be designed in a way that involves the economic, environmental and social dimensions, thus holistically monitoring sustainability performance (Tseng *et al.*, 2019; Ma *et al.*, 2021).

However, to date, the literature still shows criticalities on this point, especially in including social issues in performance measurement systems, as they are more difficult to quantify and often more prone to subjectivity (Ajibike *et al.*, 2021). Indeed, there are still few papers that develop evaluation methodologies that proper include the social dimension of business performance. One of the few models present in the literature is the Fuzzy Social Sustainability Index (FSSI), which, using fuzzy logic, represents a solution for improving social sustainability performance (Rajak and Vinodh, 2015; Wicher *et al.*, 2019). Moreover, the past oriented logic dominates the studies in this research area and few considerations have been made on the future and its role in affecting corporate actions in the present.

5.3 Research area c – dynamic sustainability performance measurement systems for sector-specific performance

The third research area is focused on SPMS developed considering the peculiarities of various industrial sectors. One example is RISE 2.0 (Response-Inducing Sustainability Evaluation 2.0). It was developed in Denmark to meet the measurement needs of agricultural enterprises. An essential prerequisite of the latter, for the measurement and subsequent monitoring of performance, is the collection of four types of data: points allocated to farm practices, quantitative farm data, regional data and master data (De Olde *et al.*, 2016). Since its introduction, the RISE 2.0 method has had some success, leading to its adoption in over 2,500 companies in 56 different countries. Its diffusion is mainly linked to the fact that the methodology provides for comparison with agricultural entrepreneurs through the creation of listening auditors capable of drawing up a final report, including an action plan for the improvement of the company. The importance of farm-specific sustainability assessments highlights how tailored SPMS can reflect the unique dynamics and challenges of agricultural systems (Tzouramani *et al.*, 2020). In the agricultural sector we also have the SAAC model (Sustainability Assessment for Agriculture Cooperative Agricole). It was devised in 2019 to verify adherence and adequacy to sustainability practices in the daily operations of agricultural cooperatives. The model helps to design a more efficient sustainability measurement system based on a set of performance indicators contingent on the cooperatives' resources, vision and mission (Marcis *et al.*, 2019b). In line with the above issues, Gusmao Caiado *et al.* (2018) underlined the importance of adapting SPMS to regional and organizational contexts to ensure relevance and effectiveness.

Another sector strongly investigated is the oil one. Salmanzadeh-Meydani *et al.* (2022) proposed a multivariate statistical-quantitative approach that can be scalable to larger data sets and extended to various industrial sectors. Multi-criteria models are particularly useful

due to their flexibility in addressing sector-specific needs while maintaining a focus on dynamic and evolving sustainability objectives (Vivas *et al.*, 2019).

In the banking sector, Aras *et al.* (2017) assessed the sustainability performance of the Turkish banking sector using the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method. This method involves a systematic process that compares and ranks banks based on their sustainability performance. In applying the TOPSIS method, a set of criteria is established to evaluate various aspects of sustainability, such as environmental responsibility, social impact and economic stability. These criteria can include indicators such as carbon footprint, social initiatives, workforce diversity, ethical investment practices and financial stability. The TOPSIS method then calculates each bank's relative closeness to the ideal sustainability profile, considering both positive and negative deviations from the ideal. By providing a comprehensive assessment, the TOPSIS method enables decision-makers to identify banks that excel in sustainability and steer investment and lending decisions toward more sustainable institutions (Aras *et al.*, 2017).

From the present SLR it emerged that the development of SPMS for assessing corporate sustainability performance extensively attracted scholars' interest. Sector-specific SPMS, by their nature, are dynamic and require continuous adaptation to the specific needs and conditions of individual organizations and industries. Nevertheless, the studies of this research area poorly considered the sustainability tensions and paradoxes that can occur in business contexts and industries. Furthermore, stakeholders' interests are still inadequately considered in SPMS designs and applications.

5.4 Research area d – sustainability performance measurement systems for supply chain evaluation

The fourth research area concerns SPMS for measuring supply chain sustainability performance. This is a contemporary topic since supply chain sustainability measurement and reporting is a current challenge induced by severe institutional requirements (e.g. European Corporate Sustainability Reporting Directive - 2022 / 2464/EU). The literature is rich in papers addressing this topic, demonstrating the importance of supply chain management practices. However, assessing suppliers' sustainability performance is particularly complex. Collaboration and transparency between the parties are key elements for ensuring proper sustainability measurements within supply chains (Beske-Janssen *et al.*, 2015). These aspects are essential for incorporating performance data into appropriate key performance indicators (KPIs) accessible to management control teams, enabling constant monitoring and improvement of the entire supply chain's sustainability performance. The aggregation of individual metrics into KPIs or composite indicators is a recurring theme in the literature. While Bai and Sarkis (2014) suggested aggregating all three dimensions of the triple bottom line (TBL) into a single composite indicator, Beske-Janssen *et al.* (2015) argued for having at least one KPI or composite indicator per sustainability dimension. This approach would enable each supply chain member to monitor specific aspects of sustainability while providing comprehensive insights for selecting the best suppliers.

