

## The Circular Imperative: Dynamic Capabilities, Governance, and Switching from Linear to Sustainable Value Chains: The Transition in the Context of Contingencies

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**ABSTRACT:** This study has introduced an integrative framework that explains how firms transition from linear to circular value-chain through the adoption of circular economy (CE) practices as a strategic corporate social responsibility (CSR) initiative. Based on the Resource-Based View (RBV), Dynamic Capabilities View (DCV), Stakeholder Theory, and Institutional Theory, the study draws on existing literature and empirical evidence from various contexts, such as global manufacturing, food systems, and emerging markets. The role of external pressures and ownership structures in influencing firms to develop dynamic capabilities (e.g., innovation, reconfiguration of resources, integration of the environment) that can support the effective practice of CE is explored. Implementation challenges such as rebound effects in circular business models (CBMs) and governance problems are given a critical assessment. Key findings show that while technological developments, like Industry 4.0 (I4.0) and servitisation, are helpful for the adoption of CE in its early stages, advanced recycling and recovery processes need strong dynamic capabilities to make it possible.

**KEYWORDS:** Circular Economy, Dynamic Capabilities, Resource-Based View, Stakeholder Theory, Institutional Theory, Corporate Social Responsibility, Sustainable Supply Chain Management

### Introduction

The current linear economic system of “take-make-dispose” is no longer sustainable and has almost exhausted the planet's resources: without action, global material use is estimated to reach 96 billion tons in 2020 and 184 billion tons in 2050 (Calvin et al., 2023). This model is connected with a significant percentage of biodiversity loss worldwide. The Circular Economy (CE) is thus considered a new paradigm for sustainable development, which aims to increase the efficiency of the use of resources and promote recycling and sustainability through the action of keeping resources in use for longer (Geissdoerfer et al., 2017). The goal of CE practices is to minimize the amount of waste that is generated, while maximizing the resource value, by focusing on resource efficiency, prolonging product life cycle, and recovering value from resources by means of reprocessing, reuse, and remanufacturing (Kirchherr et al., 2017). Circular strategies can significantly cut resource extraction, billions of tons per year for

**Pages:** 288 – 300

**Volume:** 5

**Issue:** 5 (May 2026)

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**Cite this Article:** Nawaz, F., Sabir, S. S., Yasser, F., & Sadiq, R. (2026). The Circular Imperative: Dynamic Capabilities, Governance, and Switching from Linear to Sustainable Value Chains: The Transition in the context of Contingencies. *The Regional Tribune*, 5(5), 288-300.

<https://doi.org/10.55737/trt/v-v.289>

materials (Murray et al., 2017). The purpose of this study is to create a conceptual framework to understand how firms move from linear value chains to circular value chains by using CE practices as strategic CSR initiatives. The change is not only about how things are done, but also about how they will be done, and those companies must be prepared to use their own resources, build adaptive skills, and act purposefully to various investor and institutional pressures. The research on Sustainable Supply Chain Management (SSCM) and CE is expanding, but it is still fragmented, especially when considering the dynamic capabilities theory, which is scarcely used in the SSCM field (Gruchmann & Seuring, 2018). To fill this void, the paper considers the external pressures to improve the mechanisms that link these pressures to effective CE implementation and the resulting firm performance from multiple theoretical lenses, including Resource-Based View (RBV) (Barney, 1991), Dynamic Capabilities (DC) (Teece et al., 1997), Stakeholder Theory, and Institutional Theory. This synthesis aims to:

1. To find the core theoretical mechanisms that underlie firms' strategic transition towards circularity.
2. Analyze how external forces (stakeholder and institutional pressures) shape the development of dynamic capabilities (innovation, resource reconfiguration, environmental integration).
3. Examine the role of advanced technologies (I4.0 and servitisation) in promoting CE adoption and disclosure practices.
4. Synthesize evidence on implementation challenges, particularly the risk of rebound effects in circular business models.
5. Assess the impact of corporate governance and ownership structures on CE performance, especially in emerging markets.
6. Investigate how contingency factors, such as the characteristics of waste streams, shape high-value recovery outcomes, using food waste management as an illustrative case.

