


## Enablers and Barriers to Circular Economy Adoption: Insights from a Systematic Literature Review in Business and Management

Mohammad Mahoud<sup>1\*</sup>

<sup>1</sup> Università degli Studi di Cassino e del Lazio Meridionale, Cassino, Lazio, Italy

[mohammad.mahoud@unicas.it](mailto:mohammad.mahoud@unicas.it)

\*contact author

ORCID  0000-0002-3513-2738

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### Abstract

The Circular Economy (CE) has emerged as a transformative sustainability paradigm, yet the organisational conditions determining CE adoption success remain poorly understood. Existing research treats enablers and barriers as independent variables, producing fragmented guidance of limited practical value. This study provides an integrative, cluster-based framework mapping CE enablers and barriers as dialectically interdependent forces across internal, hybrid, and external organisational contexts. Following PRISMA 2020 protocols and grounded in socio-technical transition theory and dynamic capabilities, the study screens Scopus and Web of Science for peer-reviewed articles published between 2016 and April 2025, retaining 93 studies for bibliometric and thematic analysis. Manual coding identifies nine enabler clusters, digital technologies; organisational and managerial; innovation and product design; supply chain and logistics; policy and institutional; financial and economic; stakeholder and community; education and awareness; and measurement and frameworks, and eight barrier clusters: organisational misalignment; human-capital and knowledge deficits; cultural and behavioural resistance; technical and infrastructural gaps; policy and regulatory barriers; financial constraints; digital divide; and collaboration barriers.

A structural paradox emerges: dominant enablers, digital technologies, organisational leadership, and policy support simultaneously generate binding constraints when coherence, readiness, or inter-firm trust are absent. The framework equips managers with a diagnostic tool for circular readiness, provides policymakers with evidence-based priorities, and identifies stakeholder engagement, collaboration, and performance measurement as a structured research agenda. Limitations include restrictions to English-language sources and the time-bound scope.

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**Keywords:** Circular Economy; Enablers and Barriers; Systematic Literature Review; Dynamic Capabilities; Socio-Technical Transitions; Organisational Context

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## 1. Introduction

The circular economy (CE) has emerged as a transformative paradigm for restructuring industrial and socio-economic systems by prioritising sustainability, resource efficiency, and waste minimisation (Behl et al., 2023; Pittie, 2025). In contrast to the traditional linear model of “take–make–dispose”, the CE promotes regenerative strategies such as reuse, remanufacturing, recycling, and extended product lifecycles, aiming to decouple economic growth from resource depletion (Geissdoerfer et al., 2017). Empirical evidence increasingly demonstrates that CE adoption can reduce material consumption, lower greenhouse gas emissions, and enhance firm-level competitiveness through innovation and service-based business models (Parida & Wincent, 2019).

According to the Ellen MacArthur Foundation (2015), transitioning to a circular economy could unlock trillions of dollars in economic value while reducing ecological degradation and enhancing resilience. Recent analyses suggest that the Circular Economy could contribute up to USD 4.5 trillion globally by 2030, with some models extending this estimate to USD 9–10 trillion in long-term economic benefits through reduced raw material costs, increased efficiency, and the development of innovative product-service systems (Statista, 2025). These opportunities are particularly evident in high-impact sectors such as manufacturing, construction, consumer electronics, mobility, and packaging, where Circular Economy principles are increasingly integrated into corporate and policy strategies (MarketsandMarkets, 2024). Notably, growth trajectories across these sectors are driven by digital transformation, sustainability mandates, and shifting consumer behaviours, reinforcing the systemic potential of the Circular Economy to reshape industries and economies (Graça, 2021).

Concrete examples of CE adoption illustrate its tangible impacts. In manufacturing, circular strategies, such as product life extension and closed-loop supply chains, have been shown to reduce material costs by up to 30% while improving operational resilience (Kristoffersen et al., 2020). In the construction sector, circular material reuse and modular design approaches have contributed to significant reductions in construction and demolition waste, which accounts for nearly 35% of total waste generated in the European Union (Ruggieri et al., 2016). Beyond waste diversion, scenario analyses developed in collaboration with the World Economic Forum demonstrate that applying circular strategies across six key building materials, including cement, steel, and aluminium, could abate up to 75 per cent of the built environment's embodied carbon emissions while generating substantial net economic benefits by 2050, positioning circularity as both an environmental imperative and a strategic business opportunity for the sector (McKinsey & Company, 2024). Systematic evidence further indicates that realising circular material flows in this sector depends on the development of viable waste trading markets, the effectiveness of which is shaped by a distinct set of governance, operational, and market-based enablers and barriers (Caldera et al., 2020). Similarly, in consumer electronics, design-for-disassembly and take-back systems have enabled higher recovery rates of critical raw materials, supporting both environmental and economic objectives (Bressanelli et al., 2018). These sectoral experiences demonstrate that the CE is no longer a conceptual aspiration but an increasingly operationalised model with measurable impacts.



At the macro level, estimates suggest that a large-scale transition to circular production and consumption systems could unlock substantial economic value while reducing environmental externalities. For instance, CE-oriented strategies have been associated with significant reductions in virgin material demand and energy use across global value chains, particularly in resource-intensive industries such as manufacturing, mobility, and packaging (Kirchherr et al., 2018). Nevertheless, while market-oriented reports project strong growth trajectories for CE-related activities, such figures are inherently time-sensitive and risk diverting attention from the underlying structural conditions that determine whether circular transitions succeed or fail. From a scholarly perspective, the critical issue is not the size of the CE market per se, but the configuration of enablers and barriers that shape the feasibility, pace, and depth of CE adoption across organisational and institutional contexts (Ritzén & Sandström, 2017).

Despite the growing body of CE research, existing studies remain fragmented in their conceptualisation of these enabling and constraining factors. A substantial stream of literature focuses on enablers, particularly digital technologies, Industry 4.0 applications, eco-design, and data-driven business models, portraying them as key accelerators of circular transformation (Bressanelli et al., 2018; Kristoffersen et al., 2020). In parallel, another body of work examines barriers, such as regulatory fragmentation, insufficient financial incentives, inadequate performance measurement systems, and organisational resistance to change (Kirchherr et al., 2018; Ritzén & Sandström, 2017). However, only a limited number of studies explicitly analyse enablers and barriers as interdependent, co-evolving elements within circular ecosystems. Recent reviews confirm that this separation persists across much of the CE literature, resulting in partial explanations of adoption dynamics and limited actionable guidance for practitioners (Fehrer et al., 2024; Jäger-Roschko & Petersen, 2022).

This separation constitutes a significant research gap. Enablers do not operate in a vacuum: their effectiveness is often contingent on the absence of, or mitigation for, organisational, institutional, and cultural barriers. Conversely, barriers may act not only as constraints but also as catalysts for organisational learning and adaptive innovation when addressed strategically. Without an integrative perspective, it remains challenging to explain why similar CE initiatives succeed in some contexts and fail in others. Addressing this gap requires systematic and comparative approaches that jointly examine enablers and barriers across multiple levels of analysis.

To respond to this challenge, this study draws on socio-technical transition theory and the dynamic capabilities framework. Socio-technical transition theory emphasises that systemic change depends on the alignment of technological innovation, institutional arrangements, and social practices, thereby positioning enablers and barriers as interconnected elements of multi-level transitions (Ruggieri et al., 2016). Complementarily, the dynamic capabilities perspective emphasises firms' ability to sense opportunities, seize resources, and reconfigure internal and external competences in response to environmental changes (Parida & Wincent, 2019). Together, these frameworks provide a robust theoretical lens for analysing how CE adoption unfolds across internal organisational processes, inter-organisational networks, and broader policy environments.

Guided by these perspectives, the study addresses the following research questions:

*RQ1: What are the key enablers that drive the implementation of the Circular Economy in business and management contexts?*

*RQ2: What are the main barriers that hinder the effectiveness of these enablers and constrain Circular Economy adoption?*

Methodologically, the study employs a systematic literature review of 93 peer-reviewed articles published between 2016 and 2025 and indexed in Scopus and Web of Science. Using bibliometric techniques combined with thematic coding, the analysis clusters CE enablers and barriers into coherent categories and situates them across internal, hybrid, and external organisational contexts. The results reveal nine enabler clusters and eight barrier clusters, highlighting the dominance of technological and organisational enablers alongside persistent internal and institutional barriers.

This study makes three primary contributions. First, it synthesises a fragmented body of literature by providing an integrated, cluster-based framework that captures both enabling and constraining forces shaping CE adoption. Second, it advances theory by explicitly linking CE enablers and barriers to socio-technical transitions and dynamic capabilities, offering a multi-level explanation of circular transformation processes. Third, it delivers actionable insights for managers and policymakers by identifying underexplored yet critical factors, such as stakeholder engagement, inter-organisational collaboration, and circular performance measurement, that must be addressed to translate circular ambitions into sustained practice.

The remainder of the article is structured as follows. Section 2 reviews the state of the literature on CE enablers and barriers. Section 3 outlines systematic review methodology, including database selection, screening procedures, and analytical techniques. Section 4 presents the empirical results of the clustering analysis. Section 5 discusses theoretical and managerial implications, and Section 6 concludes by outlining limitations and directions for future research.

