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Supporting circular economy decisions in hospitality SMEs: A multi-criteria approach to strategy prioritization

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HIGHLIGHTS

- MCA links CE drivers and barriers to circular strategy prioritization.
- Hospitality practices are translated into circular strategy options.
- Reduction-oriented strategies show the most favourable average position.
- Priority comparisons provide exploratory decision-support insights for SMEs.

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ABSTRACT

Circular economy (CE) research has mainly focused on manufacturing and product-based sectors, while its application to service industries remains less understood. In services, circularity cannot be reduced to material loops, as it involves customer participation, organizational capabilities, service routines, and stakeholder coordination. Existing studies have widely examined CE practices, drivers, and barriers, but provide fewer tools for translating these elements into decision criteria, understood here as conditions used to compare the relative actionability of alternative circular strategies. This study develops and applies a multi-criteria decision support approach to Italian hospitality SMEs. Circular practices are classified into circular strategy options, while CE drivers and barriers are operationalized as economic-financial, technological-operational, stakeholder-related, and governance criteria that may facilitate or constrain implementation. By combining survey data collected from hospitality firms, expert-derived criteria weights, and stochastic multi-criteria acceptability analysis, the results indicate that reduction-oriented strategies show the most favourable average position across the four ranking methods, while asset renewal and life extension occupy comparatively favourable positions. Rethink, repurpose, and reuse have very similar expected ranks and cannot be meaningfully ordered. The study frames CE adoption in services as a prioritization process guided by predefined criteria and offers insights for resource efficiency, waste prevention, and cleaner service operations.

1. Introduction

Tourism contributes substantially to economic development, employment, and territorial competitiveness but it generates significant pressure on natural resources, infrastructures, and local communities. In this study, tourism provides the broader sectoral context, while hospitality refers to the hotel and accommodation activities examined empirically. Within tourism systems, hospitality activities are particularly relevant because hotels and accommodation facilities consume energy and water, generate food and material waste, and contribute to greenhouse gas emissions (Gössling et al., 2020). These pressures make hospitality an important setting for studying how circular economy (CE) principles can support more sustainable resource use, waste prevention, and cleaner service operations. However, for hospitality small and medium-sized enterprises (SMEs) the issue is not only whether circular practices are desirable, but how different circular options can be selected and prioritized under limited resources and uncertain implementation conditions.

CE offers a framework for replacing the linear logic of "take-make-dispose" with approaches aimed at retaining value, reducing waste,

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extending the useful life of resources, and regenerating systems (Geissdoerfer et al., 2017; Kirchherr et al., 2017). In hospitality, CE principles may translate into practices such as energy saving, water conservation, food waste prevention, circular purchasing, reuse and repair of assets, leasing or sharing solutions, and other service models that reduce material intensity (Filimonau and De Coteau, 2019). These practices are not equivalent from a managerial point of view: they differ in terms of required investments, organizational capabilities, stakeholder involvement, customer acceptance, and dependence on external infrastructures.

Applying CE to services is not straightforward. In product-based sectors, circularity is often observed through material loops, product redesign, reverse logistics, remanufacturing, and recycling. In hospitality, circularity depends on service routines, customer participation, supplier relationships, employee capabilities, local communities, and institutional conditions. From a service-dominant logic perspective, value emerges through interaction and resource integration among multiple actors (Vargo and Lusch, 2004). This makes CE adoption in hospitality not only an operational issue, but also an organizational and relational one. The theoretical gap this paper aims to fill thus relates to the limited ability of product-based CE frameworks to explain how circularity is prioritized in service contexts, where firms do not fully control all material flows and where implementation depends on multiple actors involved in service delivery.

Available evidence suggests that circular transition is still at an early stage. Hospitality firms tend to adopt practices that are relatively easy to implement and generate visible operational benefits (Kaszás et al., 2022; Li et al., 2024). More ambitious circular strategies, such as rethinking service models, repurposing resources, or reorganizing business models around circular value creation, remain less diffused (Opferkuch et al., 2023). This suggests that CE in hospitality is often approached through incremental improvements rather than deeper organizational and systemic change. This pattern is particularly relevant because it raises a decision problem: hospitality firms may recognize several possible circular strategies, but they need to understand which options are more immediately actionable and which require stronger capabilities, infrastructures, or stakeholder coordination.

This issue is particularly relevant for SMEs, which represent the dominant organizational form in hospitality. Hospitality SMEs are central to local economies, yet their circular transition can be limited by scarce financial resources and technical expertise, weak managerial capabilities, difficult access to circular supply chains, and uncertainty about the economic returns of circular investments. Rizos et al. (2016) show that SMEs face specific barriers in implementing CE business models, while Ahmadov et al. (2025) highlight that these barriers involve not only financial resources, but also knowledge, capabilities, and stakeholder conditions. At the same time, SMEs should not be interpreted only as constrained actors. Their decisions are shaped by the need to balance costs, risks, capabilities, stakeholder expectations, and operational viability. Hence, CE adoption depends not only on firms' awareness of circular practices but also on how managers compare alternative strategies under resource constraints and uncertainty. If this comparison is not supported by an explicit decision logic, CE adoption risks remaining a fragmented set of isolated practices, while more demanding strategies may be postponed, misunderstood, or pursued without the necessary organizational and relational conditions.

Previous research has widely identified drivers and barriers influencing CE adoption in SMEs. Kirchherr et al. (2018) examine barriers to CE implementation at the European level, while Merli et al. (2018) systematize the broader CE literature and its main research streams. In tourism and hospitality contexts, Alharethi et al. (2024) further show that CE adoption is affected by financial, regulatory, infrastructural, and stakeholder-related conditions. Recent studies also emphasize the role of internal organizational barriers and stakeholder relationships in shaping circular transformation processes (Gennari, 2023; Arranz et al., 2024; Civera et al., 2025). However, these factors are often treated as separate categories. Less attention has been paid to how they operate as decision criteria when firms must choose among circular strategies that involve trade-offs between environmental benefits, economic efforts, organizational capabilities, technological requirements, and stakeholder acceptance. In this study, decision criteria refer to the economic, technological, stakeholder-related, and governance conditions used to compare the relative actionability of circular strategy options.

This is the main argument of the paper: CE adoption in service SMEs should not be understood only as the adoption of isolated practices, but as a prioritization problem in which firms compare circular strategies under multiple and potentially conflicting criteria. Multi-criteria analysis (MCA), also referred to as multi-criteria decision-making (MCDM), is suited to this task because it allows heterogeneous criteria to be considered simultaneously (Belton and Stewart, 2002). Its use is particularly relevant in sustainability assessment, where environmental, economic, technical, and organizational criteria may interact or conflict (Cinelli et al., 2014). This is especially important for SMEs, which cannot usually implement all circular options at the same time and need to distinguish between strategies that are more immediately actionable and more demanding strategies in terms of capabilities, partnerships, and investments.