This paper, based on the results of systematic reviews, quantitative studies (SEM, GMM, QCA), and qualitative case studies in various industries and countries (MENA, India, Spain, Brazil), proposes an integrated framework for a comprehensive journey in the corporate world towards sustainability through the adoption of the circular economy. The main contribution of the central part is to offer practical guidance for managers and policymakers to improve how internal resources are used, enhance governance mechanisms, and reduce the environmental risks of CE implementation.

## Theoretical Background of Circular Transition

The framework to explain the transition of firms from linear to circular value chains is based on four basic management theories: Resource Based View, Dynamic Capabilities Theory, Stakeholder Theory, and Institutional Theory.

### Resource Based View (RBV) and Natural Resource Based View (NRBV)

According to the Resource Based View (RBV), the ability of a firm to establish and maintain a competitive advantage depends on its ability to have and use resources that are Valuable, Rare, Inimitable and Non-substitutable (VRIN) (Barney, 1991). VRIN resources can be valuable assets in the realm of CE for the benefit of resource efficiency, reduction of waste, and lifecycle management. They cover proprietary skills, R&D capabilities, and organisational knowledge in the fields of sustainable design, recycling, and servitisation. The RBV framework plays a vital role in comprehending the use and development of the fundamental resources to strengthen value creation and boost sustainability effects (Peteraf, 1993). The Natural Resource Based View (NRBV) adds to the traditional RBV by stating that when the company puts in place proactive and organized environmental strategies, the company can

become capable of some of the SSCM competencies, such as pollution prevention, product stewardship, and sustainable development (Hart, 1995; Aragón-Correa & Rubio-López, 2007). NRBV is all about the enterprise using its resources to reduce waste, prevent pollution, and manage products sustainably. Bearing in mind this perspective, the NRBV becomes a valuable tool for food-tech startups where technology and CE practices are strategic resources. I4.0 and servitisation will enhance the firm's resource base, enabling the firm to improve its competitive advantage through effective management of tangible and intangible resources.

### Dynamic Capabilities View (DCV)

The Dynamic Capabilities View (DCV) is important for understanding how organizations respond to the continuous change in the economy and environment, especially the basic change needed by CE, in contrast to RBV, which focuses on static resources. Dynamic capabilities are the capacity to "sense" opportunities, "seize" them by means of innovative practices, and "reconfigure" the resource base to meet evolving market needs (Teece, 2007). The key issue in understanding the effective implementation of CE practices is that of DCV. For instance, dynamic capabilities like innovation, reconfiguration of resources, and environmental integration have been found to mediate the link between external pressures and better sustainability results (Chari et al., 2022). Adoption of environmental management tools leads to the development of dynamic capabilities such as Environmental Management Systems (EMSs) (Essid & Berland, 2018). Companies should develop competences to embrace and incorporate new technologies, like I4.0 and servitisation, in their business model, especially for more advanced CE activities, like reuse and recovery. One of the most important strategic alignments is the one between the business and the technology. The alignment of the business and the technology is a critical strategic alignment.