## 2. Literature Review

The Circular Economy (CE) has emerged as a prominent sustainability paradigm, aiming to reconfigure production and consumption systems away from linear “take–make–dispose” models toward regenerative and restorative logics. Foundational contributions across sustainability, production, and management literatures have clarified the conceptual scope, systemic logic, and business relevance of the CE, positioning it as a strategic response to resource scarcity, environmental degradation, and challenges to long-term value creation.

Among the most influential conceptual works, Geissdoerfer et al. (2017) frame the CE as a systemic sustainability paradigm that extends beyond recycling to encompass value retention, closed material loops, and integrated environmental, economic, and social benefits. Their contribution situates the CE at the intersection of sustainability, innovation, and business transformation, emphasising its potential to reshape organisational strategies and industrial systems. Complementing this perspective, Murray et al. (2017) provide an



interdisciplinary exploration of the CE, arguing that it represents not merely a technical or operational model but a socio-economic transition requiring changes in governance structures, cultural norms, and institutional arrangements. This view highlights the context-dependent nature of CE implementation and reinforces the need for management-oriented and organisational analyses.

As CE scholarship expanded, considerable attention was devoted to clarifying its conceptual boundaries. Kirchherr et al. (2017) analyse 114 definitions of the CE and demonstrate substantial conceptual ambiguity across the literature. While most definitions emphasise resource efficiency, recycling, and material loops, fewer explicitly address social dimensions, business models, or systemic change. Building on this, Korhonen et al. (2018) further identify inherent systemic and ecological limitations embedded in the CE concept itself, cautioning against overly optimistic interpretations that neglect thermodynamic and social complexity. Although this plurality has enriched theoretical debate, it has also contributed to fragmentation in empirical research, particularly in how CE principles are operationalised within organisations and across value chains.

Parallel to these conceptual developments, empirical research has increasingly examined the organisational and operational foundations of CE adoption. Early studies established CE as a regenerative alternative to linear production systems, emphasising eco-design, value retention strategies, and closed-loop supply chains (Tukker, 2015; Ghisellini et al., 2016; Despeisse et al., 2017). Subsequent research embedded the CE within corporate sustainability and business ethics debates, highlighting its potential to reconcile economic value creation with environmental and social responsibility (Bocken et al., 2016; Schaltegger et al., 2016). Systematic reviews of CE business model design further confirm that value creation, stakeholder integration, and resource circularity are co-dependent dimensions that must be addressed simultaneously for sustainable transitions to materialise (Centobelli et al., 2020). Within business and management scholarship, particular emphasis has been placed on organisational leadership, governance structures, and stakeholder engagement as critical determinants of successful CE implementation.

More recent studies have focused explicitly on the conditions that enable or constrain the adoption of CE. A dominant stream of literature foregrounds enablers, often portraying digital technologies, Industry 4.0 applications, and data-driven business models as primary accelerators of circular transformation. In this respect, Massaro et al. (2021) provide a critical link between Industry 4.0 and the CE, demonstrating that both academics and practitioners widely perceive technologies such as IoT, big data analytics, and digital platforms as key enablers of circular business models. However, their analysis also reveals a persistent gap between technological potential and organisational readiness, suggesting that digitalisation alone is insufficient without complementary managerial capabilities and strategic alignment. Similar conclusions are echoed in studies emphasising digital traceability, smart manufacturing, and platform-based coordination as infrastructural enablers of circularity (Kristoffersen et al., 2020; Rejeb et al., 2022).

In contrast, another substantial stream of research focuses on barriers to CE adoption, including regulatory fragmentation, organisational inertia, cultural resistance, limited access to finance, and inadequate performance measurement systems (Ritzén & Sandström, 2017; Kirchherr et al., 2017). These studies highlight how

institutional uncertainty, short-term managerial logics, and misaligned incentives frequently undermine otherwise promising circular initiatives. Importantly, several foundational contributions explicitly acknowledge that unresolved structural and socio-institutional constraints often neutralise technological and organisational enablers. Kirchherr et al. (2017) note that misalignment between policy frameworks, organisational capabilities, and stakeholder expectations limits the scalability of CE initiatives, while Geissdoerfer et al. (2017) caution against overly technocratic interpretations of circularity that neglect governance and social dimensions. Similarly, Schaltegger et al. (2016) argue that sustainability-oriented business models frequently fail to translate into practice due to misalignment between strategic intent and organisational routines.

Despite the maturity of CE scholarship, the literature remains conceptually and analytically fragmented. Enablers and barriers are typically examined in isolation, resulting in partial explanations of the dynamics of CE adoption. Empirical gaps further reinforce the need for integrative approaches. Existing studies disproportionately focus on large firms and European contexts, with comparatively limited attention to SMEs, emerging economies, and cross-regional comparisons (Behl et al., 2023). Methodologically, bibliometric analyses and single-case studies dominate, while comparative, mixed-methods, and multi-level designs remain underutilised (Shojaei et al., 2021). From a managerial perspective, few contributions offer diagnostic frameworks that enable organisations or policymakers to simultaneously assess readiness, opportunities, and constraints associated with circular transformation (Luoma et al., 2022).

Responding to these limitations, recent calls in the literature advocate for multi-level, theory-informed syntheses that capture the interactions among technological, organisational, and institutional factors shaping CE adoption (Geissdoerfer et al., 2017; Kristoffersen et al., 2020; Fehrer et al., 2024). Building on these insights, the present study integrates CE enablers and barriers within a single analytical framework, explicitly linking them to internal organisational processes, hybrid inter-organisational arrangements, and external institutional environments.

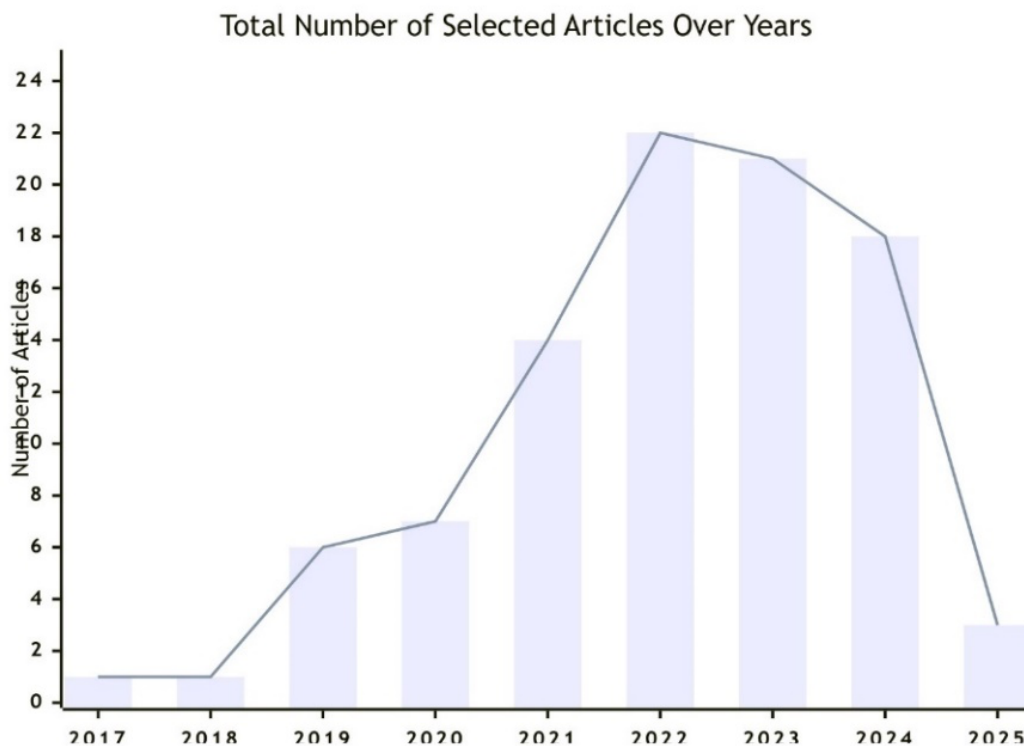
To operationalise this integrative perspective, the qualitative synthesis of 93 peer-reviewed studies clusters conceptually related factors into nine enabler clusters and eight barrier clusters. This cluster-based approach addresses the conceptual fragmentation identified by Kirchherr et al. (2017) by consolidating heterogeneous terminology into analytically coherent categories. Unlike purely bibliometric classifications, it preserves conceptual depth while enabling systematic comparison across studies, sectors, and contexts. By jointly analysing enabling and constraining conditions, this review advances a more actionable, context-sensitive, and theoretically grounded understanding of Circular Economy implementation within business and management research.

## 2.1 Quantitative Analysis of the Literature

The temporal distribution of the 93 selected peer-reviewed articles reveals a marked acceleration in scholarly attention to Circular Economy (CE) enablers and barriers over the past decade. Early foundational contributions, such as Stahel (1982) and Tukker (2004), provided important conceptual underpinnings but remained peripheral to business and management research. A decisive expansion occurred after 2016, driven by policy milestones such

as the European Commission’s Circular Economy Action Plan and the European Green Deal. More than 60% of the analysed studies were published between 2021 and 2024, indicating a clear inflexion point in CE scholarship. This surge coincides with post–COVID-19 recovery efforts, heightened sustainability reporting requirements, and increasing managerial interest in supply chain resilience, resource efficiency, and circular innovation (Behl et al., 2023). While publications were sporadic prior to 2020, the 2022 peak and sustained output in subsequent years confirm the consolidation of CE research within the management field (Figure 1).

Figure 1. Yearly Distribution of CE-Related Articles (2017–2025).



Source: Author’s elaboration.