SPMS in supply chains has garnered particular attention in the context of multinational corporations. These companies often engage with suppliers in developing countries, compelling robust systems to evaluate associated risks and opportunities. With globalization, supply chains have become increasingly complex, spanning transnational processes that present further challenges for accurate performance evaluation. A notable solution to this problem is the adoption of an input-output modeling approach based on the multi-region input-output (MRIO) model (Acquaye *et al.*, 2018). Frameworks for sustainability performance measurement in supply chains also emphasize sector-specific approaches. For instance, research has focused on the dairy sector, highlighting how sectoral characteristics influence sustainability assessment (Bourlakis *et al.*, 2014). Similarly, supply chain management has been addressed through other studies that

propose the integration of structural equation models to enhance the sustainability performance measurement of small and medium enterprises (SMEs) (Malesios *et al.*, 2020) and integrate sustainability into logistics and supply networks (Lee and Wu, 2014). Scholars have also explored the relationship between institutional pressures, sustainable supply chain management practices and corporate sustainability performance. Stakeholders' pressures often drive organizations to adopt more sustainable practices, creating a feedback loop that emphasizes the importance of aligning supply chain performance with broader corporate sustainability goals (Wolf, 2014; Saeed and Kersten, 2017).

To date, no universally valid tools exist to support companies in comprehensively assessing sustainable practices across supply chains. However, significant efforts have been made to address the complexities of sustainable supply chain management (Kafa *et al.*, 2013; Taticchi *et al.*, 2013). Advancements in this area can bridge gaps in current methodologies and establish robust frameworks that align with the dynamic and transnational nature of modern supply chains.

To summarize the insights highlighted in this paragraph, the following Table 3 systematizes SPMS literature by research area, type, domain and outcomes, according to the scheme proposed by Sharkey *et al.* (2023).

6. Literature critiques and future research agenda

This section discusses the main SLR results, providing possible future research developments. In this way, the authors aim to keep the debate alive and stimulate the research on the investigated topic. In the following lines, the authors develop a critique for each research area and develop a research agenda.

6.1 Critique of the research area a – the strategic adoption of sustainability performance measurement systems

Despite the great scholars' efforts in exploring the strategic consequences of SPMS adoption, there is still little theorization on the role of SPMS as a key actor in companies' social dynamics.

The literature review showed that performance measurement tools have had a predominantly technical consideration and consequently have been scarcely theorized. Accordingly, there are still largely unexplored areas in the current literature.

Future research opportunities: In the wake of the above critique, future research could explore how SPMS contribute to companies' collocation in time and space (e.g. Agrizzi *et al.*, 2021; Beckert, 2021; Ropo and Höykinpuro, 2017). In other words, further research is needed on how companies imagine themselves in the future (time) and acknowledge their role in the reference environment (space) through the adoption of SPMS.

Additionally, future research could explore how SPMS contribute to performing reality (e.g. Tellmann, 2020), and what is the performative power of narratives and calculative practices they contain (e.g. Ronzani and Gatzweiler, 2022). Such research would be useful to understand how different SPMS designs influence managers' actions and decisions, and how SPMS inscriptions influence humans' perception of reality.

In Actor-Network terms, future research could explore what role SPMS have within a network of actors (e.g. Pentland and Feldman, 2007), and what the socio-material dynamics underlying their design and implementation (e.g. Quattrone *et al.*, 2021). Research in this area could be useful in understanding how SPMS are designed and developed as well as their role, once adopted, in modifying the relationships between actors within a network.