In CE research, MCA has been used for different aims. D'Adamo et al. (2024) focus on CE indicators, Somorin et al. (2023) develop a decision support tool for CE business models, and Kaur et al. (2025) apply MCDM to the priority selection of circular practices. Balasbaneh et al. (2025) highlight the role of MCDM in CE research for comparing options under multiple and heterogeneous criteria. However, the use of MCA remains limited when the focus shifts to CE adoption in service SMEs and to the prioritization of circular strategies in hospitality. Existing MCA applications confirm the relevance of decision-support methods for CE, but they do not fully address how CE practices, drivers, and barriers can be translated into firm-level criteria for prioritizing circular strategy options in hospitality SMEs.

Against this background, the objective of this study is to develop and apply an exploratory decision support framework for hospitality SMEs. The framework first translates circular practices identified in the tourism and hospitality literature into circular strategy options classified according to the R-strategy framework. It then uses CE drivers and barriers as MCA decision criteria, grouped into four dimensions: economic and financial conditions, technological and operational innovation, stakeholder relations, and governance capabilities. In this way, the article moves from identifying circular practices to comparing circular strategies under constraints specific to SMEs, without assuming a predetermined or sequential transition path.

The study adopts a multi-stage research design combining a literature review-based classification of circular practices, an exploratory survey of firms' practices and perceptions, and MCA implemented through stochastic multi-criteria acceptability analysis (SMAA). This method is proposed because the prioritization of circular strategies involves uncertain assessments, heterogeneous criteria, and possible trade-offs. Given the exploratory empirical basis of the study, the results should be interpreted as a preliminary demonstration of the decision-support approach rather than as robust evidence of sector-wide priorities. The findings suggest that reduction-oriented strategies occupy the most favourable average position under the criteria considered, while asset renewal and life extension show comparatively favourable positions. The remaining alternatives are less clearly differentiated under the criteria and uncertainty considered.

Accordingly, the study addresses the following research questions:

RQ1. Which circular practices can be translated into circular strategy options for hospitality SMEs?
RQ2. How can CE drivers and barriers be used as MCA criteria to prioritize these options under SME constraints?

The paper makes three main contributions. First, it contributes to CE

research in services by developing a decision support framework that links CE practices, drivers, and barriers to the prioritization of circular strategies in hospitality SMEs. Second, it shows how internal resources, organizational capabilities, stakeholder relations, and external conditions can be translated into MCA decision criteria. Third, it provides exploratory insights into the relative prioritization of circular strategies, offering managers and policymakers a structured basis for comparing alternative strategies in relation to the organizational, technological, stakeholder, and ecosystem conditions considered.

2. Literature review and conceptual framework

2.1. Circular economy in services and hospitality SMEs

CE research has mainly developed in manufacturing and product-based sectors, where circularity is commonly associated with material loops, eco-design, reuse, remanufacturing, recycling, and resource recovery (Geissdoerfer et al., 2017; Kirchherr et al., 2017). Its application to service industries is less consolidated. In services, circularity cannot be understood only through physical products and material flows, because value is also created through organizational routines, customer participation, and relationships among multiple actors. This is particularly relevant because CE research often considers services as extensions of tangible products, for example in product-service systems or product-as-a-service models. Fehrer and Vargo (2023) argue that this view risks overlooking services as autonomous contexts for circularity. From a service-dominant logic perspective, value emerges through resource integration and interaction among multiple actors, rather than from products alone (Lusch and Vargo, 2014). Therefore, studying CE in services requires attention to how resources, service processes, users, suppliers, employees, and institutions contribute to circular outcomes. This broader perspective makes organizational and relational conditions particularly relevant to the implementation of circularity in service settings.

Hospitality is a relevant context for analysing CE in services because hotels combine significant resource use with services delivered directly to customers. Bux and Amicarelli (2023) show that hospitality firms are increasingly involved in circular and sustainable strategies, while Filimonau and De Coteau (2019) underline the relevance of food waste management within hospitality operations. CE practices in hospitality may include energy and water saving, food waste prevention, circular procurement, reuse and repair of furniture and equipment, leasing or sharing solutions, and collaboration with suppliers and local actors. Recent evidence from accommodation establishments also identifies circular solutions across water, energy, waste, food, and transport management (Li et al., 2024). These practices show that circularity in hospitality concerns not only technical improvements but also routines, customer behaviour, supplier relationships, and local coordination.

Existing studies suggest that CE adoption in hospitality is still uneven and often concentrated on practices that are easier to implement and connected to operational efficiency. Kaszás et al. (2022) describe circularity in tourism as an emerging field, while Li et al. (2024) identify several integrated solutions and good practices but confirm their limited diffusion. More advanced strategies, such as rethinking service models, repurposing resources, or developing collaborative circular solutions, require stronger organizational capabilities, technological knowledge, customer involvement, and collaboration with suppliers and institutions. The issue is not only whether hospitality firms adopt CE practices, but which circular strategies appear more actionable under specific organizational and contextual conditions.

This topic is particularly relevant for SMEs, which represent the dominant organizational form in hospitality (Khosravi et al., 2026). Rizos et al. (2016) show that limited resources and uncertain returns constrain SMEs' adoption of circular business models. More recent research broadens this perspective. Arranz et al. (2024) highlight the role of internal organizational barriers in SME circular transformation, while Ahmadov et al. (2025) show that SME transitions are shaped by interacting firm-level capabilities, stakeholder relationships, and broader institutional conditions. In hospitality SMEs, these constraints shape how firms compare circular options, balance expected benefits and implementation costs, and assess which strategies can be realistically pursued. In addition, SMEs should not be considered only as passive actors limited by barriers but as firms making decisions under limited resources, incomplete information, and dependence on external actors.

A related stream of research has examined the drivers, barriers, and enabling conditions influencing CE adoption. At the SME level, Gennari (2023) conceptualizes the transition towards CE through a set of interrelated pillars encompassing internal and external conditions. Almici et al. (2025) subsequently build on this framework in the tourism and hospitality context, organizing CE drivers and barriers into economic-financial, technological-operational, stakeholder-related, and governance dimensions. Other research in tourism and hospitality similarly highlights the coexistence of multiple drivers and barriers affecting circular transition (Alharethi et al., 2024). Recent studies further emphasize that circular transition is relational as well as organizational: stakeholder alignment and collaboration affect the capacity of firms to create and implement circular solutions (Civera et al., 2025), while internal organizational conditions may either facilitate or constrain transformation (Arranz et al., 2024). Taken together, this literature suggests that CE adoption results from the interaction of multiple internal and external conditions rather than from a single driver or barrier.

From this perspective, CE adoption in hospitality SMEs can be interpreted through different but complementary theoretical lenses. Transition perspectives underline the role of institutions, infrastructures, and system-level conditions in enabling circular change (Geels, 2011). Service-dominant logic emphasizes interactions among firms, customers, suppliers, employees, and other actors involved in service delivery (Vargo and Lusch, 2004). Resource-based and dynamic capability perspectives highlight internal resources, skills, learning processes, and organizational capabilities (Barney, 1991; Teece, 2007). Together, these perspectives help explain why the same circular strategy may be more or less actionable across firms and contexts: its implementation may depend simultaneously on internal resources and capabilities, stakeholder coordination, and institutional or infrastructural conditions.

