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Exploring the role of sustainability reporting strategies in promoting sustainable development in social economy entities: The circular economy as a mediator

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Abstract

This study focused on the relationship between sustainability reporting (SR), the circular economy (CE), and the United Nations' Sustainable Development Goals (SDGs), including an examination of the mediator role of the CE in the SR-SDGs relationship. The SR concept refers to the ways in which companies communicate with their internal and external stakeholders about their sustainability initiatives. Researchers have confirmed that the CE contributes to the achievement of SDGs based on SR. However, the literature does not offer any comprehensive frameworks that integrate these three concepts, which constitutes an important research gap. More specifically, very few studies have explored how social economy entities (SEEs) report the ways they contribute to achieving the SDGs while implementing CE practices. This research thus sought to make a significant contribution to filling this lacuna. Statistical analyses were conducted to determine how SR influences SDGs and how SR promotes these goals through the CE. Variance-based structural equation modeling via partial least squares was applied to process data on a sample of 90 SEEs in Spain. The results show that entities that provide sufficient SR often communicate how they are implementing SDGs. CE practices have a significant effect on this SR-SDGs relationship. The findings thus make an important contribution to the literature by exploring the link between these three strategies (i.e., SR, the SDGs, and the CE) in organizational contexts and thus providing a foundation for new business models.

KEYWORDS

circular economy, social economy entities, Spain, structural equation model, sustainability reporting, Sustainable Development Goals

1 INTRODUCTION

Sustainability currently occupies a prominent place in organizational strategies. This concept governs companies' action plans from the moment their strategies are defined to the steps they take to fulfill their objectives and communicate about the activities that allow these firms to achieve sustainable development (Beyne et al., 2021; Threlfall et al., 2020). The literature on sustainability reporting (SR) indicates that sharing this information is important for companies' success.

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The United Nations' (UN) Sustainable Development Goals (SDGs), in particular, have attracted the attention of governments, countries, and companies. These goals comprise an action plan that seeks to benefit people and the planet and increase prosperity to strengthen world peace based on a broader conceptualization of freedom. The SDGs also focus on eradicating poverty worldwide and achieving sustainable production and consumption (Brodny & Tutak, 2023; Graciade-Rentería et al., 2023; Khaskheli et al., 2020).

Concurrently, companies' needs have changed due to an evolution in their business models and strategies toward ensuring resilience through ongoing sustainability based on more efficient products and services (Park, 2024). In this context, many firms have adopted the circular economy (CE) strategy, which has improved their global performance via initiatives that foster better social and environmental performance (Barreiro-Gen & Lozano, 2020; Miranda et al., 2023). The CE approach has been applied in diverse fields as an alternative to linear models based on extraction, production, use, and disposal and as a way to adapt current business models to a zero emissions and waste economy (Ahmad et al., 2023; Llena-Macarulla et al., 2023).

The present research was conducted in social economy (SE) contexts, namely, a set of entities searching for goods and services production mechanisms that differ from those used by traditional capitalist companies and for ways to change forms of consumption (Monteiro, 2022). The SE is an umbrella term covering a wide range of private entities that prioritize people and social and environmental causes over profit. The scope of—and the terms used to describe—the SE concept can vary depending on national traditions (Miranda et al., 2023; Monteiro, 2022).

The SE encompasses a wide range of organizations, including cooperatives, mutual societies, associations, foundations, and social enterprises (Liptrap, 2020). In addition to putting people and the planet first, these entities share other key principles, such as reinvesting profits in activities that serve collective interests or societies and promoting democratic and/or participatory governance (European Commission [EC], 2023a). SE entities social economy entities (SEEs) form a sector characterized by pluralism, with guite different organic realities in terms of form, dimension, objectives, and operational logic. However, SEEs share in common a desire to develop activities that satisfy people's needs in sustainable ways without remunerating capitalist investors (Pitacas & Sá, 2018). The present study's interest in these entities is justified by the increasing recognition and development of SE enterprises and initiatives in what has been termed "the momentum of the SE" (Bassi & Fabbri, 2020; Castro et al., 2020; Castro Núñez et al., 2020). This impetus includes growing support from governments, organizations, and communities seeking to address social and economic issues, for example, unemployment, inequality, and environmental sustainability through collaborative, inclusive, and sustainable business models.

The links between SR, the SDGs, and the CE are important in current economic contexts and, in particular, SEEs for four key reasons. First, integrating SR, the SDGs, and the CE allows organizations to tackle economic, social, and environmental issues simultaneously, which produces more comprehensive, effective solutions. Second, SR helps organizations demonstrate their commitment to SDGs, especially SDG 12 (i.e., responsible consumption and production) by adopting CE principles. Third, increasingly stringent regulations have required companies to adopt sustainable practices and report on their progress, so integrating all three approaches guarantees that these regulations are satisfied more effectively, thus ensuring compliance and avoiding potential penalties. Last, CE practices promote efficient resource use and waste reduction, which are essential for achieving SDG 12, thereby not only conserving companies' resources but also reducing their costs and enhancing their economic sustainability.

The EU's Closing the Loop: An EU Action Plan for the Circular Economy (European Commission [EC], 2015) outlines the EU's CE strategy and its alignment with the SDGs. The follow-up report, Next Steps for a Sustainable European Future: European Action for Sustainability (EC, 2016), provides detailed insights into the EU's commitment to sustainable development and the 2030 Agenda. These documents emphasize the decoupling of economic growth from resource use and environmental degradation (EC, 2016) and highlight the critical role of the CE in achieving the SDGs. By linking SR, the SDGs, and the CE, organizations can adopt more sustainable, resilient business models that benefit both societies and the environment. This integrated approach is crucial for achieving long-term SDGs.

The literature does not offer comprehensive frameworks that integrate these concepts, making few references to their links, which constitutes an important research gap, which hinders a deep and holistic understanding of the object of study. Addressing this gap in the research would enable significant advancements in both theory and practice, benefiting both academic research and the resolution of real-world problems. The existence of this gap is justified by the lack of holistic understanding of the topic, which makes it difficult to achieve a global and comprehensive view of the phenomenon. It is also due to the conceptual isolation of each concept being studied, stemming from the absence of interrelation within a common framework; the obstacle this poses to the development of more robust and comprehensive theories, since isolated research does not always provide a solid foundation for advancing theory; and the practical limitations encountered, as the lack of conceptual integration can lead to ineffective solutions and fail to provide a complete understanding of the problem.

Addressing this research gap offers benefits that include the development of more complete and integrative theories that consider multiple factors, better interpretation of data and results, as the relationships between different factors would become more understandable, the promotion of interdisciplinarity by connecting concepts and methodologies that were previously unrelated, and the creation of more sustainable and comprehensive solutions. All of this would lead to more informed decision-making by offering a clearer view of the links between key constructs.

In order to contribute to this gap, studies have confirmed that sustainability reports describe companies' approach to the SDGs and their associated performance levels (Damiano & Di Maria, 2024; García-Meca & Martínez-Ferrero, 2021), but no researchers have 2904 WILEY Sustainable Development

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connected SR and the CE. More specifically, researchers have seldom examined how SEEs report on their contributions to achieving the SDGs while implementing CE practices. Valuable insights could also be gained by exploring these organizations' challenges and best practices when aligning their SR with both the SDGs and CE principles. Finally, scholars have yet to confirm whether the CE has an effect on the direct relationship between firms' nonfinancial information statements and these businesses' commitment to the SDGs.

These above findings indicated that the SR-SDGs-CE link could provide valuable information to SEEs. Thus, the current research concentrated on defining a comprehensive framework that can generate knowledge and favorable results for sustainable development initiatives in this type of organization, which would cover the identified gap in the literature. The present investigation thus appears to be the first to analyze the SR-SDGs-CE triple link. This study sought to answer two research questions:

RO1. Can sustainability reports be used to understand how the SDGs are implemented in SEEs?

RQ2. Do the CE approach affect the relationship between SR and the SDGs in SEEs?

The main objective was to analyze the ways SR influences the attainment of SDGs, which would address RO1. This research also explored how SR promotes the SDGs via CE strategies in order to answer RO2.

The methodology was based on structural equation modeling (SEM), more specifically, partial least squares (PLS)-SEM, using data gathered from a sample of 90 organizations involved in Spain's SE. The results make an important contribution to the literature in terms of clarifying the relationships between the three action strategies selected (i.e., SR, SDGs, and CE), which are a fundamental part of new business models. The findings indicate that accurate, complete communication about sustainability initiatives can provide strong evidence of actual SDG implementations, as well as showing how CE practices influence this process.

The model testing confirmed the existence of a direct link between SR and the SDGs and the CE's mediation of this relationship. The two hypotheses developed were supported by the data, and both research questions were answered. Organizations that focus on preparing SR are then able to clarify how they achieve the SDGs more fully. At the same time, CE practices effectively strengthen the SR-SDGs relationship. These results should be of interest to organizations seeking the best way to implement these practices as a way to move toward sustainable development. The findings also have implications for management based on the interactions between SR, the SDGs, and the CE, namely, how these links can be incorporated into new business models.

These contributions can be divided into three important areas. First, the results enhance the literature by mitigating the lack of research concurrently analyzing SR, the SDGs, and the CE, especially in SEE contexts. Second, the outcomes highlight how comprehensive strategies can advance sustainable development encompassing economic, social, and environmental dimensions. Last, this study revealed that circular business models can enhance organizational practices and speed up the attainment of the SDGs.

The remainder of this paper is organized as follows. The next section presents the literature review conducted. The methods are described in the third section, after which the results are given in section four. Finally, the paper ends with a discussion section followed by the conclusion section, with implications for both theory and practice, policy recommendations, limitations, and directions for future research

2 Literature review

2.1 **SEEs: Study context**

This study focused on SEEs. The SE is an innovative social business model that specifically concentrates on people, their partners, and their families to achieve a fairer society and greater economic efficiency (Castro et al., 2020). SEEs, in turn, are characterized by their commitment to prioritizing social, environmental, and community benefits over profit maximization, making them pivotal actors in the transition toward sustainable development and the CE (Diaz-Sarachaga & Ariza-Montes, 2022). Overall, the SE promotes individuals' active, democratic participation and encourages solidarity, equality, and sustainability while keeping in mind gender equality, flexibility, security, inclusion, diversity, and nondiscrimination (Martínez-León et al., 2020; Meliá-Martí et al., 2020; Ureña-Espaillat et al., 2022).