### Theories of Stakeholders and Institutions

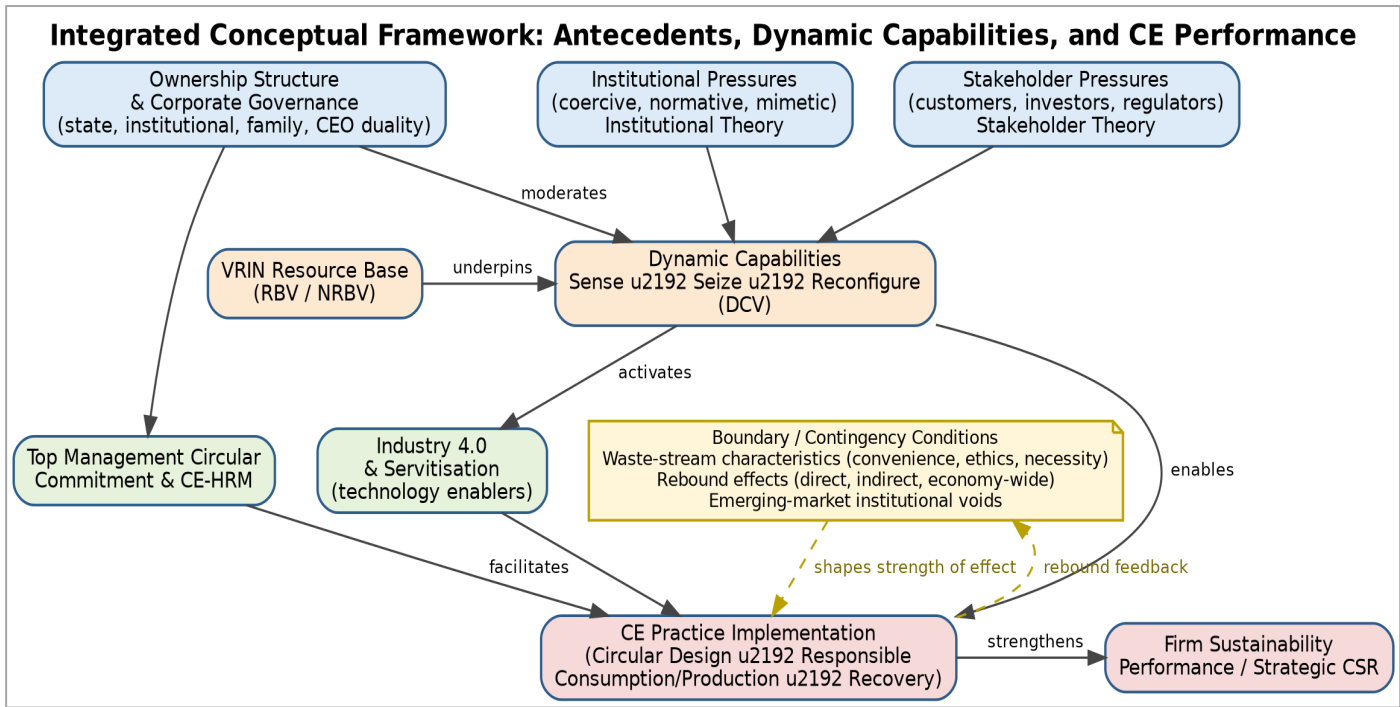
Stakeholder Theory posits that organizations are affected by their stakeholders, and the stakeholders influence organizational decisions in the pursuit of organizational goals (Sarkis et al., 2010). As a part of CE, external influences from important stakeholders (such as customers, investors, and regulators) are among key forces pushing companies to develop dynamic capabilities and embrace circular principles. To achieve economic benefits through reputation and market recognition, strategic priorities need to be aligned with stakeholder expectations. For example, proactive disclosure helps to harmonize the measures a company takes to be more sustainable in line with the trust and accountability of stakeholders (Ortas et al., 2019). The Institutional Theory is also consistent with this perspective, where administrative structures and practices are implemented as a response to institutional pressures for firms to gain legitimacy (Jabbour et al., 2020). These pressures can be seen as coercive (e.g., regulations or directives from the government such as the EU Landfill Directive), normative (e.g., industry standards or professional expectations, for example ethical sourcing schemes) or mimetic (e.g., successful competitors are emulated). Governance structures and institutional environments play a significant role in shaping a firm's ability to mobilize resources and meet sustainability demands in contexts like those in the MENA region (Agyemang et al., 2025). The role of contingency factors (e.g., ethical issues) is influenced by the normative pressure of legislation (e.g., in Italy, legislation promoting food waste donation).

### Integrated Conceptual Framework

The four theoretical lenses are combined into one conceptual model as shown in Figure 1. Stakeholder pressure, institutional pressure, and ownership/governance structures (Section 2.3; elaborated further in Section 4.2) act as antecedents that drive firms to build dynamic capabilities on top of their VRIN resource base (RBV/NRBV, Section 2.1; DCV, Section 2.2). These dynamic capabilities are activated through technology enablers Industry 4.0 and

servitisation (Section 3.2) and are facilitated by top management circular commitment and CE-HRM (Section 4.2), jointly producing CE practice implementation across the design, production, and recovery stages and, in turn, improved firm sustainability performance. The strength of this chain is not uniform: it is bounded by contingency conditions such as waste-stream characteristics (Section 4.3) and is subject to a rebound-effect feedback loop that can erode the environmental gains of CE adoption if left unmanaged (Section 4.1). This integrated model is the conceptual backbone that the remaining sections examine component by component.

