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Circular economy principles as a basis for a sustainability management theory: A systems thinking and moral imagination approach

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Abstract

To enable corporations to bring about more responsible business practices, changes in the wider system within which businesses operate – including the mental models through which sustainability is understood in the management field – are necessary. Drawing on functioning principles in natural ecosystems – as embodied in circular economy thinking – this conceptual article proposes some constructs to inform the development of a sustainability management theory. We show that the potential for the circular economy to provide a sounder basis to sustainable management theory rests on its capacity to propose a socio-eco-systemic framework, which overcomes the separation between man and nature and is isomorphic to the conception proposed by the emerging complexity paradigm. Also, we show that, by imagining a new cognitive framework and evaluating the current linear model and the alternative circular model from a moral standpoint, the circular economy can be thought of as an exercise in moral imagination.

KEYWORDS
circular economy, moral imagination, nature principles, sustainability management theory, systems thinking

> "Thus, your task consists in bridging the gap that exists between your two faculties: your faculty of making things and your faculty of imagining things; to level off the incline that separates the two; in other words: you have to violently widen the narrow capacity of your imagination (and the even narrower one of your feelings) until imagination and feeling become capable to grasp and to realize the enormity of your doings; until you are capable to seize and conceive, to accept or reject it – in short: your task is: to widen your moral fantasy [imagination]"
>
> (Günther Anders, 1961 [1957], p. 13).

1 | INTRODUCTION

The current environmental crisis – referred to as planetary emergency (Club of Rome, 2019) – calls for a major socio-economic transformation. Corporations have an important role in driving towards sustainability transitions (Schaltegger et al., 2023), yet "to transform businesses towards true sustainability and wellbeing for all, the system itself needs to change" (Waddock, 2020, p. 9), and within this,

Abbreviations: CE, circular economy; SMT, sustainability management theory.

management theories. The severe ecological crisis at this historical juncture calls for a profound rewiring of the intellectual frames through which sustainability is understood in the management field (Shrivastava et al., 2019). Current management theories are "inadequate theoretically and practically to move understanding, scholarship, and practice to where it needs to be (…) to cope with an increasing fraught world" (Wasieleski et al., 2021, p. 7), which is also echoed by Starik and Kanashiro (2020) who argue that "ever-demanding sustainability challenges are increasingly calling for significant transformation and radical reassessment of values, relationships, and priorities that will likely lead to broad changes in dominant theoretical paradigms" (p. 20). The field of Management Studies, and more specifically the field of corporate sustainability, is criticised for its failures to contribute more effectively to sustainable development and impact managerial practices (Meuer et al., 2020).

The inadequacy of current management theory is due to the conceptual frames through which problems are studied. Hence, for organisations to build better futures, it is also essential for management and organisations scholars alike – striving for relevance in the third millennium – to reconsider the foundations of our research as pointed out in recent studies (e.g., Blok, 2021; Williams & Whiteman, 2021). To step out of the traps of a conceptual framework, an effort in imagination is required, as the philosopher Günther Anders (1961 [1957], p. 13) reminded us in the abovementioned quote. To address this relevant task, this article draws on the concept of the circular economy (CE) defined as "a transformational and systemic vision for a more ecologically effective economic system that works within planetary limits and thereby maintains and rebuilds natural capital" (De Angelis, 2021, p. 1218). Particularly, this article argues that the functioning principles of natural ecosystems, as embedded into CE thinking, can be used to inform the development of a sustainability management theory (SMT). Our standpoint is consistent with recent scholarly literature (e.g., Lebdioui, 2022; Waddock & Kuenkel, 2020), which emphasises the need to learn from natural principles to implement transformational change for sustainability. Therefore, this article asks: *how can CE principles be used to inform new perspectives on SMTs?*

By developing a SMT inspired by the CE thinking in its multiple relations to the natural and social environment, we can conceptualise the CE under the lenses of the emerging complexity paradigm, which allows overcoming the separation between man and nature that is considered as a cause of the current environmental degradation. This effort in imagination can only succeed if one looks at the complexity (or systemic nature) of the environment within which firms operate. By raising our awareness of the moral limitations of the current linear economy system for the sustainability of the socio-eco-system and by providing an alternative framework, the CE is an effort in "moral imagination".