## 2.2 Qualitative analysis and the clusterisation process

Beyond temporal and geographical trends, a qualitative synthesis was conducted to extract conceptual patterns from the 93 selected articles. The objective was to systematise the fragmented terminology used in the Circular Economy (CE) literature by clustering recurring concepts into coherent analytical categories. This step was necessary because similar phenomena, such as digital innovation, smart manufacturing, and IoT-enabled systems, are often inconsistently labelled across studies, hindering the development of cumulative knowledge.

Following the quantitative screening, all articles were manually coded using Microsoft Excel and Zotero. Segments referring to CE enablers and barriers were identified, tagged, and cross-compared. Conceptually similar

terms were then aggregated into homogeneous clusters, resulting in two classification frameworks: nine enabler clusters and eight barrier clusters. Cluster titles were assigned to reflect the dominant thematic logic underlying each group, ensuring internal coherence and analytical transparency. Unlike automated text-mining approaches, manual clustering enabled contextual interpretation and preserved conceptual depth across disciplinary perspectives.

The enabler analysis identifies Digital Technologies as the most prominent cluster, encompassing Industry 4.0 applications such as IoT, artificial intelligence, blockchain, and data analytics that support traceability, real-time monitoring, and closed-loop systems (Kristoffersen et al., 2020; Rejeb et al., 2022). Organisational and Managerial Factors constitute a second critical cluster, highlighting the leadership commitment, governance structures, and change management capabilities required to align strategy with circular objectives (Seles et al., 2022). Innovation and Product Design, including eco-design, modularity, and design for disassembly, facilitate value retention and lifecycle extension (Despeisse et al., 2017). At a network level, Supply Chain and Logistics enablers stress reverse logistics, industrial symbiosis, and inter-firm collaboration (Ripanti & Tjahjono, 2019). Additional clusters, Policy and Institutional Support, Financial and Economic Mechanisms, Measurement and Frameworks, Stakeholder and Community Engagement, and Education and Awareness, appear less frequently but are essential for legitimising, financing, measuring, and socially embedding CE initiatives (Luoma et al., 2022; Sohal et al., 2022).

Conversely, the barrier analysis reveals eight recurring constraint clusters that often mirror enablers in inverse form. Organisational Misalignment is the cited barrier, reflecting siloed structures, short-term decision-making logics, and a lack of cross-functional integration (Patel et al., 2023). Human Capital and knowledge deficits, as well as cultural and Behavioural Resistance, further impede adoption by reinforcing linear mindsets and limiting CE-related competencies (Ritzén & Sandström, 2017). Collaboration Barriers arise from mistrust, power asymmetries, and reluctance to share data across networks (Rajput & Singh, 2019), while Financial Constraints reflect high upfront investments and uncertain returns, particularly for SMEs (Ghisetti & Montresor, 2020). At the systemic level, Policy and Regulatory Barriers, Technical and Infrastructural Gaps, and the Digital Divide constrain the diffusion of CE, especially in emerging and resource-constrained contexts (European Commission, 2020; Modgil et al., 2024).

Overall, the clusterisation highlights that CE adoption is shaped by a delicate balance between enabling and constraining forces. Digital technologies and policy frameworks, for instance, act simultaneously as catalysts and sources of inequality when organisational capabilities or institutional coherence are lacking. The uneven distribution of scholarly attention—favouring technological enablers while underexploring social, financial, and collaborative dimensions—reveals a persistent bias toward technological optimism. This structured clustering, therefore, provides a robust foundation for the comparative synthesis in Section 3.3, while explicitly identifying conceptual blind spots and avenues for future research.

### *2.3 Comparative Synthesis: Enablers versus Barriers across Contexts*

The comparative synthesis reveals that the adoption of Circular Economy (CE) is shaped by a structurally interdependent, and often paradoxical, relationship between enablers and barriers operating across internal, hybrid, and external contexts. Rather than functioning as independent forces, many enablers exhibit a dual character, in which their effectiveness depends on mitigating the constraints they address.

At the internal level, digital technologies represent the most frequently cited enabler, supporting traceability, process optimisation, and closed-loop systems. However, their transformative potential is frequently constrained by the digital divide, limited absorptive capacity, and skill shortages, particularly among SMEs and firms in resource-constrained settings. Similarly, organisational leadership and strategic commitment emerge as critical enablers of circular transformation, yet their absence—manifested as organisational misalignment, siloed decision-making, and short-term performance logics—constitutes the most pervasive internal barrier. These findings indicate that technological readiness alone is insufficient without complementary managerial and cultural capabilities.

At the hybrid level, supply chain integration, industrial symbiosis, and stakeholder collaboration offer significant opportunities for scaling CE practices beyond firm boundaries. However, these relational enablers are consistently undermined by collaboration barriers, including trust deficits, power asymmetries, weak governance mechanisms, and limited data-sharing infrastructures. This tension highlights the relational fragility of circular systems, where inter-organisational coordination becomes both a prerequisite for and an obstacle to systemic circularity.

At the external level, policy frameworks, regulatory incentives, and institutional support play a decisive role in legitimising and accelerating CE adoption. However, fragmented, inconsistent, or poorly enforced regulations often become binding constraints, generating uncertainty and discouraging long-term investment. This reinforces the observation that external enabling conditions must be coherent, stable, and aligned with organisational and network-level capabilities to be effective.

Conceptually, these patterns align with socio-technical transition theory (Geels, 2002), which emphasises the co-evolution of technologies, institutions, and social practices, as well as with dynamic capabilities theory (Teece, 2007), which underscores the importance of firms' ability to sense, seize, and reconfigure resources under conditions of systemic change. The comparative lens adopted in this study advances existing CE research by explicitly framing enablers and barriers as dialectically linked rather than analytically separable. Consequently, successful CE transitions require not the accumulation of isolated enablers, but their coordinated orchestration across multiple contexts and institutional layers—a perspective that offers both theoretical refinement and actionable insight for future research and practice.

### 3. Materials and Methods

This study employs a Systematic Literature Review (SLR) to identify, classify, and synthesise the enablers and barriers influencing the implementation of Circular Economy (CE) within business and management contexts. The choice of an SLR responds to the need for a transparent, reproducible, and theory-informed synthesis of a fragmented and rapidly expanding body of CE research. In line with established methodological guidance, the review follows the foundational frameworks proposed by Tranfield et al. (2003) and Kitchenham (2004) and is further aligned with best practices in recent CE-focused systematic and structured literature reviews (Merli et al., 2018; Benachio et al., 2020; Massaro et al., 2021; Secinaro et al., 2025).

Consistent with Merli et al. (2018), the SLR was selected to overcome the limitations of narrative reviews by providing a systematic, auditable process for identifying, selecting, analysing, and reporting the literature. Following Denyer and Tranfield (2009), the review integrates quantitative (descriptive and bibliometric) and qualitative (thematic and content-based) analyses, enabling a comprehensive examination of CE enablers and barriers across organisational and inter-organisational contexts.

#### Review protocol and design

The review protocol was developed *ex ante* to ensure methodological rigour and replicability. Drawing on Tranfield et al. (2003) and the structured review logic adopted by Benachio et al. (2020), the review process followed three overarching stages:

- (1) planning the review,
- (2) conducting the review, and
- (3) reporting and synthesising the results.

These stages were operationalised through a sequence of interrelated steps commonly applied in high-quality management SLRs (Briner & Denyer, 2012; Merli et al., 2018):

- Definition of the research objectives and review scope;
- Development of a transparent search strategy;
- Identification and screening of relevant studies;
- Quality assessment of included sources;
- Data extraction, coding, and synthesis.

This protocol is consistent with the principles of transparency, replicability, and updatability emphasised by Benachio et al. (2020) and widely adopted in CE-related systematic reviews.

#### 3.1 Search strategy and databases

To ensure comprehensive coverage of the literature, a systematic search was conducted on April 16, 2025, on *Web of Science (WoS)* and *Scopus*. These platforms were selected for their robust peer-review standards and extensive coverage across management and social science disciplines (Abdalla et al., 2024). The search strategy employed

a dual-layered Boolean logic, targeting titles and abstracts to maximise relevancy and minimise oversight. The search was restricted to English-language, peer-reviewed journal articles and review papers published between 2016 and 2025, specifically within the "Business" and "Management" subject categories (Han et al., 2025). This disciplinary filter was adopted to ensure the inclusion of academically credible and thematically relevant studies (Merli et al., 2020; Seuring & Müller, 2008). To ensure full replicability, the exact search queries, as copied and pasted from each database interface, are reported below.

### **Scopus search query (executed on 16 April 2025)**

*(TITLE ("circular economy") OR ABS ("circular economy"))*  
*AND*  
*(TITLE-ABS-KEY (enabler OR enablers OR facilitator OR facilitators OR driver OR drivers OR barrier OR barriers OR obstacle OR obstacles OR challenge OR challenges))*  
*AND*  
*(LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re"))*  
*AND*  
*(LIMIT-TO (LANGUAGE, "English"))*  
*AND*  
*(PUBYEAR > 2015 AND PUBYEAR < 2026)*  
*AND*  
*(LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "SOCI"))*

### **Web of Science search query (executed on 16 April 2025)**

*TS= ("circular economy")*  
*AND*  
*TS= (enabler OR enablers OR facilitator OR facilitators OR driver OR drivers OR barrier OR barriers OR obstacle OR obstacles OR challenge OR challenges)*  
*AND*  
*DOCUMENT TYPES: (Article OR Review)*  
*AND*  
*LANGUAGES: (English)*  
*AND*  
*PUBLICATION YEARS: (2016–2025)*

The Scopus query returned 73 records, and the Web of Science query returned 55, for a total of 128 records prior to deduplication.