Overall, previous research provides substantial knowledge on circular practices in hospitality and on the drivers, barriers, capabilities, and stakeholder conditions shaping CE adoption in SMEs. However, these streams also indicate that hospitality SMEs face several interacting conditions when considering alternative circular strategies. Understanding how such conditions can be taken into account when comparing different options represents an important decision-support issue. The following section examines how multi-criteria approaches can contribute to this problem.

2.2. Multi-criteria analysis for circular economy decision-making

Prioritizing CE strategies requires the evaluation of options that may differ in environmental, social, economic, technological, and organizational terms. For this reason, circular decisions cannot be reduced to a single criterion, particularly when alternative options involve different requirements and trade-offs. MCA is useful because it structures decision problems in which several criteria need to be considered simultaneously (Belton and Stewart, 2002). This is particularly relevant in sustainability assessment, where criteria may be heterogeneous, expressed in different units of measurement, and potentially conflicting (Cinelli et al., 2014). Recent reviews of MCDM applications in CE further show its increasing use for comparing alternatives under heterogeneous criteria and uncertainty (Balasbaneh et al., 2025).

In CE research, MCA has been applied to different decision problems

and levels of analysis. At the product level, Alamerew et al. (2020) propose a multi-criteria method to evaluate circularity strategies, illustrating how alternative value-retention options can be compared across several criteria. A second stream concerns the measurement and assessment of circularity: dos Santos Gonçalves and Campos (2022) review multi-criteria methods for measuring CE, while D'Adamo et al. (2024) apply a multi-criteria approach to CE indicators and circular performance. More recent applications move closer to strategic decision support. Somorin et al. (2023) develop a tool for selecting CE business models, while Kaur et al. (2025) use MCDM to prioritize circular

Table 1
Comparative overview of selected studies on CE adoption and multi-criteria decision support.

Authors	Research focus	Context	Method	Main contribution	Limitations/Remarks
Fehrer and Vargo (2023)	Meta-theoretical Service-Dominant (S-D) logic framework for circular service ecosystems	Service research/ Conceptual	Conceptual synthesis & S-D logic perspective	Re-conceptualizes CE from product material loops to actor resource integration, service routines, and value co-creation	Focuses on conceptual framing without developing operational quantitative decision-support tools or multi-criteria strategy prioritization models
Li et al. (2024)	Good environmental management practices and circular indicators in tourist accommodations	Accommodation establishments in Europe (Italy) and China	Multi-case study analysis, water, energy, waste, food, and transport (WEWFT) nexus evaluation, and circular indicators	Identifies practical circular solutions across WEWFT in hospitality operations	Documents circular practices and environmental management solutions in accommodation establishments, but does not structure their comparison through a multi-criteria prioritization model
Rizos et al. (2016)	Barriers and enablers in implementing CE business models in SMEs	European SMEs across multiple sectors	Literature review and empirical case study analysis of European SMEs	Identifies core SME barriers and organizational enablers.	Provides a broad account of barriers and enablers of CE adoption, with limited attention to their use as decision criteria for comparing specific strategy options
Arranz et al. (2024)	Organizational transformation toward CE and the role of internal barriers	SMEs	Empirical survey and quantitative structural analysis	Demonstrates how internal organizational and cultural barriers constrain circular business model adoption in SMEs.	Clarifies the role of internal organizational barriers, but does not extend this analysis to the prioritization of alternative circular strategies in service settings
Ahmadov et al. (2025)	Multi-level perspective (MLP) on SMEs' transition to a CE	SMEs across industrial and service sectors	Systematic literature review using the MLP framework	Unpacks macro, meso, and micro-level factors, actors, and mechanisms in SME circular transitions	Offers a multi-level synthesis of transition factors, while their operationalization within a quantitative decision-support model remains outside the study scope
Gennari (2023)	CE transition framework and key dimensions/ pillars affecting SMEs	SMEs	Conceptual framework based on literature analysis	Develops a framework identifying the main dimensions shaping SMEs' transition towards CE and highlights the interaction between internal and external conditions	Provides a framework for understanding SME circular transition, but does not operationalize these dimensions as multi-criteria inputs for comparing alternative circular strategy options
Almici et al. (2025)	Mapping CE drivers and barriers in the tourism industry	Tourism and hospitality sector	Systematic literature review and thematic categorization	Builds on previous SME-oriented CE frameworks and systematizes drivers and barriers in the tourism and hospitality context across economic-financial, technological-operational, stakeholder-related, and governance dimensions	Structures the conditions affecting CE adoption but does not translate them into a multi-criteria framework for comparing alternative circular strategies
Civera et al. (2025)	Relational approaches and stakeholder relationships in circular economy transitions	Circular business models across sectors	Systematic literature review and conceptual framework development	Highlights how value co-creation, stakeholder alignment, and relational governance drive circular business model transformations	Advances understanding of relational and stakeholder dynamics, with limited emphasis on their translation into quantitative decision inputs
Kaur et al. (2025)	Priority selection and ranking of CE supply chain practices	Emerging economy supply chains (India)	MCDM (TOPSIS and VIKOR)	Demonstrates that because firms face resource limitations and cannot adopt all circular practices simultaneously, MCDM priority selection is essential	Addresses priority selection of circular practices in an industrial supply-chain context; firm-level strategy prioritization in service SMEs remains less explored
D'Adamo et al. (2024)	Evaluation of CE indicators and regional circular performance	European Union	Analytic Hierarchy Process (AHP) multi-criteria decision analysis	Weighs Eurostat CE indicators across competitiveness, innovation, waste management, and sustainability categories to track circular transition progress	Focuses on CE indicators and macro/ regional performance, leaving firm-level strategic decision support outside its primary scope
Somorin et al. (2023)	Multi-criteria decision support tool for CE business model selection	Circular business model selection	MCA decision support framework	Develops a structured tool to assist decision-makers in evaluating and selecting circular business models under multi-dimensional criteria	Develops decision support for circular business model selection, but does not examine R-strategy prioritization under hospitality-specific constraints
Ghosh et al. (2024)	CE performance evaluation and SDG alignment in SMEs	Food processing SMEs in emerging economies (India)	Integrated MCDM (Delphi, CRITIC, and VIKOR)	Develops an integrated MCDM framework to evaluate SME circular performance across operational, environmental, and TBL criteria	Applies integrated MCDM to CE performance evaluation in food-processing SMEs; the decision problem addressed differs from service-based strategy prioritization
Liao et al. (2023)	Overview of fuzzy MCDM methods and application domains in hospitality and tourism	Hospitality and tourism industries	Bibliometric analysis and systematic literature review	Establishes that fuzzy MCDM methods are widely used in tourism for hotel selection, destination evaluation, and risk assessment	Shows the breadth of MCDM applications in tourism and hospitality, while firm-level CE strategy prioritization receives comparatively limited attention

practices when organizations face multiple alternatives and resource constraints. Taken together, these studies show an increasing use of MCA not only to assess circularity, but also to support the comparison and prioritization of alternative circular options.