This research contribution is valuable to management studies, whose cross-fertilisation with principles in nature is scant (Williams et al., 2017), with Wasieleski et al. (2021) lamenting that paradigms guiding organisational research do not account for the natural environment. It is also a novel contribution to the CE literature. Indeed, by shedding light on the relationship between CE principles and functioning principles in nature, we contribute to the conceptual foundations of CE thinking. In fact, the relationship between CE principles and nature functioning principles is not thoroughly investigated (Desing et al., 2020; Morseletto, 2020). Additionally, whilst the CE is considered the liveliest sustainability research field (Kirchherr, 2022), the concept is still in need of further development and theorising (Figge et al., 2022), and so this article – which places the CE in relationship with moral imagination and systems thinking – contributes to advance the conceptual and theoretical understanding of CE thinking.

The remaining parts of this article are organised as follows. Section 2 outlines the method used to develop our conceptual contribution. Section 3 provides an overview concerning the integration of ecological principles in management research. It also illustrates the functioning principles of nature underlying CE thinking. Section 4 proposes some constructs that can be used to develop a SMT informed by CE thinking. Sections 5 and 6 bring to light CE socio-eco-systemic thinking and its inherent moral imagination. Finally, Section 7 concludes summarising the research contribution and offering some suggestions for future research.

2 | RESEARCH METHOD

In this article we aim to make a theoretical contribution in line with Thatcher and Fisher (2022)'s characterisation of a theory paper as "a manuscript that seeks to develop new scientific arguments or extend existing arguments about relationships between units observed or approximated in the empirical world based on concepts and logical connections to answer the questions of "how," "when," and "why" (Bacharach, 1989)" (p. 1). Bacharach (1989) defines theory as a "system of constructs (…) in which the constructs are related to each other by propositions" (p. 498) and as put by Suddaby (2010), "clear constructs are simply robust categories that distill phenomena into sharp distinctions that are comprehensible to a community of researchers" (p. 346). The purpose of this article is to identify the descriptors of the constructs and the logical connections to lay the foundation for a CE-inspired SMT.

To come up with the descriptors of our constructs, we used 'theory borrowing', consisting in importing ideas from outside the discipline, a process very common in organisation and management disciplines (Oswick et al., 2011). Transdisciplinary cross-fertilization is viewed as an appropriate method to build relevant new theory and models (Suddaby et al., 2011; Zahra & Newey, 2009). Particularly, this article borrows from CE principles and nature functioning principles, which are detailed in Section 3. To identify those principles, we took a general approach to literature review, and following Templier and Paré (2015), our research methodology was organised as follows: formulating the problem, searching the literature, screening for inclusion, assessing quality, extracting data, analysing and synthesising data. Relevant studies were identified through a narrative approach to the literature review, involving the researcher's judgement rather than a systematic protocol (Cronin & George, 2020). This is an approach used

within the context of business research (Snyder, 2019) and CE research (e.g., Ghafoor et al., 2023; Ritala et al., 2021).

While searching for relevant literature, we encountered the work of Gruner and Power (2017), who develop a socio-ecological intergradation theory to enhance the environmental sustainability of supply chains based on five principles that mimic natural ecosystems. As our task is consistent with these authors' approach by means of borrowing from principles in nature, we followed the same steps to define inclusion criteria for relevant studies, i.e., we only considered natural principles applicable beyond the natural ecosystems context. This led our article to draw on: a) ecosystem principles for an industrial ecosystem (Korhonen, 2001), and b) nature principles (Biomimicry for Creative Innovation, 2023; Unruh, 2010). These studies are chosen because they offer some insights into how principles of ecosystem theory can be used to inform sustainable and profitable business strategies. These principles are presented in Section 3. Table 1 summarises the research approach adopted in this article that has just been illustrated.