Based on principles of democracy, the SE is a fundamental pillar of societies' sustainable, equitable, and participatory economic development, in which work and human factors prevail in decision-making processes and in benefit distribution mechanisms (Ben-Ner, 2018; Valiente, 2019). The SE is thus a business model that contributes to job creation and offers new opportunities for professional retraining and skill improvement. This approach is vital to facilitating double ecological and fair digital transitions while promoting populations' attachment to their present region (Borzaga et al., 2017). The EU recognizes that the SE contributes to economic, social, and human development and considers this model to be a driver of social transformation, social welfare systems, and contemporary economies (Castro et al., 2020). This business model also has a great capacity for strengthening resilience in times of crisis (Borzaga et al., 2017).

The SE has been increasingly mentioned in political debates at both the national and international level, especially in the context of the UN's 2030 Agenda for Sustainable Development (Castro et al., 2020; Castro Núñez et al., 2020; Chaves-Avila & Gallego-Bono, 2020). In Europe, the EC has approved a plan to promote this business model, "Building an Economy That Works for People: An Action Plan for the Social Economy" (European Commission [EC], 2022). This plan sets the guidelines that each member state must follow and supports the development of annual initiatives with specific financing that reinforce and ensure compliance with the plan.

The UN and the European Economic and Social Council (EESC) also emphasize the importance of the SE. The UN's Inter-Institutional Working Group on Social and Solidarity Economy has underlined the importance of this type of economy as it can play a key role in achieving the 2030 Agenda. The EESC, in turn, reported in 2016 that the SE is both an opportunity and a vehicle for citizen participation, responsibility, and ownership of a sustainable future. In addition, this model constitutes a vital instrument for meeting the EU's commitments within the 2030 Agenda framework.

In Spain, the SE has developed significantly in recent years, becoming an important component of this nation's socioeconomic fabric and driving growth and sustainability. Law 5/2011 of March 29 on the SE is in line with this business model's international conceptualization. This Spanish legislation quite exhaustively regulates the economic and business activities carried out by private organizations that pursue their members' collective interests and/or general economic or social interests.

Regarding SR, SEEs are potential users of nonfinancial indicators (i.e., sustainability, corporate social responsibility [CSR], and governance) that reveal and measure social and environmental impacts, going beyond financial results and informing their society (Duguid, 2017; Gibbson & Dey, 2011; Hough, 2015). The origins of these practices are found in social accounting, a stakeholder model that seeks to add both social and financial value (Etxezarreta et al., 2018; Retolaza et al., 2015; Román Cervantes et al., 2020).

For SEEs, SR is not just a tool for increasing transparency and accountability but also a way to communicate their intrinsic values to stakeholders, including customers, communities, and policymakers. Integrating SR into these organizations' operational strategies helps reinforce their mission-driven approach and ensures that their activities contribute positively to their broader societal goals. Researchers have found that SEEs are especially well-positioned to excel in SR due to their participatory governance structures, which often involve multiple stakeholders in decision-making processes (Diaz-Sarachaga & Ariza-Montes, 2022).

The SE also addresses persistent structural issues in contemporary societies, such as unemployment, inequality, regional disparities, environmental challenges, and social exclusion (Ben-Ner, 2018; Valiente, 2019). This business model is a transforming agent of economic activity (Bassi & Fabbri, 2020) and embodies a clear commitment to the SDGs given the nature of the values characteristic of the SE. These findings justify the present study's focus on the SR–SDGs– CE link in SEE contexts.

2.2 | State of the art

To identify the relevant papers, a search was conducted in the Web of Science in all 47 categories, which revealed only 92 articles. Some publications were found in more than one category. Figures 1 and 2 show the distribution of articles in categories with more than 10 papers. Categories with between 1 and 9 articles are not shown as they represent percentages from 1.087% to 9.783% and thus have a relatively insignificant weight in the sample.



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FIGURE 1 Distribution of academic publications about sustainability reporting–Sustainable Development Goals–circular economy link by Web of Science category (number of articles registered). *Source*: Authors

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FIGURE 2 Distribution of academic publications on sustainability reporting–Sustainable Development Goals–circular economy link by Web of Science category (percentage of total). *Source*: Authors

The highest concentrations are found, among others, in the categories of business economics; environmental sciences; ecology; engineering; science, technology, and other topics; energy fuels; and computer science. Despite the topicality of the three areas under study, the number of publications found was quite low, which further emphasized the need for further research on the SR–SDGs–CE link. The most seminal studies were reviewed, and the small number of papers focused on the relationships between SR, the SDGs, and the CE was confirmed, after which the theoretical basis of the hypotheses was clarified.

The academic publications examined cover SR, the SDGs, and the CE from a global perspective, that is, with reference to all types of companies, including the seminal studies summarized in Table 1. This body of work shows the scope of prior research, diverse approaches applied, and contributions made in different areas. The relevant studies were first reviewed, and then those academic articles that more specifically cover the interrelationships between SR, the SDGs, and the CE were identified.

| Author/s (Year) journal Rosati and Faria (2019) JCP | Methodology Quantitative | Paper type/methods Empirical research | Research objectives To analyze country-level institutional factors that affect whether SDGs are mentioned in sustainability reports | Findings Two factors determine reporting on the SDGs at the country level: Higher levels of individualism, climate change vulnerability, corporate social responsibility (CSR), and tertiary education spending Lower levels of market coordination, employment protection prover distance and long termination. |
|---|------------------------------------|--|---|---|
| e et al. I) FS | Qualitative and quantitative | Empirical research | To elucidate the interrelationships between reporting on the SDGs and integrated thinking | This research confirmed that reporting about the SDGs and integrated thinking have a reciprocal, mutually reinforcing relationship, so the SDGs are a good starting point for planning integrated strategies for sustainability |
| /sekera 2) SAMPJ | Qualitative | Conceptual paper | To develop a principle-based SR framework that measures, audits, and reports sustainability initiatives' outcomes and impacts as part of corporate reporting practices | The framework introduces principle-based SR in which firms demonstrate the contributions they chose to make to sustainable development, using the 17 United Nations' SDGs as targets |
| co-Zaitegi (2022) JCP | Quantitative | Empirical research, systematic literature review, and bibliometric analysis | To analyze the intellectual structure of the biodiversity accounting and management field | The results reveal five thematic clusters: one motor cluster (sustainability), two transversal clusters (biodiversity reporting and corporate biodiversity management), and two isolated clusters (environmental protection and emancipatory accounting) |
| et-Bellmunt . (2022) EM | Quantitative | Empirical research | To examine food retailers' contributions to the achievement of SDG 12, targets, and business areas as a way to assess these companies' level of engagement with sustainable consumption and production | Food retailers do a poor job of communicating their SDG 12 achievements, and these firms are more committed to sustainable production than to enhancing sustainable consumption |
| iiano and Di a (2024) EM | Quantitative | Empirical research | To analyze 211 of the most important large public companies worldwide in terms of how well they achieve SDGs | Companies that adopt more inclusive and dialogic reporting practices also make greater contributions to SDG 2, which underlines the importance of inclusive reporting to achieving SDGs |
| 9) 9 1 | Qualitative | Case study | To measure the CE's impact and its contribution to the debate about regional environmental management from the different perspectives of societies, public administrations, and the private sector | The study confirmed the economic and social benefits of the CE that will become stronger as more CE activities are implemented at the regional level The researchers also identified the main barriers to the CE (i.e., the lack of funding for investments and the supply of recycled products) |
| íguez-Antón . (2019) WE | Quantitative | Empirical research, cluster analysis | To determine whether a statistically significant relationship exists between CE initiatives undertaken in the European Union (EU) and compliance with the SDGs To check whether homogeneous groups of countries can be | The authors assert that a correlation exists between commitment to the SDGs and the EU's CE initiatives that seek to foster the efficacy—and member states' adoption—o a CE framework |

found worldwide in terms of conformity with the SDGs

| Focus of study | Author/s (Year) journal | Methodology | Paper type/methods | Research objectives | Findings |
|----------------------|---|------------------------------------|---|--|---|
| | | | | • To check whether EU countries achieve a similar level of compliance with the SDGs | Specific clusters of countries compliance with the SDGs Twenty-six of the 28 EU mem outcomes in terms of fulfilling |
| | Rossi et al. (2020) JCP | Qualitative and quantitative | Empirical research | To develop a set of indicators linking CE principles, circular business models, and the pillars of sustainability | The group of indicators devel- dimensions of sustainability (i material perspective, economi The indicators can be applied capture the innovations stimu conventional indicators do no |
| | Scarpellini et al. (2020) SAMPJ | Quantitative | Empirical research | To define and measure the environmental capabilities needed when the CE is introduced into businesses, by analyzing the different environmental competencies that firms apply during this process | The results suggest that a positiv firms' circular scope, environmen level of CSR and accountability |
| | Bassi and Dias (2020) BSE | Quantitative | Empirical research | To examine the implementation of CE practices in small- and medium-sized enterprises (SMEs) in all 28 EU countries, including the hierarchical nature of the data collected from firms nested within EU countries | Groups of firms and of EU count homogeneous in terms of the CE of SMEs are distributed across th |
| | Barreiro-Gen and Lozano (2020) BSE | Quantitative | Empirical research | To focus on CE research on the micro level by analyzing how organizations have implemented the four Rs (i.e., reduction, repairing, remanufacturing, and recycling) | Organizations focus on reducing repairing and remanufacturing CE efforts Entities are also using the foubut some are unaware that the source of the source of |
| | Dey et al. (2020) BSE | Qualitative and quantitative | Empirical research, survey, focus group, and case studies | To facilitate SMEs' achievement of greater sustainability through CE implementation by exploring CE fields of action, issues, challenges, and opportunities to adopt CE practices, as well as examining key strategies, resources, and competencies that facilitate more effective implementations of the CE in SMEs | This study found that all CE fidistribute, use, and recover) ir economic performance, but o environmental and social performancial performation include strategies, for achieving sustainability ac and for implementing CE strategies |
| | Johansson and Henriksson (2020) SPC | Qualitative | Discourse analysis | To show how issues of responsibility, politics, limits, space, sustainability, and even the shape of the CE itself changed at the turn of the millennium | CE resources can only comple primary resources as long as g responsibility for circularity or entrepreneurs Weak circularity excludes soc reinforce unequal power relat |
| | Barnabè and Nazir (2021) CSREM | Qualitative | Research-based case study | To investigate how companies conceptualize and apply CE principles and opportunities through integrated reporting practices and, more specifically, the principle of integrated thinking | The findings show that integrate performative role in terms of fav business domains and CE-relatec and shaping future strategies |