### 3.2 Screening and eligibility criteria

The initial search returned 128 articles, 73 from Scopus and 55 from WoS. These records were exported in RIS format, imported into Zotero for automated duplicate detection, and screened manually to remove any remaining redundancies. Articles were excluded if they focused on non-business domains (e.g., education, art, urban studies) or if Circular Economy enablers/barriers were only superficially mentioned without conceptual or empirical integration (Abatecola et al., 2013; Denyer et al., 2008; Xu et al., 2022). The final dataset included 93 unique articles relevant to the research objectives; the process is explained in Table 1.

Table 1: Database Search and Filtering Criteria for Article Selection (2016–2025)

Research Steps	Details	SCOPUS	WOS
<b>Research Framework</b>	Keyword Selection: “Circular Economy Enablers”	<b>279</b>	<b>368</b>
	Publication Years Between 2016 and 2025	<b>278</b>	<b>367</b>
	Document Types: Article and Review	<b>207</b>	<b>320</b>
	Subject Area Categories: Business and Management	<b>73</b>	<b>55</b>
	Languages: English	<b>73</b>	<b>55</b>
Elimination of Duplication		<b>93</b>	

Source: Author’s elaboration.

Exclusion criteria were applied to filter out:

- Non-business domains (e.g., education, urban design, art studies)
- Studies that only mentioned Circular Economy enablers/barriers superficially without conceptual or empirical analysis
- Non-peer-reviewed publications (conference proceedings without full peer review, editorials, or book reviews) (Denyer et al., 2008; Xu et al., 2022).

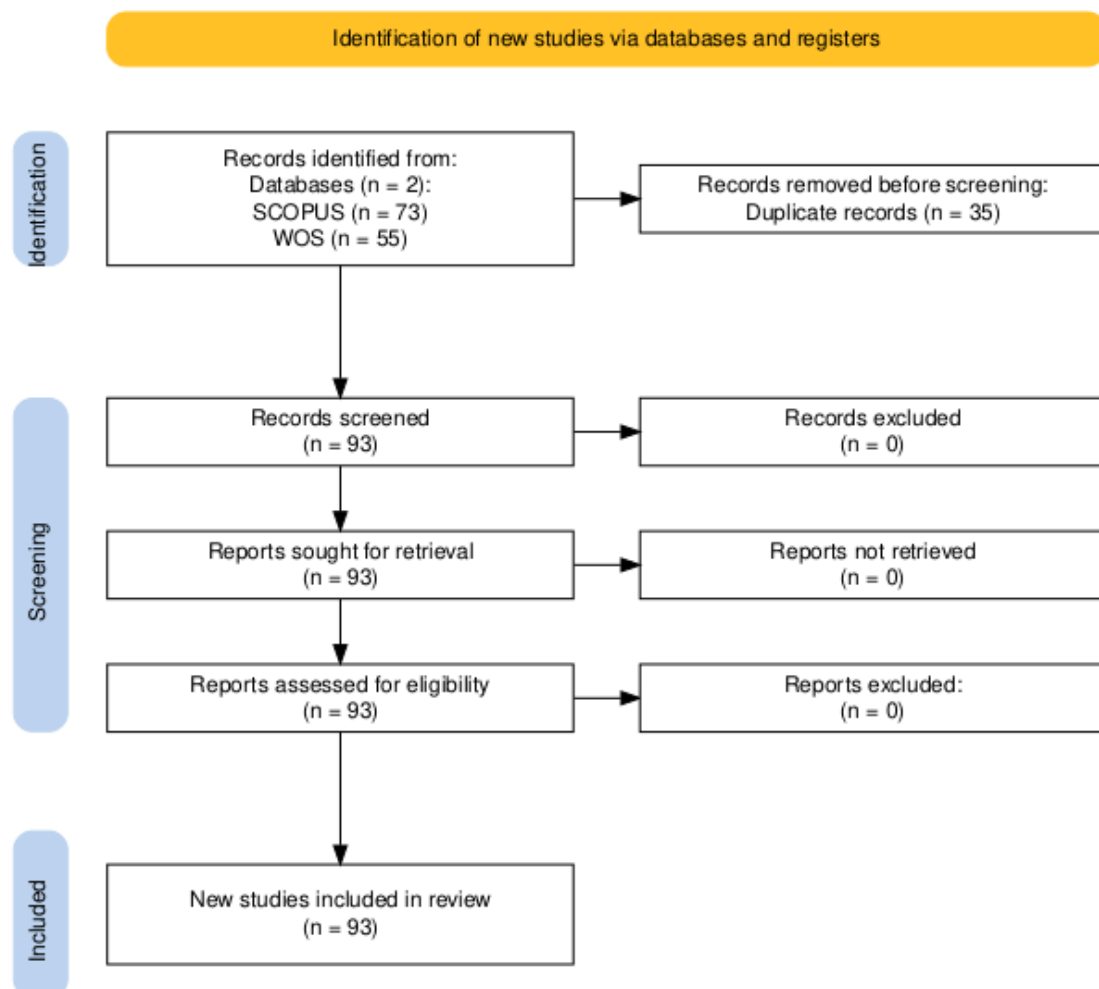
A multi-stage screening process was applied:

1. Title and abstract review
2. Full-text eligibility check
3. Cross-check against research objectives (relevance to Circular Economy enablers/barriers in organisational contexts)

### 3.3 PRISMA flow

The multi-stage screening process is documented in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021). Figure 2 presents the PRISMA flow diagram visually, detailing the identification, screening, eligibility, and inclusion stages (Moher et al., 2009; Haddaway et al., 2022). Searches were conducted in Scopus and Web of Science Core Collection, yielding a total of 128 records (Scopus: 73; Web of Science: 55). All retrieved records were exported and managed using reference management software, where 35 duplicate records were identified and removed prior to screening, resulting in 93 unique records.

Figure 1. PRISMA 2020 flow diagram of the study selection process.<sup>1</sup>



Source: Author's elaboration.

<sup>1</sup> Note. The diagram was generated using the official PRISMA 2020 online ShinyApp tool. (<https://www.prisma-statement.org/prisma-2020-flow-diagram>)

Title and abstract screening were undertaken using a theory-driven approach based on the CIMO framework (Context–Intervention–Mechanism–Outcome). Given the specificity of the search strategy, focusing explicitly on Circular Economy adoption within business and management research, with particular emphasis on enablers and barriers, all non-duplicate records demonstrated conceptual relevance at the screening stage. As a result, no records were excluded during title and abstract screening, and all 93 records were retained for full-text retrieval. All screened records were subsequently retrieved for full-text, and all full-text articles were successfully obtained. At the eligibility stage, each retrieved article met the predefined inclusion criteria. Consequently, no reports were excluded at the full-text eligibility stage, and 93 studies were included in the final qualitative synthesis. The absence of exclusions at the screening stage reflects a methodologically justified and deliberate outcome, rather than a limitation of the review process. First, the database search strategy was designed to be highly specific, combining Circular Economy terminology with explicit references to enablers and barriers within business and management domains. This specificity substantially reduced the likelihood of retrieving irrelevant records. Second, the application of the CIMO framework at the screening stage emphasises theoretical and conceptual alignment rather than superficial keyword matching. By evaluating each record in terms of its contextual relevance, intervention focus, underlying mechanisms, and reported outcomes, the screening process ensured that all retained studies met the minimum conceptual criteria for inclusion. In systematic reviews adopting theory-driven or framework-based screening approaches, it is methodologically acceptable for no records to be excluded at the screening stage when search strategies are narrowly defined and conceptually aligned (Page et al., 2021).

### *3.4 Data extraction and coding*

A structured Excel-based coding protocol complemented by Zotero tagging and the SLR-Tool platform was developed to extract metadata from each study, including:

- Publication year, journal, and country of first author;
- Methodological design (qualitative, quantitative, mixed);
- Scope and context of CE implementation (internal, hybrid, or external);
- Identification of enablers and/or barriers.

### *3.5 Quality assessment of sources*

Beyond inclusion and exclusion criteria, additional steps were taken to ensure the quality and reliability of the selected studies. Specifically:

- Only journals indexed in Scopus and WoS Core Collection were considered, ensuring peer-reviewed credibility.
- To assess the reliability of the evidence base, journals were evaluated using Scimago Journal Rankings (SJR), and through ABS (Chartered Association of Business Schools) rankings where applicable. Over 70% of the included articles were published in Q1 or Q2 journals, ensuring academic robustness.

- Studies with higher citation counts and publications in journals with established impact factors were prioritised during synthesis to strengthen reliability.
- At the same time, emerging studies published in reputable outlets but not yet widely cited were included to capture the latest trends (Jäger-Roschko & Petersen, 2022; Fehrer et al., 2024).

### *3.6 Analytical procedures*

The analysis combined bibliometric techniques with thematic synthesis. Bibliometric indicators were employed to map temporal trends, geographic distribution, and author affiliations. Thematic synthesis was used to cluster enablers and barriers into nine and eight categories, respectively. Each cluster was then cross-referenced with relevant theoretical frameworks (e.g., socio-technical transitions and dynamic capabilities) to enrich interpretation.