3 | CIRCULAR ECONOMY, MANAGEMENT THEORIES AND SUSTAINABILITY

In the early 1990s, Gladwin and colleagues warned that "modern management theory is constricted by a fractured epistemology, which separates humanity from nature (…). Reintegration is necessary if organizational science is to support ecologically and socially sustainable development" (Gladwin et al., 1995, p. 874). Gladwin et al.'s concern with limitations in management theories has been later echoed by other management scholars (e.g., Guthey et al., 2014; Hoffman & Georg, 2018; Starik & Kanashiro, 2013). Starik and Kanashiro's (2013) argument is poignant and thought provoking for management scholars as they argue that none of management theories "appear to have the unique features, benefits, opportunities, challenges, or orientations to assist individuals, organizations, and societies to move toward sustainability as much and as soon as appears necessary" (Starik & Kanashiro, 2013, p. 7). Recently, their argument has been espoused by Wasieleski et al. (2021), who argue that current management theories are "inadequate theoretically and practically to move understanding, scholarship, and practice to where it needs to be (…) to cope with an increasing fraught world" (p. 7).

Thus, various scholars acknowledge that a SMT is needed. As a result, the next pertinent question becomes: how should such a theory be reconfigured? This article argues that functioning principles of natural ecosystems, as embedded into CE thinking, can be used to inform a SMT. We believe that the CE can lend a hand to the management field in this endeavour for two reasons. Firstly, the CE draws substantially from principles in natural ecosystems (EMF & McKinsey, 2013) and it is argued that sustainability can be reached only when nature principles can be applied to the business context in a profitable manner (Unruh, 2010). Secondly, it is the CE that is considered more operational than other concepts that have been proposed over time to attain a more sustainable economy (de Jesus et al., 2019). How to achieve a more sustainable economy is a long-debated issue which has been discussed under the nomenclature of corporate sustainability within the management field. Yet, as put by Laszlo (2015), since corporate sustainability has substantially been equated to doing less harm, it does not provide inspiration any longer and current efforts are not achieving the desired outcomes. This is witnessed by the fact that we are experiencing a triple planetary crisis resulting in pollution, loss of biodiversity and climate change (UNFCCC, 2023). The CE, instead, is argued to be "a cognitive framework instrumental to the emergence of a credible, shared and persuasive imaginary of more environmentally, economically and socially sustainable production and consumption systems, by positively engaging, focusing, evoking and planning how to achieve an integral human betterment" (De Angelis & Ianulardo, 2020, p. 147) and attuned to the so-called 'transformational strategies' that are needed to implement ecological sustainability (Borland et al., 2016). But what exactly are those principles in nature? And how do they fit with CE thinking?

To detail the principles in nature that are mirrored in CE thinking, this article draws on: a) ecosystem principles for an industrial ecosystem (Korhonen, 2001), and b) nature principles (Biomimicry for Creative Innovation, 2023; Unruh, 2010). These studies, which are chosen because they offer insights into how principles of ecosystem theory can be used to inform sustainable and profitable business strategies, point to 15 principles overall, although some overlap occurs. Table 2 synthetises nature principles.

Taking nature as a model to learn from to move towards a more prosperous and eco-friendly economy is a central concern of several schools of thought promoting innovation inspired by nature (e.g., biomimicry, industrial ecology, natural capitalism). Likewise, the CE, which draws on these antecedents, takes inspiration from nature. CE principles and characteristics are detailed in a series of publications produced by the Ellen MacArthur Foundation. Particularly, according to EMF (Ellen MacArthur Foundation) (2015) and EMF (2023) they can be classified as it follows. *Eliminate waste and pollution*: in a CE, waste is a design flaw. The concept of waste is eliminated by concentrating on upstream design. Hence, materials loops are closed and resources are diverted from landfills and incineration. *Circulate products and materials*: products, components and materials are kept in use at their highest utility and value for as long as possible. Materials are

TABLE 1 Research method.