- ber states exhibit comparable SDG objectives
- to circular business models to e., environmental from a oped focus on the three ic, and social)
 - lated by the CE that t measure

e relationship exists between tal accounting practices, and

, revealing how similar groups ries are identified that are le groups of EU countries

- ing and recycling more than on and, in particular, on internal
 - ey are applying CE principles r Rs to contribute to the CE,
- nly make and use are related to elds of action (i.e., take, make, SMEs are correlated with ormance
 - ross all the CE field of actions resources, and competencies egies in SMEs
- ment the growing extraction of ver to individuals and governments hand
- ial responsibility and tends to ions

oring a better understanding of activities and opportunities d reporting concepts play a

(Continues)

| Focus | | | | | |
|-------------|--|------------------------------------|--|---|--|
| ot study | Author/s (Year) journal | Methodology | Paper type/methods | Research objectives | Findings |
| | Marco-Fondevila et al. (2021) JCP | Qualitative and quantitative | Empirical research | To assess large EU companies' engagement with the CE model, including whether their actual understanding, practices, and reports of CE initiatives correspond to the standards and principles promoted by the EU's CE Action Plan | This research highlighted how companies' reported perception of the CE differs from the EU's CE Action Plan approach and from its environmental sustainability framework, especially when taking into account types of activity |
| | Gunarathne et al. (2021) SPC | Qualitative | Research study | To explore how and to what extent CE ideas appear to inform the sustainability and integrated reporting practices of corporations in Sri Lanka | This study found low levels of disclosure using direct, explicit keywords pertaining to CE principles among firms A significant level of implicit disclosures suggests that Sri Lankan companies are strongly interested in following environmental management principles to improve their organizational sustainability performance |
| | Scarpellini (2022) CSREM | Quantitative | Empirical research | To define and analyze different categories of social impacts related to circular business models in order to describe and assess holistic, micro-level CE dimensions using the triple bottom line framework | The analysis confirmed that, to follow the CE model, companies would have to adopt broader measurement frameworks for decision making that consider potential social impacts to the same extent as economic and environmental effects |
| | Opferkuch et al. (2022) SPC | Qualitative and quantitative | Content analysis | To explore how the CE has emerged in the sustainability reports of companies listed in sustainability rankings by investigating the CE's presence in chief executive officers' messages, nonfinancial materiality assessments, references to the SDG framework, targets, and indicators | The results show that nearly all companies explicitly refer to the CE, but only 7% of them integrate the CE into all five SR elements Less than one third of the firms include both CE targets and indicators, suggesting that overall, CE content within sustainability reports is largely superficial and inconsistent |
| | Llena-Macarulla et al. (2023) RC/ SAR | Quantitative | Empirical research | To provide a model that measures the CE's presence in businesses from an environmental accounting perspective | The results mainly indicate that CE activities are in general progressively introduced by companies but fail to confirm any clear shared patterns in how these firms introduce different circular principles and activities |
| | Gallardo-Vázquez and Sánchez- Domínguez (2023) RC/SAR | Quantitative | Empirical research, bibliometric analysis | To conduct bibliometric analysis of the literature on CSR, sustainability, and the CE simultaneously | This research contributes to new business models rooted in collaboration between enterprises and universities |
| | Di Vaio et al. (2023) EDS | Quantitative | Critical literature review | To investigate accounting and accountability in the CE and waste management | The results highlight how the CE, waste management, sustainability, accountability, and management accounting practices help companies to develop ecosystems and achieve SDGs |
| | Esposito et al. (2023) BSE | Quantitative | Empirical research | To use stakeholder theory to analyze how corporate governance mechanisms can affect the amount of CE information disseminated through integrated reporting | The results show that board size, board gender diversity, and CSR committees have a positive impact on the level of CE disclosure in integrated reports |
| | | Quantitative | Content analysis, empirical research | | The findings include a negative relationship between the level of CE information disclosure and the cost of debt |

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| TABLE 1 | (Continued) | | | | |
|-----------------------------|---|--|---|---|--|
| Focus of study | Author/s (Year) journal | Methodology | Paper type/methods | Research objectives | Findings |
| | L'Abate, Raimo, Esposito, and Vitolla (2024) CSREM | | | To investigate the effect on the cost of debt of disseminating information about the CE in social networks, namely, through Twitter | |
| | L'Abate, Raimo, Albergo, and Vitolla (2024) CSREM | Quantitative | Empirical research | To apply communication and stakeholder theories in order to examine the level of CE information disseminated by companies through Twitter, as well as exploring the impact of some firm characteristics on the presence of CE practices | The results reveal that the most profitable and indebted companies disclose a greater amount of CE information through their official Twitter accounts When sector is considered, energy companies have a lower propensity to disclose CE information through Twitter compared to firms in other highly polluting sectors |
| Abbreviatic sustainabili | ons: BSE, business st ty; IJSDWE, internat | rategy and the en ional journal of su | vironment; CSREM, corp. ustainable development a | orate social responsibility and environmental management; EDS, envir nd world ecology; JCP, journal of cleaner production; JEPM, journal o | onmental development and sustainability; FS, frontiers in f environmental planning and management; RC/SAR, revista de |

management, and policy journal; SPC, sustainable production and consumption contabilidad/Spanish accounting review; SAMPJ, sustainability accounting, Source: Authors. Sustainable WILEY Development

The first group of studies listed in the table above analyzed the SR-SDGs relationship via empirical research, theoretical investigations, systematic literature reviews, and bibliometric analysis, which shows that diverse approaches were adopted. Various methodologies were applied, including qualitative and quantitative. Rosati and Faria (2019) explored country-level institutional factors affecting decisions to address the SDGs in SR. The cited authors identified variables that condition organizations' reporting on the SDGs related to CSR, climate change, education spending, market coordination, and employment. Beyne et al. (2021), in turn, focused on the presentation of reports on the SDGs with integrated thinking, confirming that the two aspects are mutually reinforcing because incorporating the SDGs helps companies integrate sustainability into strategies.

Taking a holistic approach, Abeysekera (2022) developed an SR framework that includes measuring, auditing, and reporting sustainability initiatives centered around the 17 SDGs. Blanco-Zaitegi et al. (2022) opted for a more concrete methodology, that is, analyzing the structure of the biodiversity accounting and management field and finding five clusters of interests. SDG 12 (i.e., sustainable consumption and production) was addressed by Vallet-Bellmunt et al. (2022), who noted that retail companies are more committed to sustainable production than to improvements in sustainability consumption. With regard to public companies, Damiano and Di Maria (2024) confirmed that inclusivity and dialogic accounting strengthen contributions to SDG 2 (i.e., Zero Hunger).

More research has concentrated on the SR-SDGs-CE link. These studies include empirical research; case studies; focus groups; bibliometric, cluster, discourse, and content analyses; and critical reviews of the literature, with diverse approaches adopted. Both gualitative and quantitative methodologies have also been applied. One common objective has been to measure the impact of the CE and its contribution to environmental management within regions. Researchers have confirmed that this business model offers region-level social and economic benefits (Scarpellini et al., 2019).

Studies have additionally sought to develop indicators that link sustainability and the CE, finding that these measures can capture innovations stimulated by the CE that are overlooked by conventional innovations (Rossi et al., 2020). Scholars have also defined and measured the environmental capabilities needed to introduce CE strategies and confirmed that a positive relationship exists between the CE, environmental accounting practices, and SR (Scarpellini et al., 2020). Barnabè and Nazir's (2021) research showed that reports with integrated information that include CE tactics favor circular activities and the formation of future strategies.

In the context of large EU companies, researchers have concentrated on whether these firms' CE model aligns with the EU's CE Action Plan, observing that businesses' perception differs from this plan and consider different types of activities (Marco-Fondevila et al., 2021). Analyses were conducted of how often the CE is present in executive directors' messages. In addition, studies evaluated factors affecting companies' nonfinancial materiality and the SDG framework, goals, and indicators and found that only a small percentage of firms integrate the CE into these aspects (Opferkuch et al., 2022).

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Llena-Macarulla et al. (2023) created a model that measures the presence of the CE in companies and confirmed that businesses are progressively introducing these activities. However, the cited researchers found no clear evidence that related problems are being addressed through environmental accounting. Di Vaio et al. (2023), in turn, report that the CE, sustainability in general, and accountability practices are combined to achieve the SDGs. The latest studies of the SR-SDGs-CE link listed in Table 1 above examined corporate governance mechanisms as determinants of CE disclosure (Esposito et al., 2023). This research also focused on how dissemination of information about CE strategies in social networks affects the cost of debt (L'Abate, Raimo, Esposito, & Vitolla, 2024) and how some company characteristics have an impact on the level of CE practices (L'Abate, Raimo, Albergo, & Vitolla, 2024).

2.3 Sustainability information reporting and SDGs

SR concerns are now an important part of business management decisions (Abeysekera, 2022; Windolph et al., 2014), with this strategy functioning as a tool for making decisions that strengthen organizations' achievement of SDGs (Vallet-Bellmunt et al., 2022). SR refers to how companies communicate with internal and external stakeholders about sustainability initiatives and current performance levels. The literature shows that SR has grown dramatically over the last 20 years (Bray & Rudehalgh, 2020; Threlfall et al., 2020) with many more reports focusing on contributions to sustainable development (Beyne et al., 2021).

Initially, traditional financial reports were supplemented by social reports (Cormier & Gordon, 2001; Fifka, 2012) and then by environmental reports (Clarkson et al., 2008). More recently, CSR or sustainability reports have become common. However, the increasing number of reports submitted does not mean firms' social and environmental awareness has improved, so SR is no guarantee that companies are achieving SDGs. In reality, contradictory effects have been observed, namely, decreased water and air pollution but increased greenhouse gas emissions, which reflect the cost-benefit relationship in both areas (Shapiro, 2022).