**Figure 1**  
*Integrated Conceptual Framework Linking Antecedents, Dynamic Capabilities, Enabling Conditions, and CE Performance Outcomes*



### Sustainable Supply Chain Management, Circular Practices, and Technology Integration

#### Evolution and Scope of SSCM and CE

Sustainable Supply Chain Management (SSCM) is a process that requires integrating sustainability principles along the value chain from product design to end-of-life management, with economic, environmental, and social aspects. SSCM research has evolved over the years from a few fundamental streams that focus on the minimization of environmental impacts associated with Green Supply Chain Management (GSCM), which includes Green Sourcing and Design, and Green Logistics (Srivastava, 2007). Other key thematic areas are Closed-Loop Supply Chains (CLSC) (Savacan, Bhattacharya, & Van Wassenhove, 2004), which include forward and reverse logistics for product recovery, and sustainability performance measurement; ethical supply chains related to labor rights and Corporate Social Responsibility (CSR); and standards of quality and measurement.

The Circular Economy is approached at three different levels: macro (national/supranational policy level), meso (industrial symbiosis/eco-industrial parks level) and micro (organizational practices level). At the micro level, the CE activities are concerned with the environmental sustainability of production. The 10Rs model is the standard operationalisation of CE, which can be summarised as follows: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Recover. This framework breaks circular activities down into three levels:

1. **Circular Design:** (R1–R3: Refuse, Rethink, and Reduce).
2. **Responsible Consumption and Production:** (R4–R8: Reuse, Repair, Refurbish, Remanufacture, Repurpose).
3. **Resource Recovery:** (R9–R10: Recycle, Recover). A firm that has an existing environmental management system (EMS) is likely to be better equipped to implement circular operations, since EMSs are a structured process to promote environmental sustainability. A study on Spanish manufacturing companies supports the positive relationship between EMS adoption and the number of CE practices (Daddi et al., 2021).

## The Technological Enablers are Servitisation and Industry 4.0

### The technological enablers include servitisation and Industry 4.0.

Advanced technologies are key enablers to resource productivity and to achieve the benefits of the circular economy. Servitisation is a business strategy that goes beyond selling products directly and includes providing services based on the outcomes the products deliver, thus extending material use and minimizing reliance on new inputs (Kjaer et al., 2019). The process by itself promotes product life-extension activities (e.g., R4–R8) and enables closed-loop resource flows. The positive and significant relationship between the CE performance and the concept of servitisation in all three aspects (design, responsible production, and resource recovery) signifies sustainable and innovative business operations.

Industry 4.0 (I4.0) technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and robotics contribute to the improvement of innovation capabilities and business processes (Chiappetta et al., 2020). In the CE context, I4.0 helps to more efficiently recover materials, assists with improved visibility along the supply chain, and plays a greater part in data-driven decision-making. In the Brazilian food-tech landscape, technological innovations like AI, online platforms, traceability, and digitization help reach the CE goals. Digital tools, for instance, can have a significant impact in improving lifecycle management (Nayak & Bhushan, 2019), and AI applications can substantially reduce food waste and improve resource efficiency.

Based on empirical studies of Fortune 500 companies, the research also shows that there is a positive relationship between CE-Phase 1 activities (circular design: refuse, rethink, reduce) and I4.0 implementation (Chari et al., 2022), which implies that digital resources can support firms in both their innovation and their improvement of resource use for sustainability. Likewise, there are positive relationships among CE-Phase 2 activities (responsible consumption and production) and I4.0 adoption. The relationship of I4.0 and the other CE activities (Phase 3: recycle and recover) is weak, however positive, after controlling for other variables. This indicates difficulties in achieving full integration of innovative technologies of I4.0 and complex CE recovery processes, highlighting the importance of having a sufficient dynamic capability to configure the CE resources at higher stages of the processes.