Despite this diversification, CE applications of MCA have predominantly addressed products, manufacturing and supply-chain settings, circular business models, indicators, or macro-level performance. Firm-level applications to SMEs are also emerging. For example, Ghosh et al. (2024) combine MCDM methods to evaluate CE performance in food-processing SMEs, incorporating environmental, social, economic, and operational criteria. However, this evidence remains primarily rooted in production-oriented contexts and performance evaluation. Comparatively, less attention has been paid to service industries and, more specifically, to the prioritization of circular strategy options in service SMEs, where implementation also depends on organizational capabilities, stakeholder coordination, and external conditions.

In tourism and hospitality research, multi-criteria methods have been applied to support evaluation, selection, and policy-oriented decision problems. Liao et al. (2023) show that these methods are established across several application areas, including hotel selection, destination evaluation, and risk assessment, while Blancas et al. (2010) apply a multi-criteria approach to sustainable tourism assessment and Castellani and Sala (2010) develop a sustainable performance index to support tourism policy development. These studies confirm the relevance of MCA for structuring complex decisions in tourism and hospitality contexts. Nevertheless, these applications primarily address evaluation, selection, destination-level assessment, or policy support. Ess attention has been devoted to firm-level circular strategy prioritization and to the use of CE drivers and barriers as criteria for comparing alternative circular strategy options in hospitality SMEs.

The literature reviewed above points to complementary research streams concerning CE in services and SMEs, the conditions shaping circular adoption, and the use of multi-criteria approaches for circular decision-making (Table 1).

Taken together, these studies show that CE in services and SMEs has been examined through circular practices, drivers, barriers, organizational capabilities, and stakeholder conditions, while MCA research has developed a variety of approaches for assessing circularity and supporting complex decisions. However, these research streams remain only partially connected. In particular, limited attention has been paid to how circular practices can be translated into firm-level strategy options and how CE drivers and barriers can be operationalized as decision criteria for comparing those options in hospitality SMEs. Accordingly, the gap addressed in this study concerns not the absence of CE or multi-criteria research, but the limited integration of these perspectives into a decision-support approach for circular strategy prioritization in a hospitality SME context. To address this gap, the following section develops the conceptual framework by combining the R-strategy classification of circular practices with a set of economic-financial, technological-operational, stakeholder-related, and governance conditions used to structure the subsequent multi-criteria comparison.

2.3. Conceptual framework

The R-strategies framework provides a useful way to classify CE practices according to their degree of circularity (Potting et al., 2017). Higher-order strategies, such as Refuse (R0), Rethink (R1), and Reduce (R2), aim to avoid or reduce resource use, while Reuse (R3), Repair (R4), Refurbish (R5), Remanufacture (R6), Repurpose (R7), Recycle (R8), and Recover (R9) focus on extending product life, preserving value, or recovering materials and energy. Although this framework was mainly developed in product-based contexts, its logic can be adapted to hospitality by interpreting circularity in relation to the use, maintenance, sharing, renewal, and reconfiguration of resources, assets, and service-related practices.

Building on the literature reviewed in previous Sections, the R-strategy framework is used as the main classification basis for defining circular strategy options for prioritization purposes. These options are not treated as mutually exclusive choices, as hospitality SMEs may combine several strategies in practice. The empirical analysis compares five strategy categories directly corresponding to the R-strategy framework (R1, R2, R3, R4, and R7) and one additional analytical category, labelled *asset renewal using recovered or regenerated components (R6-related)*. The latter retains the R6 reference only for traceability to the original coding process and is not intended as an operationalization of conventional remanufacturing. R1 refers to changes in access and service models; R2 to the reduction of resource use and waste; R3 to the continued use or transfer of goods that remain suitable for their original function; R4 to the restoration of existing assets; and R7 to the use of products, components, or waste materials for different functions.

For the purposes of this study, asset renewal is conceptualized as a distinct analytical category from conventional R6 remanufacturing. It refers to the use of recovered or regenerated materials or components in renovation or renewal processes, where these elements are returned to a comparable building or asset-related function. The expression R6-related does not denote full equivalence with R6 or imply remanufacturing activities by hospitality firms. Asset renewal is further distinguished from R4, which concerns the restoration of existing assets, and R7, which involves assigning products, components, or materials to a different function.

R0, R5, R8, and R9 were not retained as analytical options for the MCA because they were less directly comparable with the firm-level strategy options considered in this study. R0 is difficult to observe in hospitality because completely eliminating service components may conflict with customer expectations. R5 was not retained separately because the practices identified in the literature were not sufficiently distinct from repair, renovation, or the use of recovered components. R8 and R9 remain relevant to hospitality, but they usually depend on downstream treatment systems, specialized waste operators, or local infrastructures. Their relevance is considered through infrastructural and stakeholder-related criteria, rather than as strategy options under stronger managerial control by hospitality SMEs. This selection is analytical rather than normative and does not imply that the excluded strategies are unimportant for circularity in hospitality.

The second component of the conceptual framework concerns CE drivers and barriers. Instead of treating them only as antecedents of adoption, the framework operationalizes them as decision inputs for comparing the relative actionability of the selected circular strategy options and clusters them into four dimensions: economic and financial conditions, technological and operational innovation, stakeholder relations, and governance capabilities. This grouping links the classification of circular practices with their subsequent prioritization through MCA. These dimensions are not interpreted as deterministic causes of CE adoption, but as contextual conditions that may facilitate or constrain the implementation of different circular strategy options. The framework is not intended to provide a general theory of circular transition in SMEs, but a decision-support structure for comparing circular strategy options in relation to perceived economic-financial, technological-operational, stakeholder-related, and governance conditions.

3. Methodology

The study adopts a quantitative, multi-stage research design integrating three main components: (i) the development of an analytical framework based on the literature review, (ii) an empirical survey capturing Italian hospitality SMEs' circular practices and perceptions, and (iii) MCA to explore the relative prioritization of circular strategy options (Fig. 1). In the MCA, these options are treated as analytical alternatives for comparison purposes, although they are not mutually exclusive in practice. The design links the identification and classification of circular practices (RQ1) to their evaluation through economic-financial, technological-operational, stakeholder-related, and

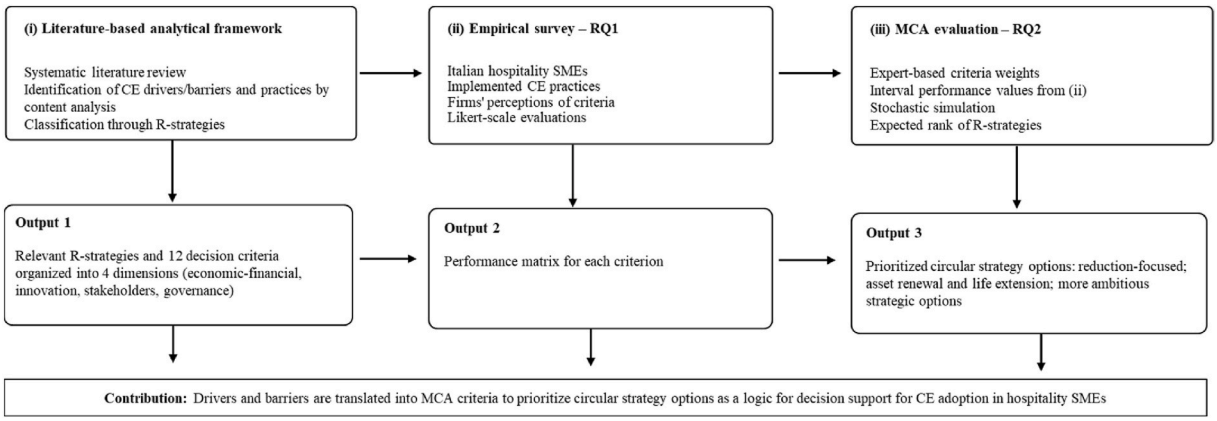

Fig. 1. Research design.

governance criteria under uncertainty (RQ2).