Experts have found numerous reasons for issuing sustainability reports. Sustainable investing requires both financial and nonfinancial information to help financiers analyze capital markets (Ernst & Young, 2020), which are driven by a desire to maximize shareholders' wealth while minimizing risks and maintaining legitimacy in the sector (Adams & Whelan, 2009). SR functions as a business communication tool that facilitates interested parties' participation and ensures the transparency of corporate affairs (Lozano et al., 2016; Vieira, & Radonji č, G., 2020).

SR must reflect environmental and social management's links with business management and competitive strategy, as well as integrating economic, social, and environmental information (Mook, 2006; Schaltegger & Wagner, 2006). Companies' orientation toward sustainability has effects that should also be reflected in sustainability reports

(Herzig & Schaltegger, 2011; Mills-Scofield, 2011). These impacts and the resulting performance are indicators of firms' ability to achieve SDGs.

Economic, social, and environmental results are reported, but, in general, the repercussions these have on firms' sustainability are omitted (Pucker, 2021). Given this silence, companies need to be encouraged to prepare consistent, comparable information on their sustainability initiatives and their results and to disseminate it through their sustainability reports (Abeysekera, 2022). Firms are moving toward a more sustainable value creation approach and leaving behind their traditional focus on financial returns (Busco et al., 2020; García-Meca & Martínez-Ferrero, 2021). Value can ultimately be created by integrating SDGs into action plans and considering different types of capital (i.e., financial, intellectual, human, social, relational, natural, and manufactured) (Adams, 2017; Gunarathne et al., 2021; Herath et al., 2021).

This sustainable value creation framework must become a priority as it requires companies to present sustainability reports that show a fair use of resources and reflect their impacts on sustainability (Abeysekera, 2022). A mutually reinforcing relationship exists between SR and the SDGs because financial information reveals the extent to which SDGs are achieved and these goals are a good starting point for planning sustainability strategies and contributing to sustainable development (Beyne et al., 2021; Vallet-Bellmunt et al., 2022). Experts advocate the preparation of more inclusive, transparent reports (Damiano & Di Maria, 2024) as inclusion and commitment to sustainability have become key to meeting the SDGs and attaining sustainable development. For example, Abeysekera (2022) introduced the concept of principle-based SR through which firms reveal how they have chosen to contribute to sustainable development based on all 17 of the UN's SDGs.

SR facilitates actions, investments, and strategies that help companies achieve SDGs (Rosati & Faria, 2019; Vallet-Bellmunt et al., 2022). SR can provide signals of how country-level institutional factors affect decisions to address the SDGs. Organizations reporting on these goals are more likely to be located in countries with higher levels of indulgence and individualism, climate change vulnerability, national CSR, and corporate spending on tertiary education. Other determinants are lower levels of market coordination, employment protection, power distance, and long-term orientation (Rosati & Faria, 2019).

In environmental accounting, Blanco-Zaitegi et al.'s (2022) bibliographic study confirmed that sustainability is a driver of SR with a clear orientation toward the SDGs. This pattern includes central accounting documents related to biodiversity research, CSR, impact mitigation, and biodiversity compensation, as well as specific guidelines for some SDGs. Food retailers' contribution to SDG 12 has also been evaluated, with the results revealing that these companies are more committed to sustainable production than to sustainable consumption (Vallet-Bellmunt et al., 2022). In addition, researchers have analyzed large global public firms' involvement in the 2030 Agenda, finding that companies that adopt more inclusive SR practices also make greater contributions to SDG 2 (Damiano & Di Maria, 2024).

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The symbolic value of SR for stakeholders is equally evident, and this strategy has a positive effect on controversial and environmentally sensitive sectors (García-Meca & Martínez-Ferrero, 2021). In short, societies' intense scrutiny and concerns about ethical and environmental issues determine the development of SR focused on the achievement of SDGs. To incorporate the above findings, the following hypothesis was proposed for the present study:

H1. The better sustainability information reporting practices become, the more fully SDGs are achieved.

2.4 | Mediating role of CE

SR highlights organizations' growing interest in developing sustainable economic activities. Companies are seeking to increase their rational exploitation of resources, and a stronger interest in environmental protection has led managers to rethink their linear business models (Barreiro-Gen & Lozano, 2020; Bassi & Dias, 2020). The CE has arisen in response as a new paradigm that has redefined traditional key economic activities (i.e., production, distribution, and consumption) that develop in a linear, unidirectional manner. The CE promotes resource regeneration, the conscious design of materials, and their return to specific cycles for reuse, while maintaining the maximum value of products until the end of their life cycle and optimizing their economic usefulness (Ellen MacArthur Foundation, 2015; Esposito et al., 2023; Stewart & Niero, 2018). This approach involves transformations of value chain processes, including industrial redesign, modified business strategies, and information systems (Kunc et al., 2020).

Opferkuch et al. (2022) examined 138 reports from 94 European companies published in 2020 and confirmed that nearly all of these documents explicitly refer to the CE. However, the cited authors observed that less than a third of these companies' reports had incorporated specific CE objectives and indicators. This finding suggests that firms' inclusion of CE content within their SR is superficial and inconsistent, further indicating that this topic needs to be studied more extensively (Opferkuch et al., 2022).

For the current research's purposes, integrating CE practices into SR entails constructing a comprehensive model that encompasses all organizational activities and integrates the economic, social, and environmental outcomes affected by the CE approach (Breuer et al., 2018; Johansson & Henriksson, 2020; Sauvé et al., 2016). In addition, SR aligned with CE principles is crucial for generating stakeholder support and establishing organizational legitimacy (Beck et al., 2017; Deegan et al., 2002). However, the literature contains few studies that have found evidence of the effective communication of CE-related business activities within SR (Gunarathne et al., 2021).

SR—especially integrated reports—fosters a deeper comprehension of business landscapes and CE activities, thereby paving the way for enhanced opportunities and the development of additional strategies (Barnabè & Nazir, 2021). With regard to environmental issues, SR includes assessments of the CE's impact on and role in environmental management and the quantification of social and economic benefits and environmental gains. The latter become more significant as additional CE initiatives are implemented (Esposito et al., 2023).

Concurrently, SR highlights any potential barriers to the CE that could hinder investment accessibility and make recycled products less available (Scarpellini et al., 2019). SR can also leverage indicators focusing on the triple bottom line of sustainability (i.e., economic, social, and environmental aspects). This strategy further helps companies align themselves with CE principles, thereby making room for potential innovations and facilitating better management of circular models (Rossi et al., 2020).

To strengthen SR, Llena-Macarulla et al. (2023) developed a model for measuring companies' CE practices based on an environmental accounting approach. The cited researchers note that CE initiatives are typically implemented gradually, without ensuring standardized patterns in terms of which principles and activities are adopted. In addition, the introduction of CE strategies depends heavily on companies' definition and assessment of their environmental capabilities and competencies. This process correlates positively with environmental practices, levels of responsibility, accountability, and the circular scope of operations (Scarpellini et al., 2020). Prior studies have found that the link between SR and the CE can be strengthened by organizations and groups' identification with consistent CE practices within each country (Bassi & Dias, 2020). Thus, for circular business models to be effective, they also need to include a comprehensive measurement framework that assesses social impacts to the same degree as economic and environmental ones and shapes decision making at a micro level (Esposito et al., 2023; Scarpellini, 2022).

The increased significance of CE issues and their impacts on SR has prompted assessments of major European companies' commitment to the CE. These evaluations have found discrepancies between firms' practices—and the reports they issue—and the standards and principles advocated by the EU's CE Action Plan, especially regarding company activities (Marco-Fondevila et al., 2021). Overall, these organizations have clearly failed to apply the CE perspective on SR practices, so a more explicit commitment must be made to CE objectives and quantifications of related initiatives (Fortunati et al., 2020; Stewart & Niero, 2018). The growing prevalence of integrated reports poses additional challenges in terms of obtaining CE-related information and incorporating it into SR (Opferkuch et al., 2022), which underscores the need for a broader dissemination of CE information (Dagiliene et al., 2020).

Interesting results can be obtained by examining how corporate governance mechanisms affect the disclosure of CE through integrated reports (Esposito et al., 2023). The cited research relied on a sample of 124 European companies and confirmed that board size, board gender diversity, and the presence of a CSR committee has a positive impact on the level of CE disclosure. Esposito et al.'s (2023) study also assessed how the disclosure of CE information affects both the use of social networks, especially Twitter, and the cost of debt.

L'Abate, Raimo, Esposito et al. (2023) further gathered a sample of 132 firms for the period 2019–2021 to determine whether a negative relationship exists between companies' level of disclosure of CE 2912 WILEY Sustainable Development

information and their cost of debt. The cited authors additionally analyzed the impact of some company characteristics on the level of CE strategies. Another study of a sample of 141 Standard & Poor's 500 companies confirmed that the most profitable and indebted companies disclose a greater amount of CE information through Twitter accounts (L'Abate, Raimo, Albergo, & Vitolla, 2024). The cited study additionally found that energy companies have a lower propensity to disclose CE information than firms in other highly polluting sectors.

CE practices are rooted in business models that emphasize reducing, reusing, and recycling of products at the end of their lifecycle in order to foster sustainable development and ensure social and economic prosperity for present and future generations (Kirchherr et al., 2017). This approach aligns the CE with the UN's SDGs (Kirchherr & Piscicelli, 2019; Rodríguez-Antón et al., 2019; Whalen et al., 2018). The results of prior studies have thus confirmed that CE strategies contribute to SR and have the potential to advance organizations' achievement of SDGs.

However, this process requires a widespread awareness of CE principles, and companies must develop well-defined strategies to integrate these principles into their management practices (Gunarathne et al., 2021; Rodríguez-Antón et al., 2019) to ensure they foster sustainable development. A simplified list of CE principles includes, first, eliminating waste and pollution and, second, minimizing the input of raw materials and output of waste. A third principle is prolonging the value of resources within the relevant systems for as long as possible. The last two key principles are reintegrating products into the systems at the end of their useful life and regenerating natural systems (Ellen MacArthur Foundation, 2020; Suárez-Eiroa et al., 2019). Thus, CE practices can specifically contribute to meeting SDG 6, SDG 7. SDG 9. SDG 12. SDG 13. and SDG 15.