This systematic process provided both quantitative breadth and qualitative depth, enabling a comprehensive understanding of CE enablers and barriers across organisational contexts.

## **4. Results**

By applying the previously presented methodology to extract the enablers and their barriers, 9 clusters of enablers (Table 2) and 8 clusters of barriers (Table 3) were identified. Table 2 presents the names of the clusters, the enablers that generated the clusters, the frequency in terms of the number of papers that analysed the enablers, the percentage of the total, the nature and relevance of the cluster of enablers in the Circular Economy and, finally, the references of the papers that studied the enablers. The same logic is followed in Table 3, which is dedicated to the barriers that block the enablers and their activation in organisations. In particular, Table 3 is dedicated to the barriers as elements that could hinder the activation of the enablers and, consequently, the development of the Circular Economy, which also contributes, in different ways, to limit the integration of actors in creating value for the Circular Economy.

Table 2. Nature and relevance of Enabler clusters in the Circular Economy

#	Cluster	Enablers	Frequency (N)	Percentage (%)	Nature and Relevance in CE	Applied Methodologies	Findings	References
1	Digital Technologies	Blockchain Internet of Things (IoT) Artificial Intelligence (AI) Digital Twin Big Data & Analytics Cyber-Physical Systems Cloud computing Smart contracts Digital supply chains Circular digital platforms	25	27.2%	Represents critical enablers, including IoT, AI, blockchain, and data analytics, that enhance resource efficiency, traceability, and informed decision-making across circular systems.	Predominantly empirical (surveys, case studies), supported by systematic reviews and conceptual analyses of Industry 4.0 technologies.	Digital technologies enable CE through enhanced traceability, data integration, and coordination of closed-loop systems; effectiveness depends on organisational readiness.	Aponte (2024), Atif (2023), Azizov (2024), Böhmecke-Schwafert et al. (2022), Bressanelli et al. (2021), Burmaoglu et al. (2023), Ferreira et al. (2024), Garmulewicz et al. (2018), Hong Nham & Ha (2022), Huynh (2022), Kerin & Pham (2020), Khanzode et al. (2023), Khan et al. (2024), Kristoffersen et al. (2020), Liu et al. (2022), Modgil et al. (2024), Prakash & Ambedkar (2023), Rajput & Singh (2019), Rejeb et al. (2022), Rejeb et al. (2022) (second article), Rusch et al. (2023), Schöggel et al. (2024), Sharma et al. (2021), Shojaei et al. (2021), Truant et al. (2024)
2	Organisational & Managerial	Dynamic Capabilities Leadership commitment Strategic vision planning	13	14.1%	Leadership commitment, strategic alignment, and effective internal change management are crucial for the successful implementation and	Mainly empirical (surveys, case studies), complemented by conceptual and review studies on organisational	Leadership, strategic alignment, and organisational learning enable CE integration; misalignment and weak change	Ababio and Lu (2023), Brogi and Menichini (2024), Cherrafi et al. (2022), Hussain and Malik (2020), Khan et al. (2024), Mishra et al. (2019), Mura et al. (2020), Sabale et al. (2025), Sabat et al. (2022), Seles et al. (2022), Tuni et al. (2024), Van

		Corporate environmental management Cross-functional collaboration Internal sustainability policies Organisational learning Reverse logistics adoption			integration of CE into business models.	change and management.	management limit effectiveness.	Keulen and Kirchherr (2021), Von Kolpinski et al. (2023)
3	Innovation & Product Design	Eco-innovation Eco-design Modular flexible product design Product-Service Systems (PSS) Additive manufacturing (3D printing) Remanufacturing & refurbishment Green R&D	13	14.1%	Focuses on eco-design, modularity, remanufacturing, and PSS to extend product lifecycles and minimise material throughput.	Primarily empirical (case studies, surveys), supported by conceptual and review-based design studies.	Eco-design, PSS, and remanufacturing extend product lifecycles and reduce material intensity; adoption depends on design capabilities and market acceptance.	Gong et al. (2020), Despeisse et al. (2017), Chakraborty et al. (2024), Gebhardt et al. (2022), Alamerew and Brissaud (2020), Ardakani et al. (2024), Vence and Pereira (2019), Mondal et al. (2023), Lisi et al. (2024), Charef et al. (2022), Wu and Pi (2023), Meath et al. (2022), Ezeudu and Kennedy (2024)
4	Supply Chain & Logistics	Circular supply chain design Reverse logistics	11	12.0%	Emphasises reverse logistics, closed-loop systems, and inter-firm	Mainly empirical (case studies, surveys), with some	Closed-loop supply chains and reverse logistics facilitate	Amir et al. (2023), Nyffenegger et al. (2024), Ripanti and Tjahjono (2019), Mishra et al. (2023), Behl et

		Green logistics Transparency & traceability Supplier collaboration Lifecycle thinking Short/closed supply chains recycling			collaboration to circulate resources and minimise waste.	modelling and review-based supply chain analyses.	resource circulation, with effectiveness dependent on inter-firm coordination and information sharing.	al. (2023), Bag et al. (2022), Fernando et al. (2023), Yang et al. (2019), Sorin and Sivarajah (2021), Yu et al. (2021), Rehman et al. (2023).
5	Policy & Institutional	Environmental regulations Circularity policies Institutional entrepreneurship Government incentives Extended Producer Responsibility (EPR) ISO 59004 & voluntary standards Public consultation	10	10.9%	Reflects the importance of supportive regulations, standards, public incentives, and institutional legitimacy for the widespread adoption of CE.	Predominantly empirical policy analyses and case studies, supported by comparative and review-based studies.	Regulatory clarity, standards, and public incentives facilitate the diffusion of CE; however, fragmentation and weak enforcement reduce its impact.	Alonso-Almeida et al. (2021), Arana-Landin et al. (2024), Beheshti et al. (2024), Das et al. (2023), Jäger-Roschko and Petersen (2022), Mhatre et al. (2023), Münch et al. (2022), Nielsen and Hakala (2023), Reike et al. (2023), Stumpf et al. (2021)
6	Education & Awareness	Sustainability culture Environmental awareness	9	9.8%	Reflects the role of training, knowledge dissemination, and a culture of sustainability in enabling circular	Mainly surveys, case studies, and qualitative empirical analyses.	Training, awareness, and sustainability culture foster CE capabilities; low	Nobre and Tavares (2021), Mondal et al. (2023), Agarwal et al. (2022), Patel et al. (2023), Sohal et al. (2022), Shayganmehr et al. (2021),

		<p>Training &amp; Education</p> <p>Knowledge management</p> <p>Attitude toward CE</p> <p>Green Mindset</p>			behaviour and capabilities.		literacy constrains behavioural change.	Koohmishi et al. (2025), Singh et al. (2021), Dohale et al. (2023)
7	Stakeholder & Community	<p>Interorganizational collaboration</p> <p>Stakeholder engagement</p> <p>Ecosystem orchestration</p> <p>Multi-actor networks</p> <p>Community-driven CE</p>	5	5.4%	Reflects the need for ecosystem collaboration, co-creation, and multi-actor engagement to scale CE transitions.	Qualitative case studies, network analysis, and conceptual frameworks.	Multi-actor collaboration and stakeholder engagement facilitate the scaling of CE; however, weak coordination limits ecosystem performance.	Luoma et al. (2022), Barford and Ahmad (2023), Sandvik and Stubbs (2019), Mangla et al. (2021), Del Vecchio et al. (2024)
8	Financial and Economic	<p>Financial incentives</p> <p>Economic viability</p> <p>Cost reduction</p> <p>ROI for CE</p> <p>Self-financing and public funding</p> <p>Circular value proposition</p>	4	4.3%	Captures cost-benefit logic, funding mechanisms, and circular value creation needed to make CE investments viable.	Empirical analyses, surveys, and conceptual economic modelling.	Financial incentives and viable value propositions are essential; high upfront costs and uncertain ROI constrain CE investment.	Rizos and Bryhn (2022), Rashid et al. (2023), Ghisetti and Montresor (2020), Formentini et al. (2022)

9	Measurement & Frameworks	CE indicators CE assessment tools (e.g. LCA, MFA) Decision support tools CE metrics Fuzzy/MCDM frameworks	2	2.2%	It involves CE metrics, LCA tools, and decision-support systems that enable firms to evaluate, benchmark, and enhance their circular performance.	Decision-support modelling and multi-criteria assessment frameworks.	CE indicators enable benchmarking and decision-making; a lack of standardised metrics limits comparability and adoption.	Sinha (2022), Kristoffersen et al. (2021)
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Source: Author's elaboration.

Table 3. Nature and relevance of Barrier clusters in the Circular Economy

#	Cluster	Main Barriers Identified	Frequency (N)	Percentage (%)	Nature and Relevance in CE	Applied Methodologies	Findings	References
1	Organisational Misalignment	Lack of CE integration in strategy, weak cross-departmental coordination, and absence of leadership commitment	18	19.6%	Lack of vision, leadership, or strategy integration weakens internal momentum and disrupts CE planning.	Systematic literature review combining qualitative synthesis and descriptive analysis.	Strategic misalignment and weak leadership consistently hinder CE integration, slowing cross-functional coordination and implementation.	Nobre and Tavares (2021), Despeisse et al. (2017), Khanzode et al. (2023), Bag et al. (2022), Rizos and Bryhn (2022), Patel et al. (2023), Sohal et al. (2022), Sinha (2022), Yang et al. (2019), Nielsen and Hakala (2023), Luoma et al. (2022), Brogi and Menichini (2024), Mishra et al. (2019), Barford and Ahmad (2023), Mangla et al. (2021), Atif (2023), Prakash and Ambedkar (2023), Azizov (2024).