## Challenges in Implementation and Mitigation Strategies are Outlined

The challenges to transition to CE are numerous, ranging from the complexity of governance frameworks and technological uncertainty to the potential for rebound effects.

## The impacts of Circular Rebound Effects and Mitigation

One of the most critical challenges of circular business models (CBMs) is the presence of rebound effects, unintended consequences that can generate negative environmental impacts related to resource use, product creation, and reduction of waste (Font Vivanco et al., 2008). Addressing such direct rebound effects, such as greater use of a product because of its increased efficiency, is more easily possible, for example by consumer education or incentive

schemes. Indirect effects/SOTW effects (e.g., reinvesting the savings from efficiency in other consumption) may not be within a single firm's control.

The results of the literature review suggest that the most prevalent rebound effects identified so far are circular production and consumption practices, product lifetime extension, and collaborative consumption (Guzzo et al., 2024). Mitigation strategies have been suggested both as a business intervention and as a policy intervention, but the effectiveness of the proposed measures has been tested very little, and there is a big knowledge gap. For instance, if rebound effects (Greening et al., 2000) are triggered by the higher efficiency of the fuel used, the environmental effects of the higher efficiency may be worse than the higher fuel consumption. The controllable direct rebound effects can be dealt with proactively, providing a competitive edge for companies and showing a genuine commitment to sustainability, while indirect and economy-wide effects are more effectively tackled through policy measures. The management of the circular rebound effects is key for the success of CE policies in achieving their goals of reducing waste, conserving resources, and lowering carbon emissions for policymakers (Das et al., 2023). There is a great need for future research to focus on quantitative empirical testing to identify which mitigation methods are effective and under which conditions.

### Governance and Ownership Dynamics in CE Performance

Corporate governance frameworks have a strong impact on a company's dedication and ability to implement CE practices. Based on RBV and Agency Theory, the results of the research conducted on listed companies in the MENA region reveal that the ownership structure has a significant impact on the performance of CE.

**Positive Impacts:** Managerial, state, and institutional ownership are positively and significantly related to CE adoption. State-owned enterprises (SOEs) have the potential to have financial resources and political will to undertake large-scale CE, but can also suffer from inefficiencies. Governance oversight and resource allocation rely on institutional ownership, which creates influence. Furthermore, these relationships are reinforced and strengthened by eco-technology intensity, which will facilitate advanced CE practices and operational efficiency and improve the effectiveness of ownership structures. Board diversity and independence are also found to positively affect CE performance (Raimo, de Nuccio & Vitolla, 2022).

**Negative Influences:** Family ownership and foreign ownership are negatively correlated to the performance of CE in the MENA region. Concentrated decision-making authority, such as CEO duality (where the CEO is also chair of the board), can also be a challenge for the successful implementation of a CEO.

While formal governance is a factor, Top Management Circular Commitment (TMCC) is also a powerful enabler of CE practices. This is put into practice in the form of tangible action: Circular Economy Human Resource Management (CE-HRM), which acts as a mediating mechanism in part. It takes great human resources and organizational support to achieve successful implementation of complex CE practices.

Furthermore, the intersection of Diversity and Inclusion (DEI) values positively moderates the link between TMCC and CE-HRM, linking social justice issues (Social RBV) and environmental actions (CE-HRM) with the organizational integrity value. Additionally, the intersection of Diversity and Inclusion (DEI) values positively moderates the link between TMCC and CE-HRM, connecting social justice issues (Social RBV) and environmental actions (CE-HRM) with the organizational integrity value (Ortas et al., 2019).

## The Use of Contingencies in Food Waste Management. Application of Contingencies in Food Waste Management

Contextual factors have a strong influence on the success of CE practices. Previous studies on the prevention and reduction of Food Waste Flows (FWFs) in industrial companies in Italy pointed out the importance of specific FWF characteristics, such as consistent quality, fixed processing procedure, adequate quantity, economic value and nutritional value (Priefer et al., 2016). The study identified high-value recovery outcomes (prevention and human or animal reuse) using the food waste hierarchy (Papargyropoulou et al., 2014) through the use of Qualitative Comparative Analysis (QCA) (209 FWFs) with three configurations that were based on combinations of FWF characteristics:

**Convenience:** The quality of the product/service (core condition) and economic value (peripheral condition) and quantity (peripheral condition). These are desirable properties for recovery, which frequently results in re-use or recycling.