The EU issued a report, Closing the Loop: An EU Action Plan for the Circular Economy (EC, 2015), which outlines the EU's CE strategy and its alignment with the SDGs. A subsequent report, Next Steps for a Sustainable European Future: European Action for Sustainability (EC, 2016), further details the EU's dedication to sustainable development and the 2030 Agenda. Numerous references to the SDGs are evident in CE practices, especially SDG 12. The latter cited report affirms that "resource efficiency and CE actions aim to decouple economic growth from resource use and environmental degradation" (EC, 2016, p. 5).

In addition, the Investment Plan for Europe (EC, 2023a; EC, 2023b) directly addresses SDGs 8, 9, 12, and 13 and highlights investment in various strategic sectors such as education, healthcare, water, energy, transportation, infrastructure, industries, and agriculture. The EU (EC, 2016) also seeks to promote forward-thinking initiatives including, among others, renewable energy, the CE, and climate change mitigation and adaptation. The cited EU documents further explore methods of financing CE practices, advocating for a comprehensive strategy that encompasses various initiatives. The latter include upgrading the quality and acceptance of recycling, promoting plastic reuse, minimizing leaks, and providing solutions to mitigate global marine pollution (SDG 14). In addition, the EU's plans focus on the safe reuse of treated wastewater (SDG 6), sustainable food systems, and efforts to reduce food waste (SDG 12), among other goals.

The EU's reports thus effectively illustrate how the CE can play a pivotal role in meeting the SDGs. All facets of CE practices (i. e., extraction, manufacturing, distribution, use, and recovery) exhibit correlations with economic performance, but only manufacturing and use are directly associated with companies' environmental and social performance. Nonetheless, each area of the CE contributes to the attainment of the SDGs (Dey et al., 2020). The above findings underscore how the CE, waste management, sustainability, accountability, and management accounting practices help develop appropriate ecosystems and raise the SDGs' profile (Di Vaio et al., 2023). To build on previous research, the present study included the following hypothesis:

H2. The relationship between sustainability information reporting practices and SDGs is positively mediated by the CE.

Figure 3 presents the hypothesized relationships tested in this research.

Methods 3

3.1 Data collection

SEEs have great potential in terms of sustainability as they generally make a concerted effort to implement initiatives focused on the SDGs and CE (Castro et al., 2020; Castro Núñez et al., 2020; Chaves-Avila & Gallego-Bono, 2020; Etxezarreta et al., 2018; Román Cervantes et al., 2020). Given this capacity, an opinion survey was created to cover issues related to SR, the CE, and the SDGs and sent to a population of 250 SEEs in Spain's Extremadura region. The questionnaire contained two sections: (1) the organization's characteristics and (2) a list of items that evaluated the organization's knowledge and behavior regarding SR, CE, and SDG issues. The respondents' perceptions were assessed using a Likert-type scale ranging from 1 ("Little knowledge") to 7 ("Extensive knowledge"). The survey was distributed via email in November 2022. The final sample comprised 90 entities, which is a response rate of 36%.

The descriptive statistical analysis of the sample revealed a set of entities that contrast with the region's other organizations. The largest





FIGURE 3 Conceptual model. H, hypothesis. Source: Authors

TABLE 2 Participants' profile.

| Sample information | Number | % |
|--|--------------------|-------|
| Social economy entities with largest per | centages in sample | |
| Cooperatives | 44 | 48.9% |
| Associations | 19 | 21.1% |
| Special employment centers | 10 | 11.1% |
| Labor companies | 8 | 8.9% |
| Sector to which organizations belong | | |
| Primary | 23 | 25.6% |
| Secondary | 20 | 22.2% |
| Tertiary | 47 | 52.2% |
| Organization size (number of workers) | | |
| Less than 5 | 46 | 51.1% |
| Between 6 and 10 | 12 | 13.3% |
| Between 11 and 25 | 12 | 13.3% |
| Between 26 and 50 | 7 | 7.8% |
| Between 51 and 100 | 7 | 7.8% |
| More than 100 | 6 | 6.7% |
| | | |

Source: Authors.

group was cooperatives (48.9% of the sample), followed by associations (21.1%), special employment centers (11.1%), and labor companies (8.9%). The rest of the sample comprised smaller groups: foundations (5.6%), agricultural transformation companies (3.3%), and special or unique organizations (1.1%). These entities' sectors included a clear majority from the tertiary sector (52.2%), followed by the primary (25.6%), and secondary (22.2%) sectors. The organizations' size was determined by the number of employees. Most had less than five workers (51.1%) (see Table 2).

3.2 | Measurement

This study analyzed the interactions between SR, the SDGs, and the CE. The research also included an examination of the CE's mediating effect on the relationship between SR and the SDGs. The model variables were lower-order composite constructs measuring multidimensional concepts based on the literature (Henseler, 2017a), which were made up of indicators. All three constructs were defined as reflective constructs and estimated in Model A.

3.2.1 | Sustainability reporting

SR reflects organizations' sense of obligation to act in ways that benefit societies and the environment, going beyond serving their own financial interests and meeting legal requirements. SR involves ethical practices, transparency, and active contributions to humans' social, economic, and environmental well-being. This type of reporting includes fair labor practices, sustainable resource use, community engagement, and efforts to reduce inequality and environmental impacts. An SR scale was developed based on Scarpellini et al. (2019); Aranda-Usón et al. (2020); and Scarpellini's (2022) work. This construct was measured using four items referring to communications of sustainability policies to the staff, citizen awareness and dissemination campaigns, and management's involvement in distributing sustainability information.

3.2.2 | Sustainable Development Goals

The SDGs require evaluations of how well different entities, such as countries, organizations, or projects, are progressing toward achieving specific objectives. These goals can include metrics to assess the impact and effectiveness of various initiatives seeking to boost sustainable development. This scale comprised nine items adapted from Elavarasan et al. (2022); Ogunmakinde et al. (2022); and the Global Indicator Framework for SDGs (UN. 2022). The SDG construct was assessed using items referring to the integration of sustainability, corporate strategy's contributions to meeting the SDGs, and organizations' identification of priority SDGs. Other items covered the development of sustainable mobility plans to promote cities and sustainable communities and of energy vulnerability plans to guarantee environmental protection. The remaining items focused on the promotion of healthy living habits to improve employees' health and wellbeing, contributions to quality education, and projects that seek to transform the environment to help eradicate poverty and hunger.

3.2.3 | Circular economy

The CE involves using the principles of reducing, reusing, and recycling materials and products, as well as assessing sustainability practices. To analyze CE strategies, researchers need to evaluate the environmental and economic benefits of sustainable production and consumption patterns within different entities, such as businesses or communities. The CE scale was based on Scarpellini et al. (2019), Aranda-Usón et al. (2020), and Scarpellini's (2022) research. This construct was measured using four items referring to training in environmental issues, redesigning products and/or services to increase their functionality, offering CE training to staff, and meeting the demand for new professional profiles compatible with the CE. A final item assessed efforts to increase collaboration between workers in terms of sharing goods and services.

3.3 | Analytical approach

The research model focused on latent or unobserved variables that could be inferred from indicators (Chin, 1998a). This type of secondgeneration multivariate analysis facilitates the incorporation of abstract constructs that are only indirectly observable and the determination of the degree to which the measurable indicators describe WILEY Sustainable Development

the latent variables. The resulting statistics can then be used to test hypotheses based on previous theoretical knowledge using the data collected (Chin, 1998b). PLS-SEM was conducted with the help of SmartPLS 4 software (Ringle et al., 2022). PLS-SEM is appropriate for exploratory research as this method does not require data normality or large sample sizes (Hair et al., 2014).

The current research included descriptive analysis that estimated the mean and standard deviations of the items measuring the model constructs. The model was tested in two phases. The first phase (i. e., measurement model) determined the extent to which the unobservable variables describe the observed variables. The second phase (i. e., the structural model) tested the hypotheses defined. The extensive application of the PLS technique enhanced the empirical robustness of the analyses and ensured optimal results.

4 | Results

Four steps were followed to process the data. First, the measurement model was analyzed to check the scale items' reliability and validity. Second, the structural model was examined to check the significance of the relationships under study. Third, the model's goodness of fit was assessed, and, last, the model's predictive power was appraised.

TABLE 3 Descriptive and measurement model results.

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4.1 | Assessment of measurement model

The first step comprised an evaluation of the mean and standard deviations of all the items measuring the model's constructs (see Table 3). The results include quite low mean values for the three constructs on a Likert scale ranging from 0 to 7. The reasons for these averages may be inadequate implementations of sustainable practices, the need for greater awareness and commitment among entities, or limitations in available resources and technologies. However, low mean values can also highlight opportunities for growth and development, indicating that stakeholders need to be given incentives to intensify their efforts to achieve better sustainability outcomes. Thus, SEE managers should work on strengthening their knowledge about SR, the SDGs, and the CE and adopt new action mechanisms that more directly guarantee these goals and strategies are being addressed. SEE managers must also determine, which areas show significant room for improvement.