2	Human Capital & Knowledge Deficits	Lack of skilled personnel, limited interdisciplinary collaboration, and insufficient CE training	14	15.2%	This includes a shortage of CE-trained professionals, limited awareness, and insufficient cross-disciplinary collaboration in CE projects.	Systematic literature review with qualitative thematic coding.	Skills shortages, low CE awareness, and weak interdisciplinary collaboration constrain CE adoption and the development of CE capabilities.	Seles et al. (2022), Chakraborty et al. (2024), Khan et al. (2024), Kristoffersen et al. (2020), Behl et al. (2023), Rashid et al. (2023), Shayganmehr et al. (2021), Lisi et al. (2024), Singh et al. (2021), Shojaei et al. (2021), Cherrafi et al. (2022), Dohale et al. (2023), Formentini et al. (2022), Aponte (2024)
3	Cultural & Behavioural Resistance	Linear consumption habits, stakeholder inertia, resistance to change, and low awareness	12	13.0%	Describes entrenched linear mindsets, low environmental awareness, and stakeholder inertia that impede CE transformation.	Systematic literature review with thematic synthesis.	Entrenched linear mindsets, low environmental awareness, and resistance to change hinder CE transition across stakeholders.	Agarwal et al. (2022), Reike et al. (2023), Vence and Pereira (2019), Sabat et al. (2022), Charef et al. (2022), Sorin and Sivarajah (2021), Schögl et al. (2024), Meath et al. (2022), Truant et al. (2024), Kerin and Pham (2020), von Kolpinski et al. (2023), Del Vecchio et al. (2024)
4	Technical & Infrastructural Gaps	Inadequate reverse logistics, recycling facilities, and incompatibility with existing systems	11	12.0%	It refers to poor recycling facilities, limited digital infrastructure, and weak reverse logistics, especially in legacy industries.	Systematic literature review with cluster-based thematic coding.	Insufficient infrastructure, weak reverse logistics, and system incompatibility constrain CE implementation, particularly in legacy sectors.	Amir et al. (2023), Gong et al. (2020), Rejeb et al. (2022), Koohmishi et al. (2025), Wu and Pi (2023), Sandvik and Stubbs (2019), Rehman et al. (2023), Ezeudu and Kennedy (2024), Beheshti et al. (2024), Tuni et al. (2024), Ferreira et al. (2024)
5	Policy & Regulatory Barriers	Fragmented policies, regulatory uncertainty, lack of enforcement, and misalignment	11	12.0%	Concerns include unclear policies, fragmented regulation, and inconsistent standards that impede CE	Systematic literature review with cross-study thematic synthesis.	Fragmented and inconsistent regulatory frameworks, weak enforcement, and governance misalignment	Ababio and Lu (2023), van Keulen and Kirchherr (2021), Ripanti and Tjahjono (2019), Gebhardt et al. (2022), Das et al. (2023), Garmulewicz et al. (2018), Stumpf et al. (2021), Mondal et al. (2023), Alonso-

		between levels of governance			alignment and investments.		create uncertainty and discourage CE investments.	Almeida et al. (2021), Burmaoglu et al. (2023), Huynh (2022)
6	Financial Constraints	High investment costs, limited access to green finance, long payback periods, and risk aversion	10	10.9%	This includes a lack of capital, uncertain ROI, and weak financing channels, which are particularly hindering SME participation.	Systematic literature review with comparative thematic analysis.	High upfront costs, limited access to green finance, long payback periods, and risk aversion constrain CE adoption, particularly among SMEs.	Nyffenegger et al. (2024), Mhatre et al. (2023), Mishra et al. (2023), Fernando et al. (2023), Ardakani et al. (2024), Ghisetti and Montresor (2020), Mura et al. (2020), Jäger-Roschko and Petersen (2022), Arana-Landin et al. (2024), Khan et al. (2024)
7	Digital Divide	Low digital maturity, unclear ROI on digital technologies, and infrastructure limitations	8	8.7%	Refers to unequal access to digital tools, poor system interoperability, and resistance to tech integration in circular systems.	Systematic literature review with thematic synthesis.	Low digital maturity, infrastructure gaps, interoperability issues, and uncertain returns limit the effective deployment of digital technologies for CE.	Modgil et al. (2024), Mondal et al. (2023), Böhmecke-Schwafert et al. (2022), Liu et al. (2022), Hong Nham and Ha (2022), Kristoffersen et al. (2021), Sabale et al. (2025), Rusch et al. (2023)
8	Collaboration Barriers	Lack of trust, high transaction costs, poor value chain coordination, and data-sharing hesitancy	8	8.7%	It involves a lack of trust, high coordination costs, and fragmented stakeholder networks obstructing circular ecosystems.	Systematic literature review with thematic synthesis.	Trust deficits, high coordination costs, and reluctance to share data hinder inter-organisational collaboration in CE systems.	Bressanelli et al. (2021), Hussain and Malik (2020), Rajput and Singh (2019), Alamerew and Brissaud (2020), Münch et al. (2022), Rejeb et al. (2022), Yu et al. (2021), Sharma et al. (2021)

Source: Author's elaboration.

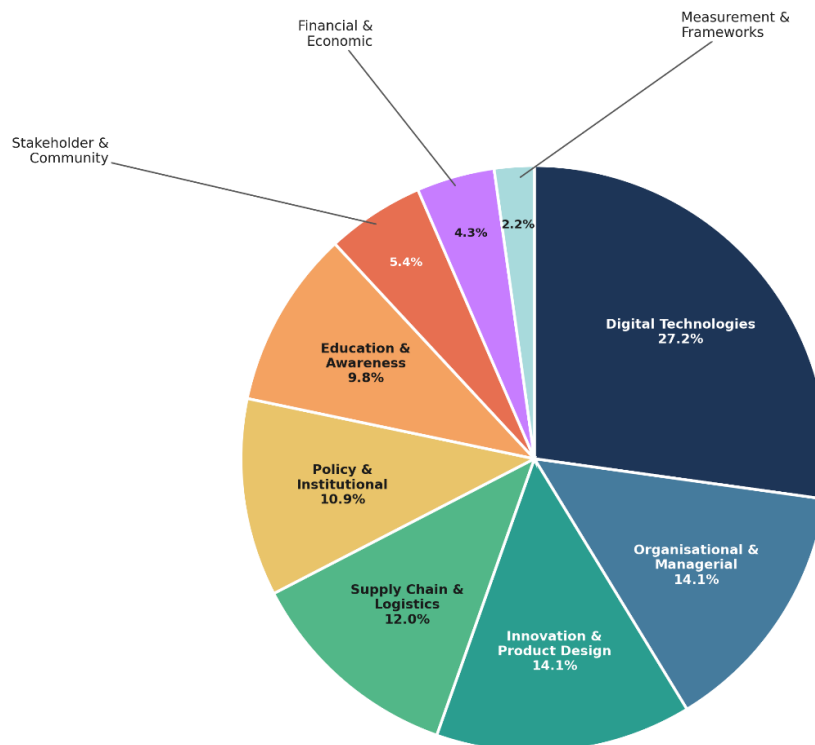
#### 4.1 Overview of enabler and barrier clusters

The quantitative distribution of clusters indicates an apparent asymmetry in scholarly attention. Among enablers, Digital Technologies emerge as the most frequently cited cluster, accounting for 27.2% of the reviewed studies. This dominance reflects a strong technological orientation in CE research, where Industry 4.0 technologies—such as IoT, artificial intelligence, blockchain, and digital platforms—are portrayed as foundational infrastructures for resource traceability, process optimisation, and closed-loop value chains (Kristoffersen et al., 2020; Rejeb et al., 2022). Organisational and Managerial Factors, as well as innovation and product design, follow with equal prevalence (14.1% each), underscoring the importance of leadership, strategic alignment, and eco-design in operationalising circular strategies.

By contrast, Measurement & Frameworks (2.2%) and Financial and Economic mechanisms (4.3%) receive comparatively limited attention. This imbalance suggests that while CE research emphasises technological and organisational capabilities, it devotes less effort to developing robust performance metrics and financial evaluation tools, an observation consistent with earlier critiques in the literature (Sinha, 2022; Kristoffersen et al., 2021).