(i) Development of an analytical framework based on literature review

The analytical framework was developed through a structured literature review aimed at identifying CE drivers, barriers, and circular practices relevant to tourism and hospitality businesses, with particular attention to hospitality SMEs and accommodation establishments. The review followed the PRISMA protocol (Page et al., 2021). The review protocol is summarized in Table 2, while the screening and selection process is reported in the PRISMA flow diagram in Fig. 2.

The final corpus was analysed in two sequential steps. First, drivers and barriers explicitly or implicitly mentioned as influencing CE adoption were manually extracted and used to inform the definition of the MCA criteria. Second, the same studies were examined to identify circular practices that could be translated into managerial or operational actions relevant to hospitality SMEs and classified with reference to the R-strategy framework. This process informed the conceptual framework, questionnaire design, and construction of the MCA criteria.

Based on this process, the analytical framework was organized into four dimensions: economic-financial conditions, technological-operational innovation, stakeholder-related conditions, and governance capabilities. This structure builds on the SME-oriented framework proposed by Gennari (2023) and its subsequent adaptation to the tourism and hospitality context by Almici et al. (2025), while related studies further support the relevance of organizational and stakeholder conditions in circular transition (Arranz et al., 2024; Civera et al., 2025).

(ii) Empirical survey capturing CE practices and perceived enabling conditions

Table 2
– Literature review protocol.

Protocol Item	Specification
Database	Scopus
Search date	January 2024
Search terms	(“circular economy” OR “CE”) AND (“tourism” OR “hospitality”)
Search fields	Title, abstract, keywords
Document type and language	English-language, peer-reviewed journal articles
Subject areas	Business, Management and Accounting; Social Sciences; Economics, Econometrics and Finance
Duplicate removal	Single-database search; no duplicates identified
Screening	Full-text availability, title/abstract relevance, and full-text assessment
Analysis and coding	Manual extraction by five researchers; doubtful cases discussed until consensus

The empirical focus on hotels and similar accommodation establishments is consistent with the Tourism Satellite Account framework, which treats accommodation services as activities characteristic of tourism (OECDEuropean UnionUnited NationsWorld Tourism Organization, 2017). The main features of the sampling frame, survey administration, and valid cases are summarized in Table 3.

No specific organizational role was targeted. Among the 15 complete MCA cases, seven respondents were owners or administrators, three administrative managers, and five held other functions. Most had no prior professional experience specifically devoted to CE; therefore, their responses are interpreted as sector-informed perceptions rather than expert assessments.

The questionnaire was developed from the analytical framework based on (i). The first sections collected respondent and firm-level information, while the MCA block asked respondents to evaluate the extent to which each criterion facilitated the adoption of the six circular strategy options (Table 4). Importantly, these evaluations were framed as sector-level perceptions rather than detailed assessments of the respondent's own organization. The survey instructions explicitly asked respondents to consider the hospitality sector in which they operated, regardless of their direct experience with each individual circular practice. Criteria and strategy options were described in concrete terms and accompanied by examples to support a common interpretation of the evaluation task.

Complete criterion-strategy responses were used to construct the MCA performance matrix. Of the 64 responses received, 15 contained complete evaluations for all criterion-strategy combinations required by the MCA; no missing values were imputed. The resulting values represent perceived enabling strength associated with each strategy under each criterion, rather than measured environmental performance or objective firm-level readiness. For every criterion-strategy combination, the mean and standard deviation of the Likert-scale responses were calculated and used to define an interval representation of performance, expressed as $\mu \pm \sigma$ and bounded within the scale limits of 1–7. Given the limited number of complete cases, the empirical component is explicitly exploratory. The resulting MCA ranking is interpreted as a preliminary empirical demonstration of the decision-support framework under the observed assessments, rather than as statistically robust evidence of the relative priority of circular strategies across Italian hospitality SMEs.

(iii) MCA evaluating alternative circular options

The MCA combined two separate inputs. Sector-informed evaluations provided by hospitality-firm respondents were used to construct the performance matrix, while a separate expert survey was used to derive criteria weights. The experts did not evaluate the performance of the circular strategy options; their role was limited to assessing the relative importance of the twelve MCA criteria (Table 5).

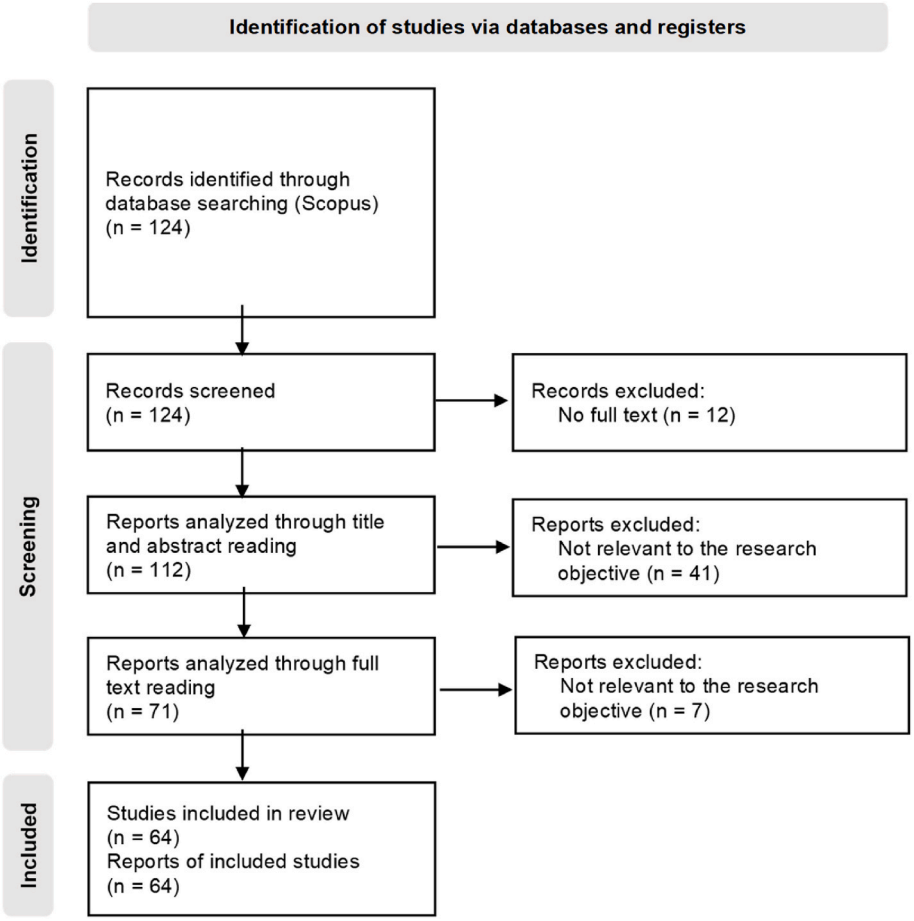

Fig. 2. – Screening process according to PRISMA.