Each item's and all the scales' reliability was evaluated to assess the measurement instrument. The standardized factor loadings (i.e., λ) needed to be greater than 0.707 (e.g., Chin & Dibbern, 2010; Roberts et al., 2006). The resulting values range from 0.708 to 0.947 (see Table 3 above), which confirm the individual reliability of the measurement model.

| Lower-order composite constructs and indicators | Mean | SD | Loading | Student's t | α | ρΑ | ρC | AVE |
|---|-------|-------|---------|-------------|------|-------|-------|-------|
| Sustainability reporting (SR) | | | | | .898 | 0.905 | 0.930 | 0.770 |
| SR2 | 0.897 | 0.022 | 0.898 | 41.609 | | | | |
| SR5 | 0.947 | 0.010 | 0.947 | 96.923 | | | | |
| SR6 | 0.892 | 0.027 | 0.892 | 33.543 | | | | |
| SR13 | 0.762 | 0.062 | 0.764 | 12.374 | | | | |
| Sustainable Development Goals (SDGs) | | | | | .935 | 0.940 | 0.946 | 0.663 |
| SD1 | 0.860 | 0.032 | 0.861 | 27.096 | | | | |
| SD2 | 0.915 | 0.018 | 0.915 | 51.892 | | | | |
| SD3 | 0.706 | 0.059 | 0.708 | 11.937 | | | | |
| SD4 | 0.873 | 0.026 | 0.873 | 34.024 | | | | |
| SD5 | 0.806 | 0.043 | 0.806 | 18.969 | | | | |
| SD6 | 0.774 | 0.060 | 0.773 | 12.783 | | | | |
| SD8 | 0.850 | 0.030 | 0.850 | 28.071 | | | | |
| SD9 | 0.795 | 0.051 | 0.799 | 15.508 | | | | |
| SD11 | 0.717 | 0.061 | 0.719 | 11.841 | | | | |
| Circular economy (CE) | | | | | .929 | 0.932 | 0.947 | 0.782 |
| CE4 | 0.766 | 0.057 | 0.767 | 13.449 | | | | |
| CE7 | 0.909 | 0.020 | 0.910 | 45.989 | | | | |
| CE8 | 0.917 | 0.021 | 0.917 | 43.092 | | | | |
| CE9 | 0.924 | 0.021 | 0.924 | 44.996 | | | | |
| CE10 | 0.893 | 0.023 | 0.893 | 39.550 | | | | |
| | | | | | | | | |

Note: SD, significance and standard deviations based on bootstrapping (10,000 repetition); α , Cronbach's alpha; ρ A, Dijkstra-Henseler's composite reliability; ρ C, Jöreskog's composite reliability.

Abbreviation: AVE, average variance extracted.

Source: Authors.

Next, the model was evaluated by checking the latent variables' reliability. Cronbach's alpha, composite reliability, and the Dijkstra-Henseler values were used because they indicate how well a set of items measures the relevant latent variable. The Cronbach's alpha values in the current study range from 0.898 to 0.935, which can be considered satisfactory because they are over 0.700 (Hair et al., 2006). More specifically, SR has a value of 0.898, SDGs 0.935, and CE 0.929 (see Table 3 above).

The composite reliability and Dijkstra-Henseler values are also acceptable as they fall between 0.905 and 0.947 (Nunnally, 1978; Vandenberg & Lance, 2000). For pA, SR has a value of 0.905, SDGs 0.940, and CE 0.932. For pC, the SR value is 0.930, while the SDGs value is 0.946 and the CE value 0.947. Nunnally (1978) and Vandenberg and Lance (2000) recommend scores above 0.80 for advanced research (see Table 3 above), so the latent variables' reliability was confirmed.

The constructs' convergent validity was assessed by calculating their average variance extracted (AVE) (Fornell & Larcker, 1981; Hair et al., 2011). This measure shows the degree to which distinct approaches to assessing a single construct can produce the same outcomes. The AVE values range from 0.663 to 0.782. More specifically, SR has a value of 0.770, SDGs 0.663, and CE 0.782. All these results exceed the recommended cut-off point of 0.500, so the model constructs' convergent validity can be considered satisfactory (Hair Jr et al., 2010) (see Table 4). The latent variables' internal consistency was thus confirmed.

 TABLE 4
 Construct discriminant

 validity (Fornell and Larcker's and

 heterotrait-monotrait criteria).

The model's discriminant validity was checked. According to For-

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are shown on the diagonal and in bold in Table 4 above. They are less than the correlations between constructs, which shows that the model has satisfactory discriminant validity (Henseler et al., 2015; Roldán & Sánchez-Franco, 2012) (i.e., 0.878 > 0.805, and 0.824; 0.814 > 0.805, and 0.807; and 0.884 > 0.824, and 0.807).

Discriminant validity was also confirmed using the heterotraitmonotrait ratio. Roldán and Sánchez-Franco (2012) and Henseler et al. (2015) suggest that a maximum threshold of 0.90 is acceptable. The values in Table 4 above fall under the maximum limit. The results, therefore, confirm that all three constructs satisfy the established discriminant validity criteria. Figure 4 summarizes the information generated for the measurement model.

4.2 | Assessment of structural model

The structural model was evaluated by applying a non-parametric resampling technique or bootstrapping procedure, which provides standard error and Student's *t*-distribution values that represent the statistical significance of the path coefficients (β) (Henseler et al., 2009). The procedure was applied with 10,000 subsamples, and a one-tailed Student's *t*-test was run with n - 1 degrees of freedom (Chin, 1998a; Hair et al., 2011). The bootstrapping procedure also

| Construct | SR | SDGs | CE | Construct | SR | SDGs | CE |
|-----------|-------|-------|-------|-----------|-------|-------|----|
| SR | 0.878 | | | SR | | | |
| SDGs | 0.805 | 0.814 | | SDGs | 0.809 | | |
| CE | 0.824 | 0.807 | 0.884 | CE | 0.897 | 0.899 | |

Abbreviations: CE, circular economy; SDGs, Sustainable Development Goals; SR, sustainability reporting. Source: Authors.



FIGURE 4 Results of evaluation of the measurement model. AVE, average variance extracted; CA, Cronbach's alpha; CE, circular economy; CR, composite reliability; *R*², coefficient of determination; SDGs, Sustainable Development Goals; SR, sustainability reporting. *Source*: Authors

defined the percentile confidence intervals (Cls) and the corrected bias. The value 0 was excluded (Chin, 1998a) (see Table 5).

The results support H1, clearly showing that, as SR practices improve, organizations show a greater tendency to achieve SDGs. The findings confirm previous research and suggest that societies' intense scrutiny and concerns about ethical and environmental issues stimulate the development of SR focused on achieving the SDGs in Spain (Damiano & Di Maria, 2024; García-Meca & Martínez-Ferrero, 2021; Vallet-Bellmunt et al., 2022).

The present mediation analysis concentrated on the effect CE has on the SR–SDGs relationship, namely, whether the direct SR–SDGs link changes when the CE is present. The mediation hypothesis (i.e., H2) was tested by applying Hayes et al.'s (2011) suggested approach. The causal effect of SR was divided into two parts: (i) an indirect effect of SR on SDGs through CE ($a \times b$) and (ii) a direct effect of SR on SDGs (c'). The analysis determined how important the indirect effects ($a \times b$) and direct effect (c') were (see Table 6).

After bootstrapping with 10,000 subsamples (Chin, 2010; Hayes & Scharkow, 2013), the direct effect of SR on SDGs (*c'*) was found to be significant (β = .835; *t* = 23.297; *p* < .000), which is in line with the result for the Cls (see Table 6 above and Figure 5a). Figure 5b shows the total effect SR has on SDGs as the total direct (*c*) and indirect effects (*a* × *b*). All three structural paths are significant. A significant positive relationship exists between SR and CE (*a*) (β = .914***; *p* < .001). A significant positive link is also present between CE and SDGs (*b*) (β = .504***; *p* < .001).

Effects on endogenous variables.

In addition, the results confirm that SR affects SDGs (*c*) given the significant effect detected ($\beta = .375$; p < .01). When the mediator is incorporated (see Figure 5b above), SR has less influence but still a significant direct effect on SDGs (H1: c = 0.375; t = 2.352). This finding supports H1 and H2, clearly showing that the relationship between sustainability information reporting practices and SDGs is positively mediated by the CE. The results thus highlight that the CE, waste management, sustainability, accountability, and management accounting practices foster functional ecosystems and the achievement of SDGs (Di Vaio et al., 2023).

The current research model was verified as SR has a significant indirect effect on SDGs. The CE partially mediates (i.e., a complementary effect) the relationship between SR and SDGs, so the mediation hypothesis is supported (see Table 6 above). Of the total effect of SR on SDGs, 55.12% is delivered through the CE, as shown by the variance accounted for measure.

Each exogenous construct's contribution to the coefficient of determination (R^2) values of the endogenous constructs was also measured using f^2 values (Cohen, 1988). The results show a small effect for the SR \rightarrow SDGs relationship ($f^2 = 0.089$), a moderate effect for the CE \rightarrow SDGs link ($f^2 = 0.162$), and a large effect for the SR \rightarrow CE connection ($f^2 = 5.047$).

The model's explanatory capacity was assessed based on the strength of each structural path as measured by the R^2 or AVE values of the latent dependent variables (Chin, 2010; Hair et al., 2019). For each path, the R^2 value must be at least equal to or greater than 0.1

| Effects on endogenous variables | Path coefficient (β) | T-value (Bootstrap) | P-value | Percentile 95% confidence interval | Supported (Yes/No) |
|---------------------------------|-------------------------|------------------------|---------|------------------------------------|-----------------------|
| CE | | | | | |
| $(R^2 = 0.835)$ | | | | | Yes |
| SR 	o CE (a) | .914*** | 62.467 | .000 | [0.890; 0.938] Sig. | |
| SDGs | | | | | |
| $(R^2 = 0.740)$ | | | | | |
| H1: SR (c) | .375** | 2.352 | .009 | [0.113; 0.637] Sig. | Yes |
| CE (b) | .504*** | 3.255 | .001 | [0.249; 0.759] Sig. | Yes |

Note: based on a Student's $t_{(4999)}$ two-tailed distribution; $t_{(0,05,4999)} = 1.645$; $t_{(0,01,4999)} = 2.327$; $t_{(0,001,4999)} = 3.092$.

Abbreviations: CE, circular economy; H, hypothesis; R^2 , coefficient of determination; SDGs, Sustainable Development Goals; Sig., significance; SR, sustainability reporting. **p < .01.***p < .001.

Source: Authors.

Source: Authors.

TABLE 5

TABLE 6Summary of mediating effect tests.

| Total effect of S SDGs (c') | iR on | Direct et | ffect of SR on | SDGs | Indirect effect | of SR on SDGs | | |
|--------------------------------|---------|-----------|----------------|---------|---|----------------|--|-----------------------|
| Coefficient | t-value | | Coefficient | t-value | | Point estimate | Percentile bootstrap 95 lower upper | % confidence interval |
| 0.835*** | 23.297 | H1 = c | 0.375*** | 2.352 | $\begin{aligned} Total &= a \times b \\ H2 &= a \times b \end{aligned}$ | 0.460 | 0.229 | 0.693 |

Note: Based on a Student's $t_{(4999)}$ two-tailed distribution; $t_{(0,05,4999)} = 1.645$; $t_{(0,01,4999)} = 2.327$; $t_{(0,001,4999)} = 3.092$. Abbreviations: H, hypothesis; SDGs, Sustainable Development Goals; SR, sustainability reporting. ***p < .001. **FIGURE 5** Structural model results. CE, circular economy; H, hypothesis; SDGs, Sustainable Development Goals; SR, sustainability reporting. *Source*: Authors



 $H_1 = SR \rightarrow SDGs (+) = c$ $H_2 = SR \rightarrow CE \rightarrow SDGs (+) = a * b$

(Falk & Miller, 1992). In this case, for the dependent constructs, R^2 has the following values: $R^2_{CE} = 0.835$ and $R^2_{SDGs} = 0.740$. The model's explanatory power (i.e., in-sample prediction) was thus confirmed.