**Ethics:** It is based on nutritional value (core condition) and supported by consistent quality and economic value (peripheral conditions). This pattern pushes firms toward prevention and donation, thus giving primary consideration to the food's primary purpose (nourishment). Other enabling factors must be present to shift firms to high-value recovery actions.

**Necessity:** Compelling amount + economic value or uniformity (peripheral conditions). If there is a significant surplus, it will require active management and may be used in animal feed or for other alternative purposes.

Notably, among the results presented, only a few configurations might be enough to attain good CE performance, a result that somewhat challenges the general CE literature where a wide range of favorable characteristics (high-quality, high-value, large quantity, certainty of timing) is often cited as being required for effective recovery. The edibility and nutritional potential of food waste are key to understanding the economic and ethical principles of recovery, and food waste is a different waste stream than others (Teigiserova et al., 2020).

## Pathways to Sustainability in Emerging Economies

The insights presented above are especially relevant to emerging markets that are strategic for global sustainability transitions.

## Indian Conglomerates and Resource Management

In India, CSR has moved from being a part of the periphery to being part of the core business (Hahn & Kühnen, 2013). The Indian organisations that are at the forefront of the game make measurable strides in sustainable resource management:

**Water and Energy Management:** Tata Steel achieved a reduction of 24.5% in water usage, and Tata Motors achieved a reduction in energy usage per vehicle of 16.2% over 2012–2023. Adoption of renewable energy achieved 27.8% of Tata Group's energy mix, and the energy portfolio of Reliance Industries consisted of 20 GW.

**Circular Material Practices:** UltraTech Cement achieved 21% use of industrial waste over virgin raw materials as a circular target, with a 50% target by 2030.

**Net Zero Commitments:** There is also a wide disparity in the stated targets, with Adani aiming for 2029, Tata Group 2045, and Reliance 2070, suggesting varying ambitions. This aggressive 2029 delivery timeline suggests that Adani is keen on renewable energy and green hydrogen, and if realised, the transformation in emerging markets can

happen quickly enough. Disclosure issues are inconsistent, regulatory issues are fragmented, and technological issues are uncertain. Further research is needed to corroborate these corporate claims and to compare these across countries.

### Devise Solutions for Sustainable Logistics and Closed-loop Systems

Sustainable logistics (green logistics, GL) is a concept that aims to minimize the environmental and energy impact of goods transport, which includes logistics, material handling and logistics, waste management, and packaging. It is important for GL practices as transportation is estimated to be responsible for about 24% of the global CO<sub>2</sub> emissions (Zaman & Shamsuddin, 2017). CE in logistics is achieved by the following key practices: energy efficiency in transportation, sustainable packaging, green procurement, and reverse logistics (reduction of waste, reprocessing, recycling and collection, responsible disposal). They can contribute to environmental, financial and social value creation: the environmental value is created by pollution prevention and carbon emissions reductions; financial value is created by cost savings and reputation; and social value is created by community engagement and CSR. Closed-Loop Supply Chains (CLSC) combine forward and backward supply chains for reuse and remanufacturing (Savaskan et al., 2004). The use of mathematical modeling techniques (such as mixed-integer linear programming, multi-objective optimization) is crucial to optimize the operation of the CLSC in the framework of sustainability constraints, while simulation studies also contribute to the evaluation of the effects of the different sustainability scenarios and trade-offs.

### Methodological Approaches to CE Research

Studies in this field employ a range of sophisticated methodologies suited to addressing the complexity of CE and SSCM research.

### Systematic Literature Reviews (SLR) and Bibliometrics

Systematic literature reviews are crucial for consolidating knowledge, connecting findings that are scattered into a systematic whole, and for creating conceptual frameworks. For example, SLRs are employed to establish theoretical bases for SSCM, to examine rebound effects in CBMs, and to examine the development of the SSCM research. Based on a thorough review of SSCM, it was found that the most significant research stream was Green Supply Chain Management (GSCM) (Sarkis 2011). Bibliometric analysis gives insight based on data on the intellectual structure of the field. Techniques like citation analysis, PageRank algorithms (Brin & Page, 1998), co-authorship network analysis, etc., can identify influential papers and thematic clusters of papers to focus future research on areas of high impact.