Table 3
Empirical survey design and questionnaire structure.

Reporting Item	Specification
Data source	ATOKA database
Target firms	Italian SMEs (sectoral code NACE/ATECO 55.1, corresponding to ISIC 5510)
SME definition	European Commission criteria
Sampling frame	2066 hospitality SMEs
Survey mode and period	Online questionnaire through Qualtrics (Dec 2024 – Jan 2025)
Recruitment	Institutional e-mail addresses available in ATOKA; three reminders sent
Participation	Voluntary and anonymous
Respondent target	No specific role targeted
Questionnaire structure	Respondent profile; accommodation firm profile; evaluation of circular strategy options against MCA criteria; implemented CE practices
MCA evaluation block	Six circular strategy options evaluated against the 12 criteria reported in Table 4
Evaluation scale	1-7 Likert scale, where 1 = "not at all" and 7 = "very much"
Responses received	64 responses (3% of the target population)
Valid responses by criterion block	C1-C3: 21; C4-C6: 18; C7-C9: 16; C10-C12: 15
Complete MCA cases	15 complete criterion–strategy responses
Missing data treatment	No imputation

Table 4
Dimensions and criteria.

Dimensions	Criteria
Economic and financial	C1. The availability of financial resources (equity and/or debt capital) to support the initial investment
	C2. Tax incentives specifically designed to support the circular economy
	C3. Operating costs
Technological and operational innovation	C4. Green resources availability
	C5. Availability of circular economy-oriented waste management infrastructure
	C6. Technological advancement and research activity within the sector
Stakeholder relations	C7. Presence of value chain stakeholders willing to collaborate in support of the circular economy
	C8. Green awareness among customers
	C9. The existence of regulations, guidelines, and standards supporting the circular economy
Governance	C10. An organizational culture supportive of circularity and change management
	C11. The presence of control and risk management systems for risks associated with circular economy implementation
	C12. Employees' skills, expertise, and experience relevant to circular economy implementation

FUCOM was selected because it requires only n−1 pairwise comparisons, reducing expert burden while explicitly controlling consistency, whereas its interval extension allows uncertainty and variation across expert judgments to be retained rather than collapsed into single-point weights (Pamučar et al., 2018; Xu and Yuan, 2025). Individual judgments were processed through interval FUCOM (Pamučar et al., 2018; Xu and Yuan, 2025), while SMAA was used to estimate the acceptability of each circular strategy option under uncertainty instead of producing a single deterministic ranking (Tervonen and Lahdelma, 2007; Tervonen and Figueira, 2008).

Table 5
Criteria weighting and SMAA model settings.

Model Component	Specification
Expert selection	Purposive sampling
Expertise fields	CE, hospitality SMEs, sustainability, policy
Expert questionnaire	Anonymous online questionnaire: responses could not be linked to names, e-mail addresses, or respondent categories
Useable expert responses	16
Expert task	Assessment of the relative importance of the 12 MCA criteria
Weighting method	Interval FUCOM
Use of weights	Final hierarchical interval weights used in SMAA
SMAA inputs	Interval performance values from firms; interval weights from experts
Criteria direction	Benefit/cost coding applied before normalization
Monte Carlo iterations	2000
Ranking methods	GRP, TOPSIS, VIKOR, COPRAS
Software	Python

4. Results

(i) Development of an analytical framework based on literature review

The literature analysis operationalized the conceptual framework by mapping the circular practices identified in the final corpus with reference to the R-strategy framework. The coding process supported the definition of six circular strategy options relevant to hospitality SMEs (R1, R2, R3, R4, asset renewal (R6-related), and R7). This classification provides the basis for addressing RQ1 and defines the alternatives subsequently compared through MCA.

The mapped practices were not evenly distributed across the circular strategies. R2 was the most visible category in the reviewed literature and included practices related to resource efficiency, waste prevention, refill systems, and reduced use of virgin inputs. R1 was associated with access-based arrangements and shared or collective service solutions, while R3 included the continued use or transfer of goods that remained suitable for use. R4, asset renewal (R6-related), and R7 were represented by more specific practices, respectively related to asset repair, the use of recovered or regenerated components in renovation processes, and the reconfiguration of products or waste materials for different functions.

The coding confirmed that R0, R5, R8, and R9 were not sufficiently suitable as direct MCA alternatives in this study. This does not mean that these strategies are irrelevant to hospitality. Rather, their implementation was either difficult to observe as a distinct firm-level option, not clearly separable from other retained categories, or strongly dependent on external infrastructures and specialized operators. For this reason, the subsequent analysis focuses on the six circular strategy options that can be more directly compared in hospitality SMEs.

(ii) Empirical survey capturing firms' CE practices and perceived enabling conditions

The survey provides exploratory evidence on firms' reported CE practices and sector-informed perceptions of conditions associated with the selected circular strategy options. These evaluations provide the performance input for the subsequent MCA.

4.1. Adoption of CE practices

The descriptive analysis of implemented practices is used to contextualize the circular strategy options retained for the MCA. It is not intended to provide a representative assessment of CE adoption in Italian hospitality SMEs, but to show how the selected circular strategy options are reflected in the practices reported by respondent firms.

The evidence shows that CE engagement is mainly concentrated in practices associated with R2. All respondent firms reported resource-efficiency measures related to energy, water, gas, or thermal insulation. Food waste reduction was reported by 87% of firms, while 73% indicated the use of recycled-content products. Practices linked to R1 were also present, including refill systems replacing single-use products (67%) and rental or leasing solutions (60%). R3 was reflected in the donation or transfer of still useable goods (53%) and in the use of recovered furniture (40%). More demanding practices appeared less frequent, including food waste valorisation (33%), car-sharing services (27%), and the reuse of construction materials or components in renovation processes (20%).

Overall, these descriptive results confirm that the selected circular strategy options are reflected in the sample, but also that CE adoption is concentrated in resource-efficiency and waste-prevention practices. This evidence provides contextual support for the subsequent MCA prioritization, rather than a standalone analysis of CE practice diffusion.

4.2. Criteria influencing circular strategy adoption

The evaluation of the twelve criteria provides the performance input for the MCA (Table 6). The values reflect sector-informed perceptions of economic, technological, stakeholder, and governance conditions considered in relation to the different circular strategy options.

R2 records comparatively high values across several criteria, indicating favourable perceived enabling conditions for reduction-oriented strategies. C12 and C7 show consistently high values across the circular strategy options, suggesting that employee skills and stakeholder collaboration are perceived as transversal enabling conditions. Other criteria display stronger associations with particular options: for example, C5 is comparatively high for asset renewal (R6-related), R3, and R7, suggesting the perceived relevance of CE-oriented infrastructures for strategies involving recovered, regenerated, or reconfigured materials.