4.3 | Model goodness-of-fit test

This research sought to confirm the validity of a composite-based model, so exact goodness-of-fit tests were run using a bootstrap procedure (Benitez et al., 2020; Henseler, 2017a, 2017b; Henseler et al., 2016; Henseler & Schuberth, 2020). Various goodness-of-fit indices were checked to determine the model fit. Two approximate fit indices were included, namely, the standardized root mean square residual index (SRMR) and normed fit index (NFI), which are incremental fit measures. These indices must respect the following cut-off points: SRMR <0.08 and NFI >0.90. For the present model, the SRMR score is 0.067, which is lower than the established upper limit, and the NFI score is 0.991 (Hu & Bentler, 1998), which is above the suggested lower limit. Both values show an acceptable fit.

The current assessment also used two exact overall model fit measures based on bootstrap inference: the unweighted least squares discrepancy and geodesic discrepancy. The 99% CIs drawn from the sampling distribution include the original values of the bootstrap statistics for both the estimated and saturated models. That is, the values of the discrepancy measures fall below the 99% percentile. This result indicates that the model has goodness-of-fit (see Table 7).

4.4 | Model predictive power

The analysis also included cross-validation with holdout samples to determine the model's predictive ability (i.e., out-of-sample prediction) (Evermann & Tate, 2016) by checking its performance in terms of generating accurate predictions (Shmueli & Koppius, 2011). The present

TABLE 7 Model goodness-of-fit.

| | Estimated | model | Saturated | model |
|------------------|-----------|-------|-----------|-------|
| | Value | HI99 | Value | HI99 |
| SRMR | 0.067 | 0.068 | 0.067 | 0.068 |
| d _{ULS} | 0.770 | 0.778 | 0.770 | 0.778 |
| d _G | 0.816 | 0.906 | 0.816 | 0.906 |

Note: HI99 = 99% bootstrap quantile.

Abbreviations: d_{G} , geodesic discrepancy; d_{ULS} , unweighted least squares discrepancy; SRMR, standardized root mean square residual. *Source*: Authors.

study used the PLS-predict algorithm procedure (Shmueli et al., 2016) included in SmartPLS 4 software (Ringle et al., 2022). The algorithm generated *k*-fold cross-validated prediction errors and their summary statistics to assess the model's predictive performance regarding the indicators and constructs.

The dependent constructs' predictive power was assessed using the predictive relevance (Q^2) criteria. Models have good predictive capability if $Q^2 > 0$ (Shmueli et al., 2016). The current evaluation focused on the model's key dependent constructs (i.e., CE and SDGs) and found that both $Q^2_{predict}$ values are greater than 0 (see Tables 8 and 9). Next, the distribution of prediction errors was analyzed. The root mean square error (RMSE) was used because the absolute value skewness for all indicators needs to be less than 1.

The model has predictive power for CE, as CE4 and CE10 have a positive Q^2_{predict} value and negative differences in terms of RMSE and mean absolute error (MAE). CE7 and CE8, in turn, have a positive Q^2_{predict} value and negative differences for RMSE but positive differences for MAE. CE9 has a positive Q^2_{predict} and positive differences for both RMSE and MAE, so this indicator does not contribute to the model's predictive performance. Regarding the SDGs construct, the model exhibits great predictive power because SD1, SD2, SD3, SD6, SD9, and SD11 have a positive Q^2_{predict} value and negative

TABLE 8Predictive power.

| Dependent constructs | Indicator | R ² | Q ² _{predict} constructs | Q^2_{predict} | Skewness | Election |
|--------------------------------------|-----------|----------------|--|------------------------|----------|----------|
| Circular economy (CE) | CE4 | 0.835 | 0.831 | 0.509 | -0.942 | RMSE |
| | CE7 | | | 0.583 | -0.637 | RMSE |
| | CE8 | | | 0.573 | -0.729 | RMSE |
| | CE9 | | | 0.778 | -0.566 | RMSE |
| | CE10 | | | 0.770 | 0.089 | RMSE |
| Sustainable Development Goals (SDGs) | SD1 | 0.740 | 0.690 | 0.396 | -0.063 | RMSE |
| | SD2 | | | 0.554 | -0.132 | RMSE |
| | SD3 | | | 0.330 | -0.039 | RMSE |
| | SD4 | | | 0.492 | -0.479 | RMSE |
| | SD5 | | | 0.496 | -0.363 | RMSE |
| | SD6 | | | 0.504 | -0.388 | RMSE |
| | SD8 | | | 0.613 | -0.382 | RMSE |
| | SD9 | | | 0.310 | -0.091 | RMSE |
| | SD11 | | | 0.340 | -0.477 | RMSE |

Abbreviations: Q^2_{predict} , predictive relevance; R^2 , coefficient of determination; RMSE, root mean square error. *Source*: Authors.

TABLE 9 Predictive power.

| Ind. | PLS-SEM RMSE | PLS-SEM MAE | Q^2_{predict} | Ind. | LM-RMSE | LM-MAE | Ind. | PLS-LM RMSE | PLS-LM MAE |
|------|--------------|-------------|------------------------|------|---------|--------|------|-------------|------------|
| CE4 | 1.499 | 1.109 | 0.509 | CE4 | 1.569 | 1.132 | CE4 | -0.07 | -0.023 |
| CE7 | 1.418 | 1.173 | 0.583 | CE7 | 1.426 | 1.163 | CE7 | -0.008 | 0.01 |
| CE8 | 1.391 | 1.109 | 0.573 | CE8 | 1.407 | 1.098 | CE8 | -0.016 | 0.011 |
| CE9 | 1.025 | 0.831 | 0.778 | CE9 | 1.017 | 0.828 | CE9 | 0.008 | 0.003 |
| CE10 | 1.043 | 0.764 | 0.770 | CE10 | 1.066 | 0.780 | CE10 | -0.023 | -0.016 |
| SD1 | 1.492 | 1.187 | 0.396 | SD1 | 1.524 | 1.238 | SD1 | -0.032 | -0.051 |
| SD2 | 1.421 | 1.062 | 0.554 | SD2 | 1.485 | 1.113 | SD2 | -0.064 | -0.051 |
| SD3 | 1.815 | 1.489 | 0.330 | SD3 | 1.855 | 1.518 | SD3 | -0.04 | -0.029 |
| SD4 | 1.593 | 1.282 | 0.492 | SD4 | 1.625 | 1.266 | SD4 | -0.032 | 0.016 |
| SD5 | 1.508 | 1.200 | 0.496 | SD5 | 1.579 | 1.190 | SD5 | -0.071 | 0.01 |
| SD6 | 1.523 | 1.214 | 0.504 | SD6 | 1.594 | 1.215 | SD6 | -0.071 | -0.001 |
| SD8 | 1.344 | 1.050 | 0.613 | SD8 | 1.358 | 1.027 | SD8 | -0.014 | 0.023 |
| SD9 | 1.737 | 1.361 | 0.310 | SD9 | 1.781 | 1.426 | SD9 | -0.044 | -0.065 |
| SD11 | 1.602 | 1.191 | 0.340 | SD11 | 1.634 | 1.202 | SD11 | -0.132 | -0.011 |

Abbreviations: CE, circular economy; Ind., indicator; LM, linear regression model; MAE, mean absolute error; PLS-SEM RMSE, partial least squaresstructural equation modeling root mean square error; $Q^2_{predict}$, predictive relevance; SD, sustainable development. *Source*: Authors.

differences in terms of RMSE and MAE. However, SD4 and SD5 have a positive Q^2_{predict} but negative differences for RMSE and positive differences for MAE.

5 | Discussion

This study focused on SEEs, which are important actors in the search for sustainable development (Borzaga et al., 2017). The present results provide compelling support for both hypotheses, thereby underscoring the critical role of SR and the CE in advancing the achievement of SDGs. These strategies make a significant contribution to regional and national socioeconomic development, and they can address the current and future challenges faced worldwide (Martínez-León et al., 2020; Meliá-Martí et al., 2020; Ureña-Espaillat et al., 2022).

More specifically, the current study addressed the connections between SR, the CE, and the SDGs, including investigating the mediating role of the CE in the SR–SDGs relationship. The results highlight SEEs' key role in fostering sustainable development within the SE framework (Diaz-Sarachaga & Ariza-Montes, 2022; Liptrap, 2020). The SE is a progressive business model that emphasizes the importance of people, communities, and an equitable distribution of resources to ensure fairer societies and enhanced economic efficiency. A gap in the literature was filled by exploring these three variables together, and valuable insights were generated into how SR practices influence the SDGs, especially when mediated by the CE. The analysis relied on SEM to process data provided by 90 SEEs in Spain and found support for the hypotheses proposed.

H1 highlighted the importance of SR practices to the achievement of SDGs. The literature reviewed highlights that SR has evolved over time, moving from traditional financial reports to more comprehensive reports that include social and environmental aspects (Clarkson et al., 2008; Fifka, 2012). The recent increase in the quantity of reports, however, has not necessarily raised managers' environmental and social awareness or helped them meet the SDGs in their practices. The present research also clarified the challenges and opportunities associated with integrating CE principles into SR. While the results indicate SR has a positive impact, they also reveal that the extent to which CE strategies are integrated varies significantly among companies.