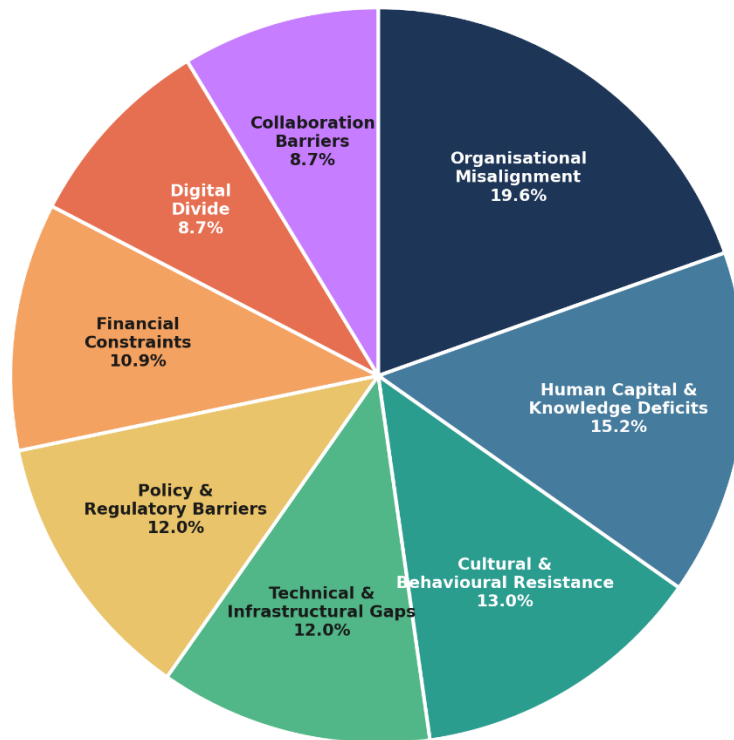
On the barrier side, Organisational Misalignment constitutes the most prominent constraint (19.6%), followed by human capital and knowledge deficits (15.2%) and cultural and behavioural resistance (13.0%). These findings indicate that internal organisational and human factors represent the most persistent obstacles to CE implementation, often outweighing purely technical or infrastructural limitations. External constraints, such as policy and regulatory barriers and technical and infrastructural gaps (both 12.0%), further compound these challenges, highlighting the need for systemic alignment across organisational and institutional levels. Figure 3 and Figure 4 provide a visual representation of the distribution of enablers and barriers across the 93 selected articles.

Figure 3. Distribution of Enabler Clusters in Circular Economy Literature ( $n = 93$ ).



Source: Author's elaboration.

Figure 4. Distribution of Barrier Clusters in Circular Economy Literature (n = 93).



Source: Author's elaboration.

## 4.2 In-depth analysis of enabler clusters

The Digital Technologies cluster encompasses a wide range of Industry 4.0 applications that facilitate transparency, coordination, and efficiency in circular systems. Studies in this cluster emphasise how digital tools facilitate product traceability, predictive maintenance, and lifecycle monitoring, thereby supporting closed-loop supply chains and circular business models (Bressanelli et al., 2021; Kristoffersen et al., 2020). Among digital enablers, artificial intelligence has attracted growing scholarly attention as a driver of managerial decision-making, with structured reviews confirming its potential to enhance strategic planning, resource allocation, and operational responsiveness within circular systems (Oppioli et al., 2023). However, the concentration of research in this area also signals a form of technological optimism, often as if digitalisation alone can drive circular transitions.

Organisational and Managerial enablers highlight leadership commitment, dynamic capabilities, and internal governance structures as prerequisites for adopting CE. These studies emphasise that without strategic alignment and cross-functional coordination, technological and design-oriented initiatives tend to remain fragmented (Van Keulen & Kirchherr, 2021; Seles et al., 2022). Earlier empirical work further confirms that organisational capabilities — including absorptive capacity, strategic flexibility, and environmental commitment — are foundational enablers that determine the pace and depth of CE integration at

the firm level (Lopes de Sousa Jabbour et al., 2018). Similarly, the Innovation & Product Design cluster underscores eco-design, modularity, remanufacturing, and Product–Service Systems (PSS) as mechanisms for extending product lifecycles and reducing material throughput (Despeisse et al., 2017; Tukker, 2015).

At the inter-organisational level, Supply Chain & Logistics enablers demonstrate the importance of reverse logistics, supplier collaboration, and industrial symbiosis in circulating materials across networks (Ripanti & Tjahjono, 2019; Dey et al., 2020). In manufacturing contexts specifically, supply chain integration and collaborative resource planning have been identified as critical success factors that determine whether circular material flows achieve operational viability (Dey et al., 2020). Meanwhile, policy and institutional enablers confirm that regulatory clarity, standards (e.g., ISO 59004), and public incentives play a crucial role in legitimising and scaling CE practices (Jäger-Roschko & Petersen, 2022).

Notably, education and awareness, as well as stakeholder and community engagement, remain underrepresented despite their recognised importance in shaping behavioural change and collective action. These findings echo calls in the literature to move beyond firm-centric and technology-centric perspectives toward more socially embedded models of circularity (Luoma et al., 2022).

### *4.3 In-depth analysis of barrier clusters*

The barrier clusters mirror the enablers, reinforcing the notion that CE adoption is constrained less by the absence of solutions than by misalignment and capacity gaps. Organisational Misalignment captures strategic short-termism, siloed structures, and weak leadership, which undermine systemic CE initiatives even when technical solutions are available (Kirchherr et al., 2018). Human capital and knowledge deficits further constrain adoption, as firms lack personnel with interdisciplinary CE competencies and the ability to translate sustainability ambitions into operational practices.

Cultural & Behavioural Resistance reflects entrenched linear consumption patterns and organisational inertia, reinforcing prior CE studies' findings that emphasise the socio-cultural dimension of sustainability transitions (Ritzén & Sandström, 2017). At the network level, Collaboration Barriers and Digital Divide issues illustrate how trust deficits, data-sharing concerns, and uneven access to digital infrastructure hinder ecosystem-level coordination—particularly for SMEs and firms in emerging economies.

Externally, policy and regulatory barriers, as well as technical and infrastructural gaps, highlight the persistence of fragmented governance frameworks and insufficient recovery and recycling infrastructures. These findings corroborate earlier evidence that policy incoherence and infrastructural deficits remain among the most significant constraints on CE scalability (Ghisellini et al., 2016; Kirchherr et al., 2018).

### *4.4 Multi-perspective analysis of the sample*

To further deepen the analysis, the sample was examined from multiple perspectives. Methodologically, the dataset is dominated by qualitative case studies and conceptual analyses, with a smaller proportion of quantitative and mixed-methods

studies. This methodological skew partly explains the strong emphasis on descriptive enablers and barriers, as well as the relative scarcity of performance measurement frameworks. Longitudinal and mixed-methods designs remain rare, limiting insights into how enablers and barriers evolve over time.

From an organisational context perspective, most studies focus on internal firm-level factors, followed by hybrid inter-organisational arrangements (e.g., supply chains and ecosystems), while external policy-level analyses are comparatively rare. This distribution suggests that CE research remains largely firm-centric, despite growing recognition that circular transitions require coordinated action across value chains and institutional systems.

Finally, clustering the studies across both enablers and barriers reveals a recurring duality: dominant enablers often correspond to equally prominent barriers. For example, digital technologies are widely promoted as enablers, yet the digital divide and unclear returns on digital investment simultaneously constrain their adoption. Similarly, organisational leadership is a key enabler, but its absence constitutes the most frequently cited barrier. This duality highlights that CE adoption is not a linear accumulation of enabling factors, but rather a balancing process shaped by tensions between opportunity and constraint.

## 5. Discussion

### 5.1 Reinterpreting Circular Economy Enablers: Beyond Technological Determinism

The distribution of enabler clusters confirms that digital technologies dominate contemporary Circular Economy (CE) scholarship, accounting for over one quarter of the analysed studies. This result is consistent with prior reviews that frame Industry 4.0 as a foundational driver of circularity (Kristoffersen et al., 2020; Rejeb et al., 2022). However, the present study advances existing knowledge by demonstrating that digital technologies function less as standalone solutions and more as structural catalysts whose effectiveness depends on organisational and institutional alignment.

Unlike earlier studies that emphasise digitalisation as a primarily technical upgrade, our clustering reveals that digital enablers are tightly interwoven with managerial leadership, governance structures, and eco-design capabilities. In line with dynamic capabilities theory (Teece, 2007), digital tools only yield circular outcomes when firms possess the capacity to sense opportunities, seize them through strategic alignment, and reconfigure their internal processes accordingly. This finding nuances the prevailing technological optimism in CE research by highlighting that digital readiness without organisational readiness yields limited circular impact.

Moreover, the relative marginalisation of measurement frameworks, financial mechanisms, and stakeholder engagement in the literature exposes critical blind spots. While previous studies have acknowledged these dimensions individually (Ghisetti & Montresor, 2020; Luoma et al., 2022), this review demonstrates that their systematic underrepresentation constrains the scalability and legitimacy of CE initiatives. Without credible metrics and investable financial models, circular projects struggle to compete with linear alternatives, regardless of their technological sophistication.

## *5.2 Understanding Barriers as Structural Constraints Rather Than Isolated Obstacles*

The analysis of barrier clusters reveals that the most significant impediments to CE adoption are internal rather than external, with organisational misalignment, knowledge deficits, and cultural resistance collectively accounting for nearly half of all barrier occurrences. This finding reinforces earlier observations that sustainability transitions are as much socio-organisational challenges as they are technical ones (Ritzén & Sandström, 2017; Kirchherr et al., 2018).

However, the contribution of this study lies in showing that barriers systematically mirror dominant enablers. For example, while digital technologies are the most frequently cited enablers, the digital divide simultaneously emerges as a significant barrier. Similarly, leadership and governance are critical enablers; their absence constitutes the single most frequently cited constraint. This duality suggests that CE transitions are characterised not by linear progress but by tensions between capability development and structural inertia.

From a socio-technical transitions perspective (Geels, 2002), these findings indicate that many firms remain locked into dominant linear regimes, even when niche innovations and enabling technologies are available. Organisational routines, incentive systems, and cultural norms continue to favour short-term efficiency over long-term circular value creation, thereby slowing regime-level change.