These descriptive results indicate different patterns across the criteria for the selected circular strategy options and provide the basis for the subsequent MCA prioritization.

(iii) MCA evaluating alternative circular options

The MCA results show the relative priority of the six circular strategy options considered in the analysis. Average expected ranks across the four ranking methods are reported in Table 7, where lower values indicate better positions.

The robustness analysis indicates that the main pattern is stable, although the alternatives cannot all be clearly distinguished. R2 ranks first across all four ranking methods (GRP, TOPSIS, VIKOR, and COPRAS), with an average expected rank of 2.216. Under GRP, it has a 52.20% probability of ranking first and a 74.65% probability of being among the top two alternatives. The asset renewal (R6-related) option

Table 6
– Sector-informed criteria evaluations by hospitality SME respondents.

Criterion	R1	R2	R3	R4	Asset renewal (R6-related)	R7
C1	4.81	5.33	4.76	5.05	4.62	4.38
C2	4.52	5.00	4.10	4.24	4.14	3.90
C3	4.90	5.14	4.57	4.57	4.81	4.48
C4	5.28	5.11	4.89	4.83	4.67	4.72
C5	4.78	4.72	5.17	5.00	6.06	5.17
C6	4.67	5.39	4.44	4.72	5.28	5.00
C7	5.38	5.31	5.13	5.06	5.13	5.06
C8	5.00	5.13	4.94	4.63	4.88	4.75
C9	4.13	4.81	3.88	4.06	4.31	4.00
C10	4.80	5.20	5.07	5.00	5.07	5.00
C11	4.40	4.87	4.40	4.53	4.80	4.53
C12	5.60	5.73	5.53	5.80	5.73	5.67

R6-related denotes an analytical asset-renewal category retained for traceability to the original coding scheme; it does not represent conventional remanufacturing by hospitality firms.

Table 7
Multicriteria ranking of circular strategy options.

Circular strategy option	Average Expected Rank
R2	2.21625
Asset renewal (R6-related)	3.183750
R4	3.715375
R1	3.886375
R7	3.985125
R3	4.013125

ranks second across all four methods and has a 44.10% probability of being in the top two under GRP. R4 generally occupies an intermediate position, but its separation from the remaining alternatives is less clear. In particular, R1, R7, and R3 have almost identical average expected ranks (3.886, 3.985, and 4.013) and change relative position across the four methods. Therefore, they should be considered a closely competing group instead of interpreted as distinctly ranked alternatives. Kendall's tau coefficients range from 0.600 to 0.867, indicating moderate to high agreement among the four ranking methods and supporting the stability of the overall pattern, but not a precise ordering of the closely ranked alternatives.

On the whole, the results suggest a broad pattern comprising a leading reduction-oriented option, a comparatively favourable position for asset renewal and life extension, and a closely competing set of other circular options. This pattern is not intended as a fixed transition sequence or as evidence of statistically distinct strategy groups, but as an exploratory prioritization under the criteria and uncertainty considered. In this way, the analysis addresses RQ1 by identifying and classifying circular strategy options relevant to hospitality SMEs, and RQ2 by showing how MCA criteria can support their comparative assessment.

5. Discussion

The results support the interpretation of CE adoption in hospitality SMEs as a prioritization problem rather than as the accumulation of isolated circular practices. The MCA compares circular strategy options in terms of their relative actionability when economic-financial, technological-operational, stakeholder-related, and governance conditions are considered jointly. This is particularly relevant in hospitality, where circularity depends not only on resource flows, but also on service routines, customer participation, supplier relations, employee capabilities, and local infrastructures.

The comparatively favourable position of reduction-oriented strategies suggests that circular options that fit more closely with existing service operations may be perceived as more readily actionable under the conditions considered, whereas other strategies may be more sensitive to organizational capabilities, stakeholder coordination, or infrastructural support.

The present study extends this evidence by showing that strategies oriented to resources reduction also emerge favourably when alternative circular options are compared simultaneously against multiple enabling and constraining conditions. Their perceived relative actionability may reflect their closer fit with existing service operations, whereas asset renewal, repair, reuse, repurposing, and service-model changes may be more context-sensitive with respect to organizational capabilities, stakeholder coordination, or infrastructural support.

The robustness analysis reinforces the view that circular strategy prioritization in hospitality SMEs is context-dependent instead of hierarchical. The clearer support for some options suggests that they are more readily actionable under the conditions considered, whereas the weaker discrimination among others suggests that their relative attractiveness should be interpreted in relation to firm capabilities, stakeholder relationships, and external infrastructures. This finding supports a non-linear interpretation of circular transition, in which firms may pursue different combinations of strategies depending on their organizational and contextual conditions rather than following a predefined sequence of increasingly advanced circular options.

5.1. Theoretical implications

From a theoretical perspective, the study extends CE research in services by framing circular adoption in hospitality SMEs as a comparative decision process as opposed to the accumulation of individual practices. This complements Fehrer and Vargo's (2023) service-based interpretation of circularity by showing that service-specific circular strategies can be compared through criteria reflecting organizational capabilities, stakeholder relationships, and external conditions. The findings are also consistent with service-dominant logic, according to which value emerges through resource integration among multiple actors (Lusch and Vargo, 2014). In this sense, the study adds a decision-support perspective to service circularity by considering relational and organizational conditions in relation to the relative actionability of alternative circular strategies.

The findings are consistent with previous hospitality studies showing that CE adoption is often concentrated on operationally visible practices such as resource efficiency and food waste reduction (Filimonau and De Coteau, 2019; Bux and Amicarelli, 2023; Kaszás et al., 2022; Li et al., 2024). The present study extends this evidence by showing that the favourable position of reduction-oriented strategies does not simply reflect their observed diffusion, but also emerges when circular alternatives are compared simultaneously against economic-financial, technological-operational, stakeholder-related, and governance conditions. This may indicate that their perceived relative actionability is associated with their compatibility with existing service operations and with comparatively lower requirements for organizational and inter-organizational change.

A second implication concerns CE drivers and barriers. Previous research has primarily examined them as antecedents or contextual factors that enable or constrain circular adoption (Kirchherr et al., 2018; Rizos et al., 2016; Ahmadov et al., 2025). The present study reconceptualizes these conditions as decision criteria for comparing alternative circular strategies. This shifts the analytical focus from whether specific drivers or barriers are present to how these perceived conditions can be considered jointly when comparing the relative actionability of different strategy options. In doing so, the study connects the literature on CE adoption conditions with a decision-support perspective that is more directly aligned with the strategic choices faced by hospitality SMEs.

Finally, the study extends existing MCA applications in CE. Previous research has applied multi-criteria approaches to circularity indicators, business model selection, practice prioritization, and CE performance assessment (D'Adamo et al., 2024; Somorin et al., 2023; Ghosh et al., 2024; Kaur et al., 2025). The present study differs by applying this logic to hospitality SMEs and by integrating two elements that are usually treated separately: service-relevant circular strategy options and the organizational and contextual conditions associated with their implementation. The contribution lies not in the use of MCA per se, but in the integration of CE practices, drivers, and barriers within a single firm-level prioritization framework for a service context.