The present results suggest that, the better the SR practices become, the more progress is made toward the SDGs. In addition, this research confirmed that organizations that implement SR also emphasize the SDGs (Damiano & Di Maria, 2024; Vallet-Bellmunt et al., 2022). The current findings indicate that companies' willingness to communicate transparently and comprehensively their sustainability initiatives can drive sustainable development. The results thus support Windolph et al. (2014) and Abeysekera's (2022) conclusions about the significant effect SR has on management decisions and Vallet-Bellmunt et al.'s (2022) assertion that SR strategies contribute to decisions leading to the attainment of SDGs. H1 was, therefore, supported, confirming that SR creates sustainable value for organizations (Abeysekera, 2022; Gunarathne et al., 2021; Herath et al., 2021).

H2 examined the CE's mediating effect on the relationship between SR and SDGs. The CE has emerged as a new business model that redefines traditional economic activities by prioritizing resource regeneration and waste minimization (Kunc et al., 2020; Scarpellini, 2022). The current findings stress the need to incorporate CE practices more consistently into sustainability reports to promote a deeper understanding of CE-related business activities and pave the way for additional SR strategies (Di Vaio et al., 2023). The present study demonstrated that the integration of CE principles into SR practices enhances the impacts sustainability efforts have on the SDGs. Companies can more effectively contribute to sustainable development by including CE strategies, such as resource regeneration, product lifecycle extension, and waste reduction, and incorporating them into their SR. The CE focuses on reducing resource consumption and minimizing waste, which aligns directly with several SDGs. In particular, the above results confirm that the hypothesized model has greater predictive power for SD1, SD2, SD3, SD6, SD9, and SD11. The findings thus suggest that, by adopting a circular approach, companies not only improve their sustainability performance but also enhance their ability to meet these specific SDGs.

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The present findings also suggest that the link between SR practices and SDGs is strengthened by including the CE approach, which enhances this relationship. This result contributes to the literature by justifying the incorporation of more effective communication about CE-related business activities into SR (Gunarathne et al., 2021). Concurrently, the CE was shown to be aligned with the SDGs, so circular practices contribute to SR and have the capacity to further the achievement of the SDGs (Kirchherr et al., 2017; Kirchherr & Piscicelli, 2019; Rodríguez-Antón et al., 2019; Whalen et al., 2018). The above findings confirm that the SR-SDGs-CE link is a complex topic that requires further study (Opferkuch et al., 2022).

The present research produced a conceptual model that elucidates the interrelationships between SR, the CE, and the SDGs, providing a solid framework for understanding how these elements mutually influence each other. The results include valuable insights into how companies can communicate their sustainable practices, the CE can improve this process, and this three-way link can contribute to advancing the SDGs. In addition, the findings underline the importance of integrated approaches that consider economic, social, and environmental aspects to promote sustainable development more effectively (Park, 2024). The current results also expand the academic literature on the model's three constructs and the relationships between them.

6 | Conclusions

This study explored the interplay between SR, the CE, and the SDGs, with a specific focus on the CE's mediating effect on the link between SR practices and the SDGs' achievement, in SE contexts. A direct association was found between SR and SDGs, and the CE was shown to function as an intermediary between SR and the SDGs. By integrating CE principles into sustainability reports, organizations can foster a fuller understanding of their sustainable business activities, paving the way for better opportunities, additional strategies, and greater resilience aligned with sustainable development objectives (Park, 2024).

Both hypotheses were upheld, and both research questions were addressed. The present results provide an affirmative answer to RQ1 because organizations engaging in effective SR generate comprehensive sustainability reports that fully display their dedication to pursuing SDGs. RQ2 was also answered in the affirmative because CE practices effectively intercede in the SR–SDGs relationship.

This study makes eight contributions to the literature. First, the findings add to the existing literature by bridging the gap in prior research regarding a simultaneous examination of SR, the CE, and the SDGs specifically in SEE contexts. Second, this investigation included a methodological innovation using an empirically robust approach based on SEM, which provides a more solid foundation for future research in this area. Third, the results provide empirical support for the key role of the SE as a transformation agent in economic activities. Fourth, the findings underscore the importance of integrated approaches to promoting sustainable development that consider economic, social, and environmental aspects.

Fifth, this study should foster the development of practical tools and integrated frameworks to help SEEs promote development projects that consider economic, social, and environmental aspects. The results may also improve these entities' reporting on sustainability practices and their alignment with SDGs. Sixth, the findings also include that circular business models can lead to improvements in organizations' ability to achieve SDGs. Seventh, valuable insights were gained into how policymakers can design and implement regulations that effectively promote SR, the SDGs, and CE principles within the SE. Last, this research has important implications for education as it highlights that educational and training programs need to raise SEEs' awareness of and build their capabilities around SR, the SDGs, and the CE.

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In addition, the present results have quite diverse theoretical implications. First, SEE managers should develop comprehensive frameworks that combine SR with the SDGs and CE. This research underscores the importance of integrating SR into these organizations' core operational strategies in order to align SEEs' activities with broader societal goals, such as those outlined in the SDGs. These entities are participatory by nature as they involve a variety of stake-holders in governance—a critical factor that ensures the effectiveness of sustainability initiatives and drives SEEs to adopt CE strategies. A new research framework was created by exploring all three topics together, which could help managers improve transparency and accountability in these organizations.

Second, SEEs' strategic alignment can be enhanced by bringing their strategic objectives in line with their global sustainability objectives, thereby improving their social and environmental impacts. Last, sustainability reports both reflect the implementation of socially responsible actions and determine the scope of the SDGs in business contexts, so SR plays a far larger role than that suggested by the literature, going well beyond a mere reflection of nonfinancial information.

The findings also have implications for public actors and stakeholders. Government officials can use the results to create policies that encourage SEEs to adopt integrated SR practices. Public actors can further provide financial incentives and support to organizations that demonstrate a strong alignment with the SDGs and CE. Stakeholders could, in turn, benefit from the clearer understanding provided of how SEEs contribute to sustainable development. SEEs additionally need to identify opportunities to collaborate through partnerships with other stakeholders in order to promote the SDGs and CE.

From an academic perspective, the methodology used (i.e., PLS-SEM) clarified the theoretical model and confirmed its predictive validity, so this investigation of the SR–SDGs–CE relationship in SEE contexts revealed new avenues of research. In addition, this study documented and analyzed case studies of SEEs that have successfully integrated the three concepts, thus providing valuable ideas and best practices. Finally, by addressing these theoretical implications, scholars will contribute to a deeper understanding of how SEEs can effectively leverage SR, the SDGs, and CE principles to ensure greater social, environmental, and economic impacts.

The findings also have multiple practical implications. First, SEEs need to use training programs and resources to develop their capacity for implementing effective sustainability practices and reporting mechanisms. Second, governments and decision-making entities need to link the push to achieve SDGs to a rigorous examination of SR and its compliance with specific requirements. This policy should be seen as more than just a simple obligation, providing a motivation for companies to improve their SR and to be recognized as significant contributors to the 2030 Agenda. Third, firms in general and SEEs in particular can strengthen their connection with social well-being and legitimacy—benefits that must go hand in hand for both societies and companies. Fourth, the present results should encourage business managers, as well as governments and institutions, to design their management practices based on CE processes.

The fifth implication is derived from those above. Namely, SEEs that successfully integrate SR, the SDGs, and the CE can be incentivized to innovate by being classified as eligible for subsidies or tax exemptions. Sixth, the findings are based on SEM, so this study tested a robust methodological approach that can be used in future research and that has practical applications, namely, allowing organizations to understand—and predict the impact of—their sustainability practices more fully. Seventh, the results should support SEEs' efforts to improve their sustainability practices, align more closely with global sustainability goals, and effectively apply CE principles.

Eighth, benchmarking tools can now be constructed for SEEs to help them share their best practices with other entities and promote continuous improvement and innovation in sustainability projects. Last, by prioritizing social value creation over profit maximization, SEEs have the potential to play an important role in increasing social cohesion and reducing regional disparities. This approach aligns with core SE values and ensures that these organizations remain true to their mission of contributing to the common good.

Despite these significant contributions, this research had five limitations that should be kept in mind. First, the data comprised the subjective opinions of the leader of each SEE surveyed, which may have introduced bias into the dataset. Second, the geographic scope was restricted by the data gathered from a limited number of Spanish entities and, more specifically, from SEEs in the Autonomous Community of Extremadura, which constrains the generalizability of the results. Third, the sample size is adequate, but the findings may not, nonetheless, be fully generalizable to all SEEs. Fourth, sector variability within the SE could affect the applicability of the results. Last, SEM provided empirically robust insights based on the model, but this method has inherent shortcomings, such as the complexity of the model specifications and potential bias in parameter estimates.

Future research can take numerous directions. First, studies of this topic should use a larger sample of SEEs to enhance the generalizability of the findings. Second, cross-regional analysis could be used in comparative research to understand geographic variability in sustainability practices. These studies may also benefit from introducing the sector variable as a moderating factor into their theoretical model. Third, cross-sector analysis is needed to investigate the integration of SR, the SGDs, and the CE—and differences in their implementation across various sectors within the SE in order to identify sector-specific challenges and opportunities.

Fourth, longitudinal research should be conducted to assess changes and trends over time, thereby providing insights into the longterm impacts of SR and CE initiatives on sustainable development outcomes. Fifth, future studies can evaluate stakeholders' effect by exploring how their engagement influences the effectiveness of SR and CE practices focused on achieving the SDGs. Sixth, researchers need to evaluate the level of technological integration and assess the role of emerging technologies, such as blockchain and the Internet of things, in enhancing transparency and efficiency in SR and CE initiatives.

Seventh, scholars should consider cultural influences, examining how cultural factors influence the adoption and success of SR, the SDGs, and CE practices in different regions. Eighth, further investigations could also explore how effectively specific CE practices drive progress toward the SDGs and how regulatory frameworks shape SR practices. Ninth, detailed case studies can focus on leading SEEs that have successfully integrated SR, the SDGs, and CE principles in order to identify best practices and replicable models. Last, this exploratory research provides a good starting point for future investigations due to the originality of its methodological approach to SR, the CE, and the SDGs; its examination of the links between these three extremely current topics; and its focus on the SE.

AUTHOR CONTRIBUTIONS

All authors have contributed equally to the different phases of the study: Conceptualization, methodology, data analysis, formal analysis, writing-original draft, writing-review and editing. The authors declare that they have prepared the article in accordance with the standards published by the Journal on its website and that the paper has not been submitted or is under evaluation in any other journal.

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CONFLICT OF INTEREST

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

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