Table 3 Systematization of SPMS by research area, types, domain and outcomes

Types	*Reference*	*Domain*	*Outcomes*
The strategic adoption of SPMS (No. of articles = 20)			
Holistic corporate sustainability management	Lee and Saen, 2012; Searcy, 2012; Goyal *et al.*, 2013; Maas *et al.*, 2016; Morioka and Carvalho, 2016 Wijethilake, 2017; Tasleem *et al.*, 2017; Ahi *et al.*, 2018; Vitale *et al.*, 2019;	Corporate Sustainability	Effective corporate sustainability planning, control and reporting
Corporate sustainability index and measures	Ngai *et al.*, 2014; Nicolaescu *et al.*, 2015; Pádua and Jabbour, 2015; Searcy, 2016; Nigri and Del Baldo, 2018; Cagno *et al.*, 2019; Marcis *et al.*, 2019a; Nikolau *et al.*, 2019; Trianni *et al.*, 2019; Asiaei *et al.*, 2021; Malesios *et al.*, 2021	Corporate Sustainability	Corporate sustainability performance analysis and evaluation
The development of comprehensive SPMS (No. of articles = 14)			
Composite sustainability performance indexes	Gadenne *et al.*, 2012; Zhou *et al.*, 2012; Chang *et al.*, 2013; Dočekalová & Kocmanová, 2016; González *et al.*, 2016	Mathematical statistics and econometrics	Better communication with stakeholders and evaluation of the efficiency of decision-making units
DEA (data envelopment analysis) and "fuzzy logic"	Zhou *et al.*, 2018; Rashidi and Cullinane, 2019; Pachar *et al.*, 2022;		Fair measurement of performance
Fuzzy social sustainability index (FSSI)	Rajak and Vinodh, 2015; Pislaru *et al.*, 2019; Tseng *et al.*, 2019: Wicher *et al.*, 2019; Ma *et al.*, 2021; Ajibike *et al.*, 2021		Social sustainability performance evaluation
Dynamic SPMS for sector-specific performance (No. of articles = 7)			
RISE 2.0 (Response-Inducing Sustainability Evaluation 2.0)	De Olde *et al.*, 2016; Tzouramani *et al.*, 2020;	Agricultural sector	Sustainabilty measurement of agricultural enterprises
SAAC (sustainability assessment for agriculture cooperative)	Marcis *et al.*, 2019b	Agricultural sector	Verifying adherence and adequacy to sustainability practices in agriculture cooperative
Multivariate Statistical-Quantitative approach	Gusmao Caiado *et al.*, 2018; Salmanzadeh-Meydani *et al.*, 2022	Oil sector	Evaluation of social and environmental sustainability performance of oil sector companies
TOPSIS (technique for order of preference by similarity to ideal solution	Aras *et al.*, 2017	Banking sector	Sustainability assessment of the banking sector
Multi-Criteria Decision-Making method	Vivas *et al.*, 2019	Textile sector	Sustainability measurement of textile industry
SPMS for supply chain evaluation (No. of articles = 17)			
Input-Output modelling approach based on the Multi-Region model (MRIO)	Acquaye *et al.*, 2018; Wang *et al.*, 2020;	Supplier evaluation	Evaluation the multidimensional characteristic of supply chains in a global context

(*continued*)

Table 3

Types	*Reference*	*Domain*	*Outcomes*
Supply chain and the relationship with corporate sustainability performance	Kafa *et al.*, 2013; Taticchi *et al.*, 2013; Baumann and Genoulaz, 2014; Bourlakis *et al.*, 2014; Lee and Wu, 2014; Schaltegger and Burritt, 2014; Wolf, 2014; Beske-Janssen *et al.*, 2015; Saeed and Kersten, 2017; Qorri *et al.*, 2018; Malesios *et al.*, 2020	Sustainability Performance measurement and assessment	Sustainability performance measures for SC and supply chain
Composite indicator (CI)	Bai *et al.*, 2012; Bai and Sarkis, 2014; Lodhia and Martin, 2014; Neri *et al.*, 2021	Supplier evaluation	KPIs for each dimension of sustainability and to each member of the supply chain

Source(s): Authors' own work

The above research developments are relevant to understanding the sociological dynamics and the theoretical implications related to the definition and use of SPMS. Therefore, future research should heavily focus on these topics.

6.2 Critique of the research area b – the development of comprehensive sustainability performance measurement systems

Over the years, scholars have drawn up several comprehensive sustainability performance assessment tools and methodologies. Nevertheless, many of the proposed frameworks present past-oriented logic being focused on past performance. Few SPMS have been developed considering the future challenges that companies will have to face.