### Advanced Quantitative Modeling

**Structural Equation Modeling (SEM):** Used to test multiple variables in relation to the causal relationship between the variables. PLS-SEM has been used to test the relationships between I4.0, servitisation, and CE adoption and proved to be relevant for the model analysis (Chin, 1998).

**Qualitative Comparative Analysis (QCA):** Identifying causal complexity and configurations of factors that result in specific outcomes (equifinality) (Ragin, 1987). Pappas & Woodside (2021) used fuzzy-set QCA (fsQCA) to research food industry FWF configurations and how various combinations of factors (convenience, ethics, necessity) contribute to high CE performance.

**Processes and Principles of SD Modeling:** Used to model complex and dynamic urban systems, especially waste management. Another study fused SD modeling with fuzzy Analytic Hierarchy Process (AHP) to quantitatively assess and integrate behavioral factors, including social awareness, to forecast waste for Amman, resulting in high forecasting accuracy.

## Conclusion and Future Research Directions

Adopting a linear value chain to a circular one is a complex strategic issue that involves technological innovation, sound governance, and adaptability. This transition, viewed as a strategic CSR goal, relies on firms' VRIN resource deployment (RBV), their ability to adapt to market and institutional pressures (DCV), and their interactions with stakeholders in a transparent and open way. The key findings of the synthesis are:

**Dynamic Capabilities Are Critical Enablers:** DCV is the theoretical link between external pressures and the effective CE implementation (Teece, 2007). To capitalize on the potential of CE, companies must build their ability to sense, seize, and reconfigure their resources.

I4.0 and the concept of servitisation, as a key element of technology, is a good support for CE activities in the early phase (circular design and responsible production). For achieving competitive advantage in advanced CE activities (recycle/recover), more developmental focus should be placed on dynamic capabilities to be able to embed such technologies into more complex reverse logistics and supply chain processes.

Ownership and support mechanisms can have a wide influence on CE performance, especially in emerging markets, through governance and social capital configuration. The implementation of CE-HRM is closely linked to the top management's commitment and the supportive culture for DEI.

The high value recovery of waste streams like food is not necessarily a function of high value or high quantity, but rather a function of the specific configuration of contingency factors (e.g., nutritional value and ethical motivations).

## Future Research Recommendations

Several important directions for future theoretical investigation stand out in this synthesis, namely in enhancing the empirical rigor, exploring shared boundaries between disciplines, and dealing with methodological challenges:

**Quantitative empirical testing of Mitigation Approaches:** For the uncertainty of successful rebound mitigation approaches, future research should focus on quantitative empirical testing of proposed mitigation approaches, both in terms of business and policy interventions, across novel designs of circular business models.

Future studies should consider the differentiated combination of the specific technologies of the I4.0 with CE stages, and how dynamic capabilities can be built to maximize recovery and reuse adoption and operation mechanisms. Research should also investigate the accountability mechanisms in CE and I4.0 adoption, with transparency and algorithmic integrity.

**Extension of Context and Methodology:** Research should go beyond the existing geographical scope of the companies (e.g., European and Chinese firms) and also involve primary data collection and cross-country comparison in other emerging markets, to explore the influence of the different regulatory context and institutional environment on the corporate sustainability trajectory. In complex areas like SSCM, the mixed-methods approach is recommended to achieve a balance between depth of qualitative findings and methodological rigor in quantitative findings.

**Linking Social and Ecological Indicators to Economic and Operational Outcomes:** There is a need to better understand how to strongly connect the social sustainability indicators (DEI) with the more complex ecological indicators (such as Scope 3 emissions) through theory-informed models and life cycle-based designs to economic and operational outcomes. The future of responsible value chain management requires a combination of empirical rigor and forward-looking thinking, moving toward adaptive, context-sensitive frameworks that proactively shape solutions for an uncertain world.

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