## *5.3 Circular Economy as a Multi-Level Interaction System*

By explicitly differentiating internal, hybrid, and external contexts, this study extends prior CE frameworks that tend to focus either on firm-level practices or macro-level policy instruments. The results show that hybrid contexts, such as supply chains, financial ecosystems, and stakeholder networks, play a pivotal mediating role between internal capabilities and external pressures.

This insight advances the existing literature by demonstrating that CE success depends on contextual alignment across levels rather than on excellence in any single domain. A firm may possess advanced digital infrastructure and strong leadership, but without access to collaborative supply chains, patient capital, and coherent regulation, circular initiatives remain fragmented. Conversely, supportive policies and public incentives have limited impact if firms lack internal capabilities and cultural readiness.

This multi-level interpretation aligns with systems-thinking approaches to sustainability. It provides a more integrative explanation for why CE adoption remains uneven across industries and regions, despite widespread policy endorsement and technological availability.

Table 4. Contexts where Enablers and Barriers are generated

	Enablers Clusters	Barriers Clusters
<b>Internal</b>	Digital Technologies Organizational & Managerial Innovation & Product Design	Organisational Misalignment Human Capital & Knowledge Deficits
<b>Hybrid</b>	Supply Chain & Logistics Stakeholder & Community Financial & Economic Measurement & Frameworks	Technical & Infrastructural Gaps Financial Constraints Collaboration Barriers
<b>External</b>	Policy & Institutional Education & Awareness	Cultural & Behavioural Resistance Policy & Regulatory Barriers Digital Divide

Source: Author's elaboration.

The analysis of Table 4 reveals a marked research interest in hybrid contexts, with comparatively less attention directed toward purely internal or external environments. This distinction likely reflects the inherent complexity of the Circular Economy (CE), which simultaneously demands internal organisational transformation and active engagement with broader stakeholder ecosystems. On the one hand, the Circular Economy relies on firms' internal commitment to develop products, services, and managerial processes aligned with circular principles. On the other hand, it emphasises the relational dynamics between companies and external stakeholders, including suppliers, regulators, and consumers, to co-create sustainable value.

Considering these dimensions allows for a deeper understanding of the conditions that determine the success or failure of Circular Economy initiatives (Kirchherr et al., 2017; Geissdoerfer et al., 2017). Internally, the activation of the Circular Economy depends on a company's strategic vision, organisational culture, and ability to align sustainability with core business functions. Such alignment enables operational innovation and positions Circular Economy as a central component of corporate development (Seles et al., 2022; Von Kolpinski et al., 2023). Externally, contextual factors such as institutional norms, market expectations, and regulatory structures exert varying levels of influence, encouraging firms to adopt circular practices through differentiated incentives and pressures.

#### 5.4 Hybrid Contexts

In hybrid contexts, the Circular Economy system emerges from the importance of the relationships among stakeholders and various actors, both directly and indirectly involved. Inter-organisational frameworks confirm that CE transitions in hybrid contexts are deeply entangled with ecosystem service dynamics, where value creation depends on the coordinated management of resource flows, institutional relationships, and shared governance arrangements (Kapsalis et al., 2019). In particular, the research community highlighted that most Circular Economy enablers originate from the contexts emerging between individual

organisations and their external environments, situated within the Circular Economy system, for example, across Supply Chains, Finance, and Stakeholder Networks. Enablers such as *Measurement*, *Frameworks*, and *Financial and Economic* systems (Sinha, 2022; Formentini et al., 2022; Rashid et al., 2023) facilitate these connections. However, barriers persist: *Collaboration Barriers*, *Financial Constraints*, and *Technical Gaps* remain significant. For instance, stakeholder misalignment and fragmented reverse logistics hinder the scaling of the Circular Economy (Sharma et al., 2021; Amir et al., 2023; Rehman et al., 2023). The relationship between firms and financial institutions also poses challenges, as access to green financing is not always assured (Ardakani et al., 2024; Ghisetti & Montresor, 2020). When the barriers emerge, organisations like companies involved in Circular Economy work integrate their efforts to reduce the difficulties and the barriers they face within the external environment and increase the relationships with the Circular Economy community, their stakeholders and the financial and economic system, searching for credit lines to support Circular Economy activities within the companies.

Lastly, the external context produces appropriate norms to encourage the activation and adoption of the Circular Economy (Nobre & Tavares, 2021; Mondal et al., 2023). countries support the Circular Economy culture because a genuine Circular Economy system can be activated when the community and consumers are willing to participate, even accepting its limitations and their role as stakeholders and integral parts of the overall Circular Economy project. On the other hand, Policies and regulations emerge as barriers (Reike et al., 2023; Vence & Pereira, 2019; Modgil et al., 2024) because of their slow path in identification and practical application in each analysed context (internal, hybrid and external), on one side and another side, the emerging complexity in real and practical application by the Circular Economy stakeholders' sides.

## 5.5 Managerial and Theoretical Implications

Theoretically, the interplay between enablers and barriers can be framed through the lenses of dynamic capabilities (Teece, 2007) and socio-technical transitions theory (Geels, 2002). Dynamic capabilities theory helps explain how firms can reconfigure resources to transform enablers into sustainable competitive advantages. At the same time, socio-technical perspectives highlight the institutional and cultural lock-ins that sustain linear systems. From a managerial standpoint, the findings suggest three key priorities: (1) investing in digital infrastructures must be accompanied by organisational transformation programmes to overcome internal resistance; (2) collaborative governance mechanisms, such as trust-building platforms and transparent data-sharing agreements, are essential to bridge hybrid barriers; and (3) firms should adopt performance frameworks and financial models that make circular projects both measurable and investable. In practice, managers must move beyond isolated enabler adoption toward *systemic orchestration* across internal, hybrid, and external contexts. This implies not only redesigning operations but also engaging with regulators, financiers, and communities to co-create viable Circular Economy ecosystems.

## 6. Conclusions

This study provides a systematic synthesis of 93 peer-reviewed articles (2016–2025) to identify and structure the key enablers and barriers influencing the implementation of the Circular Economy (CE) within business and management research. By

clustering nine enabler categories and eight barrier categories and mapping them across internal, hybrid, and external contexts, the review responds to the fragmentation of prior CE scholarship. It offers an integrative perspective on how circular transitions unfold in organisational settings.

The findings reveal a pronounced imbalance in the literature: while digital technologies, eco-design, and supply chain innovations dominate CE discourse, organisational misalignment, human capital deficits, and cultural resistance remain the most persistent constraints. This mismatch highlights the limits of technologically driven approaches and underscores that CE adoption is primarily a socio-organisational and systemic challenge, rather than a purely technical one. The analysis further demonstrates that hybrid contexts, such as supply chains, stakeholder ecosystems, and financial systems, play a decisive mediating role, functioning simultaneously as critical enablers and structural bottlenecks.

The study contributes theoretically by integrating enablers and barriers within a single multi-level framework, thereby advancing Circular Economy research beyond isolated factor analyses. From a managerial and policy perspective, the results emphasise the need for coordinated action across organisational capabilities, inter-firm collaboration, and institutional support mechanisms. Circular transitions, therefore, require strategic alignment, performance measurement, and inclusive governance structures that extend beyond firm boundaries.

Overall, this review consolidates dispersed knowledge into a coherent analytical framework and reinforces the view that successful implementation of the Circular Economy depends on systemic orchestration across technological, organisational, and societal domains. By clarifying where enabling conditions converge with structural constraints, the study provides a robust foundation for future research and informed decision-making toward scalable, resilient circular transformations.

## *6.1 Limitations and Future Research Directions*

Firstly, the review is restricted to peer-reviewed journal articles in business and management disciplines, excluding insights from engineering, environmental sciences, and policy studies. While this focus ensures conceptual coherence, future reviews could adopt a cross-disciplinary scope to capture technical and regulatory dimensions more comprehensively.

Second, the analysis relies on qualitative clustering and frequency counts, which limit the ability to draw causal inferences. Future research could employ meta-analytical or configurational methods (e.g., fsQCA) to investigate how combinations of enablers and barriers influence successful or unsuccessful CE outcomes.

Third, the literature remains dominated by conceptual and cross-sectional studies, with limited longitudinal evidence. Future empirical research should investigate how enablers and barriers evolve, particularly as firms progress through different stages of circular maturity.

Finally, the underrepresentation of measurement systems, financial instruments, and consumer-side dynamics suggests fertile ground for future inquiry. Developing robust CE performance indicators, circular investment models, and behavioural studies on consumer acceptance would significantly advance both theory and practice.



Moreover, building on these findings and limitations, future research could advance Circular Economy scholarship through a structured agenda organised by analytical levels:

- Internal level (organisations and firms)
- Hybrid level (supply chains, networks, and financial systems)
- External level (policy, institutions, and society)

In sum, while this study provides a comprehensive and integrative synthesis of CE enablers and barriers, future research should move toward dynamic, multi-actor, and evidence-based models that better reflect the complexity of circular transitions.

## *6.2 Final Reflection*

Overall, this study contributes by consolidating fragmented knowledge into a cluster-based framework that clarifies how enablers and barriers interact across internal, hybrid, and external contexts. The findings emphasise that Circular Economy transitions cannot rely solely on technological innovation or policy prescriptions; they require systemic orchestration of managerial capabilities, inter-organisational collaboration, and societal engagement. By mapping the interplay between enablers and barriers, this review offers both theoretical advancement and practical insights, while paving the way for future research to develop more inclusive, measurable, and context-sensitive pathways to circular transformation.

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