Future research opportunities: Sustainability challenges must be tackled in the present but have a future relevance. The actions that companies undertake today will have an effect in the future. Accordingly, in setting up new SPMS, companies should go beyond the mere reporting of past performance. To date, the literature is still lacking papers that focus on the role of SPMS in supporting companies to shape a better future. This is of great relevance considering the current future unknowability and present uncertainties (Beckert, 2021; George *et al.*, 2016; Grimes and Vogus, 2021; Gümüsay *et al.*, 2022). Under the current socio-political scenario, the future is more uncertain than ever and the challenges that will affect society will be countless and wicked (Grimes and Vogus, 2021). In this regard, in literature it emerged the concept of "Grand Challenges," or challenges that concern society as a whole and have a global relevance (Gümüsay *et al.*, 2022). In light of this scenario, future research could deepen the relationship between SPMS and the human imagination of the future. Imagination enables managers to create images that refer to potential future happenings. Indeed, one of the main companies' activities is to anticipate future events imagining a set of possible scenarios, events, solutions and actions to be taken (Oomen *et al.*, 2022). This activity is increasing in complexity due to current Grand Challenges and environmental uncertainties. In this direction, future research could explore how SPMS can support managers in imagining the future, tackling Grand Challenges, preserving business activity in highly uncertain contexts and fostering a better future. Simultaneously, future research could also deepen how environmental uncertainty and future unknowability affect SPMS design (e.g. Rikhardsson *et al.*, 2021). Therefore, a promising future research area regards the design

of SPMS starting from the emergency imagination that companies have of the future due to the current turbulent environment and societal Grand Challenges (e.g. Beckert, 2021; Gomes *et al.*, 2023; Melnyk *et al.*, 2014; Nudurupati *et al.*, 2021).

6.3 Critique of the research area c – dynamic sustainability performance measurement systems for sector-specific performance

Research aimed at measuring corporate sustainability performance is characterized by a "silos approach" considering the environmental, social and economic dimensions singularly. Moreover, there is often a drift toward the environmental dimension at the expense of the social one. Most of the actual SPMS failed to account for tensions and interdependencies that can arise among the several sustainability dimensions. Finally, most research has focused on business contingencies structuring SPMS accordingly. Few studies explored SPMS design starting from stakeholders' needs.

Future research opportunities: Several scholars have pointed out that a company's sustainable development is closely linked to its ability to manage tradeoffs between the different TBL dimensions (e.g. Hahn, *et al.*, 2015). In this regard, the environmental, social and economic dimensions rarely give rise to linear situations in which they reinforce each other in a win-win approach. Tensions and paradoxes often emerge whereby managers must be willing to sacrifice one of the three dimensions to pursue an improvement in the others (e.g. Hahn *et al.*, 2010). Moreover, such tensions exist not only between performance dimensions but also in temporal terms since short-term corporate interests may conflict with long-term ones (Slawinski and Bansal, 2015). In this scenario, SPMS can play a key role in supporting companies in balancing tensions between the multiple aspects of business administration by providing management with the evidence needed to make informed decisions. In particular, SPMS can make explicit the different stakeholders' interests, make conflicts visible and, consequently, support management in balancing tensions (e.g. Jørgensen *et al.*, 2022). Accordingly, future research should focus on the development of SPMS that can account for sustainability tradeoffs, tensions and paradoxes, making them visible and allowing managers to implement appropriate interventions. In this perspective, scholars could explore how SPMS can unveil the complexity of business management and enable companies to effectively manage tensions by shifting them from obstacles to opportunities for innovation and sustainable growth (e.g. Hahn *et al.*, 2015; Jørgensen *et al.*, 2022).

In connection with the above line of reasoning, stakeholders' involvement is crucial to identifying sustainability topics, tradeoffs, tensions and paradoxes. Despite this, still few studies analyzed the stakeholders' role in SPMS design and implementation (Gadenne *et al.*, 2012; Lodhia and Martin, 2014). Accordingly, future research should explore how stakeholders can be involved in SPMS design and what effects their involvement has on sustainability performance measurement and management. Stakeholders are bearers of different and multiple logics that, if appropriately integrated with those of the company, can enrich SPMS and make them more complete and better aligned with the needs and priorities of the reference environment. In line with this, further research can look at SPMS as an accounting space in which the multiple (and sometimes conflicting) logics that characterize sustainable business management are mediated, hybridized and prioritized.

6.4 Critique of the research area d – sustainability performance measurement systems for supply chain evaluation

The supply chain backbone is often made up of SMEs. Research so far has investigated how a supply chain leader should evaluate its suppliers' performance, but it still pays little

attention to how SMEs can measure sustainability performance and how SPMS should be designed to meet SMEs' peculiarities.