Overall, compared with previous studies that have examined circular practices, adoption conditions, or multi-criteria decision support largely as separate research streams, the present study advances the literature by integrating these elements into a single framework that structures the comparison of alternative circular strategy options in relation to perceived implementation conditions in hospitality SMEs.

5.2. Practical and policy implications

For hospitality SMEs, the main practical implication is that circular strategies should be assessed in relation to the conditions required for their implementation rather than selected according to a fixed

hierarchy. The comparatively favourable position of reduction-oriented options suggests that resource efficiency, food waste prevention, and lower material use may be perceived as more compatible with existing service operations (Filimonau and De Coteau, 2019). However, the limited discrimination among some of the other alternatives suggests that their relative attractiveness should be interpreted in relation to firm-specific capabilities and contextual conditions. The proposed framework can provide managers with a structured basis for considering which circular options appear more actionable and which economic, technological, organizational, or relational conditions may warrant attention when evaluating more demanding alternatives. This perspective is particularly relevant for SMEs, where limited resources make simultaneous investment in multiple circular initiatives difficult. Rather than treating the MCA ranking as a prescriptive sequence, managers can use the criteria to structure their consideration of the conditions associated with different strategy options. For example, strategies involving asset renewal, repair, reuse, repurposing, or changes in service models may require different combinations of employee skills, supplier collaboration, customer acceptance, technical knowledge, and access to appropriate infrastructures. In this respect, the framework can help organize consideration of conditions that may be addressed internally and those associated with external actors or local ecosystems.

The same logic may also inform public policy. Rather than assuming a uniform support approach, policymakers may consider how different forms of support relate to the conditions associated with alternative circular strategies. Financial support may facilitate investment-intensive initiatives, while other strategies may depend more strongly on training, technical assistance, circular procurement, collaboration platforms, or infrastructures for reuse, repair, repurposing, and waste valorisation. This extends previous evidence on barriers to CE adoption in SMEs (Rizos et al., 2016; Ahmadov et al., 2025) by suggesting that policy support may be more effective when aligned with the implementation conditions associated with different circular options.

Overall, the decision-support approach can provide managers and policymakers with a basis for moving from generic support for circularity towards a more differentiated consideration of the capabilities and external conditions associated with particular circular strategies. Its use should nevertheless remain context-sensitive, taking into account firm characteristics, local infrastructures, and stakeholder configurations.

6. Conclusions, limitations, and future research

This study examined how circular strategy options can be comparatively assessed in hospitality SMEs when multiple enabling and constraining conditions are considered simultaneously. By combining the classification of service-relevant circular practices with economic-financial, technological-operational, stakeholder-related, and governance criteria, the analysis shows that circular strategies differ in their relative actionability. Reduction-oriented strategies show the most favourable average position across the methods considered, although the robustness analysis also indicates residual uncertainty in the ranking. The relative positions of several other options remain less clearly differentiated. The findings support a context-dependent interpretation of circular transition rather than a fixed hierarchy or predefined sequence of strategies.

The main scientific contribution lies in connecting research streams that have largely developed separately. Previous CE research has examined circular practices, drivers and barriers, organizational capabilities, and stakeholder conditions, while MCA research has provided methods for comparing alternatives under multiple criteria. This study integrates these perspectives by translating circular practices into firm-level strategy options and CE drivers and barriers into explicit decision criteria. Therefore, the novelty of the study lies not in proposing a new circularity taxonomy or a new multi-criteria method, but in developing a service-oriented decision-support framework that incorporates perceived CE adoption conditions into the comparative assessment of alternative circular strategies in hospitality SMEs.

The study also makes a methodological contribution. The proposed multi-stage design links literature-based identification and classification of circular practices, sector-informed perceptions of enabling conditions collected from hospitality-firm respondents, expert-based weighting through interval FUCOM, and uncertainty analysis through SMAA and alternative ranking methods. This combination makes it possible to distinguish between prioritization patterns that are comparatively stable and alternatives whose relative positions cannot be meaningfully separated. Methodologically, the contribution is a replicable decision-support architecture for analysing circular strategy choices under uncertainty instead of a deterministic ranking procedure.

These contributions have broader implications for CE research in service settings. They suggest that the study of circular transition can move beyond documenting the presence of individual practices or cataloguing adoption barriers towards comparing strategic options in relation to multiple organizational and contextual conditions. This perspective may be relevant to other service-based SME contexts in which circularity depends not only on material flows, but also on capabilities, customer participation, stakeholder coordination, and local infrastructures. Future research can build on this approach by testing whether similar patterns emerge across different service industries, institutional contexts, and stakeholder configurations.

Although the empirical analysis focuses on Italian hospitality SMEs, the broader relevance of the proposed decision-support logic may extend beyond this specific setting. SMEs represent 99% of businesses in the European economy (European Commission, n.d.), making their circular transition particularly relevant to broader sustainability objectives. The framework may therefore provide a useful basis for examining circular strategy prioritization in other service-based SME contexts where implementation depends on resource efficiency, organizational capabilities, stakeholder coordination, and local infrastructures. However, its transferability should not be assumed: applications to other sectors or countries would require adaptation to sector-specific criteria, institutional conditions, and stakeholder configurations.

The findings also have practical and policy relevance, although they should not be interpreted as prescriptive rankings. For managers, the framework can provide a structured basis for comparing circular options and considering which capabilities or external conditions may warrant attention when particular strategies are evaluated. For policymakers, the framework provides a basis for considering differentiated forms of support in relation to the implementation requirements associated with different circular options, potentially combining financial incentives with training, technical assistance, collaboration mechanisms, and appropriate local infrastructures.

The study has several limitations. First, the empirical analysis is exploratory and is based on a limited number of complete questionnaires; the low response rate may also involve nonresponse and self-selection bias. Second, the data are self-reported and reflect sector-informed perceptions rather than objective measures of firm-level readiness or environmental performance. Third, the analysis is cross-sectional and does not capture how strategy priorities may evolve as firms develop new capabilities or as contextual conditions change. Fourth, although uncertainty was explicitly incorporated into the MCA, the framework has not yet been validated through longitudinal implementation or repeated application with managers.

Future research should test the framework on larger and more diverse samples, across countries and service industries, and examine its stability under different institutional and infrastructural conditions. Longitudinal studies could investigate whether changes in capabilities, stakeholder relationships, or external support alter the relative actionability of circular strategies over time. Further research could also compare alternative weighting structures, incorporate different stakeholder perspectives, and assess how the framework performs when applied directly in managerial decision processes. These extensions would help establish the external validity of the proposed approach and

clarify its applicability beyond the exploratory hospitality setting examined here.

CRediT authorship contribution statement

Francesca Gennari: Writing – review & editing, Writing – original draft, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Raffaella Cassano:** Writing – review & editing, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Writing – original draft. **Sharareh Khosravi Haftkhani:** Writing – review & editing, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Writing – original draft.

Declaration of competing interest

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

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2026.149741.

Data availability

Data will be made available on request.

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