Future research opportunities: SMEs have major difficulties in properly measuring sustainability performance both due to a shortage of financial resources and the lack of adequate skills and tools (Mengistu and Panizzolo, 2023). At present, few methodologies exist to holistically monitor and measure sustainability performance considering SMEs' features. Indeed, the literature highlighted the need to develop new SPMS designed to intercept the various sustainability facets and, at the same time, be consistent with SMEs' peculiarities (e.g. Mengistu and Panizzolo, 2024). Furthermore, even though environmental and social objectives are key for SMEs (Jansson *et al.*, 2017), the literature has provided little evidence about their interconnection with stable economic growth (e.g. Lopez-Torres, 2023). Following the above line of reasoning, future research could explore new SPMS designs and applications in SMEs. In so doing, scholars could deepen what features should characterize SMEs SPMS, which drivers and mechanisms foster SPMS adoption by SMEs, and how different SPMS interact along the supply chain crossing SMEs boundaries and enhancing supply chain assessment and reporting. Furthermore, scholars should also deepen whether and how sustainability fosters SMEs' economic growth and how SPMS can account for the interconnections between economic, social and environmental performance dimensions.

7. Conclusion and future research questions

This systematic literature review aimed at schematizing and putting in order the various contributions that have been offered in the last ten years on sustainability performance measurement, evaluation and monitoring systems. The need to carry out this review is linked to the variety and heterogeneity that characterize the literature on the investigated topics. The main evidence found in this study is related to the massive presence of new proposals for indicators, metrics and frameworks for measuring sustainability performance. It is not by chance that more than half of the considered publications focus on measurement techniques developed for specific application contexts (e.g. the supply chain, individual production sectors or particular geographical contexts). Therefore, this paper paves the way for new spaces for in-depth studies and further research. For example, one of the crucial issues on which it will be essential to focus is how SPMS will support companies in tackling future grand challenges, with particular attention to the still largely neglected context of SMEs.

In particular, future research questions could concern:

- The link between SPMS, sustainability tensions and stakeholders' expectations: "How can SPMS include and make visible the tensions and paradoxes that may emerge between the different dimensions of the TBL?"; How can SPMS mediate the multiple and conflicting logics that affect corporate sustainability management?"; "What is the role of SPMS in managing and prioritizing these logics?"; "What are and how are stakeholders' expectations about corporate sustainability performance evolving?"; "What will be their impact on SPMS?"; "How do these expectations vary between developed and emerging countries and how do SPMS vary accordingly?"; "How SPMS can be re-designed to better meet stakeholders' expectations?".
- SPMS, SMEs and supply chains: "How could SPMS be rethought for their more effective application in SMEs?"; "How could SPMS be rethought for an effective holistic representation of SMEs economic, social and environmental performance?"; "Which is the tradeoff between SPMS implementation costs and benefits in an SME context"; "What managerial drivers and mechanisms trigger the SPMS adoption in SMEs?"; "How do SPMS interact" and "dialogue" within the supply chain crossing a single company

boundaries?; "How can this enhance the evaluation and reporting of the entire supply chain performance?".

- Future and SPMS: "How will SPMS deal with the incalculability and uncertainty of the future?"; "How can SPMS help companies in making the imagined and desired future happen?"; "How should SPMS be designed to intercept future grand challenges and foster a better future?"; "How do SPMS perform the current reality based on the emergency image of the future?"; "How can SPMS support companies operating in turbulent environments?".

Furthermore, due to the current literature shortcomings, the authors underline the need to further explore SPMS practices from a sociological point of view. Relevant research opportunities relate to further conceptualizations and theorizing on the role of SPMS in the social dynamics that characterize business phenomena. This study contributes to the current knowledge by putting an order in the vast, confusing and heterogeneous literature on the topic. In particular, the present paper systematized the scientific developments produced so far on SPMS, addressing the calls for systematic literature reviews (e.g. Mio *et al.*, 2022; Negri *et al.*, 2021) and updating Searcy's works (2011, 2012). In so doing, the paper identified several new research trajectories that could be intercepted by academics and practitioners in the future. Accordingly, the authors hope that scholars will be able to use this review as a starting point for the future development of SPMS, thus reviving the debate on this relevant topic. This work has some limitations. The data set used includes only articles published in journals present in the database of "Web of Science" and "Google Scholar." It would be advisable, in future research developments, to also consult the "Scopus" database which appears to be equally reliable and characterized by a wide range of scientific journals. However, this limitation is mitigated by the fact that Google Scholar contains most of the papers included in Scopus and, therefore, there is a reasonable probability that we have considered a significant portion of the articles present in Scopus.

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