Conceptual development approach	Theory borrowing.
Literature review approach	Narrative approach to literature review.
Key studies	Socio-ecological intergradation theory (Gruner & Power, 2017); ecosystem principles for an industrial ecosystem (Korhonen, 2001); nature principles (Biomimicry for Creative Innovation, 2023; Unruh, 2010).

Source: The authors

TABLE 2 Functioning principles in natural ecosystems.

Ecosystem principles for an industrial ecosystem [Korhonen, 2001]	Nature principles [Biomimicry for Creative Innovation, 2023]	Biosphere rules [Unruh, 2010]
Roundput/recycling systems: In ecosystems waste equals food (most vital nutrients are kept within the system) and energy is cascaded in food chains. Ecosystems are open to the input from solar energy. **Diversity:** Ecosystems adaptation and resilience are based on diversity in species, organisms, interdependency, cooperation and information. **Locality:** Ecosystems utilise local resources, adapt to the local environmental conditions and cooperate locally through diverse and interdependent relationships. **Gradual change:** Evolution in natural ecosystems is the result of cumulative, slow processes, i.e., evolution respects ecosystems renewal rate.	**Resilient**: Resilience is the ability of a system to return to more or less the same state after a shock. Nature builds resilience through redundancy (functioning and responding in more than one way), decentralisation and diversity at every level. **Optimising**: Optimising is more effective than either maximising or minimising. Nature builds optimisation by creating forms that fit functions, not the other way around, embedding redundancy, complexity and diversity using simple components and patterns. **Adaptive**: Nature has survived through radical changes in conditions and context through adaptation and evolution. Nature has adapted through effective feedback loops at all levels and scales, by becoming part of cyclic processes and by using resources based on availability. **Systems-based**: In nature there are myriads of complex, dynamic, interactive, interdependent and cooperative systems. In nature each organism, while caring for its own interest, benefits the system as well and can rely on the system to perform many crucial functions. A network of relations allows the continuous cycling and recycling of energy, materials, and information so that benefits are accrued by the single parts and the system as a whole. **Values-led**: Nature works in harmony with each unique organism within it to achieve common positive outcomes. **Life supporting**: Nature is life-supporting by making products that are biodegradable, drawing on information and innovation rather than energy and materials and creating the conditions for mutual support across individual components and the whole system.	**Materials parsimony** Minimize the types of materials used in products choosing materials that are non-toxic and economically recyclable. In nature, 99% of the weight of every living system is made just of four elements: carbon, hydrogen, oxygen, and nitrogen. Materials parsimony is about the number of types of materials used and not about quantity. In nature, these four elements are always abundant and locally available for easy reuse. **Power autonomy** Maximize the power autonomy of products and processes by functioning only on renewable energy. Living systems rely only on renewable energy. **Value cycles** Recover end-of-life materials and incorporate them into new products. In all its forms, the biosphere has always reused the same materials repeatedly though in evolving configurations. **Sustainable product platforms** Leverage your value cycle as a product platform for profitable scale, scope, and knowledge economies. In nature, all living systems share a common design, a fundamental platform from which every entity is built. **Functions over forms** Fulfil customers' needs focussing on functions and not forms. The biosphere's function is indifferent to the form community members take and depends on evolving solutions to critical functions.

Source: The authors and based on the literature cited in table.

kept in use either as a product or as components/raw materials. This is achieved by circulating products, materials and components in 'technical' and 'biological' cycles. By doing so nothing becomes waste and the intrinsic value of products and materials is retained. *Regenerate nature*: a CE builds natural capital rather than degrading it, as there is a shift from extraction to regeneration. This means that farming practices regenerating soils and increasing biodiversity are used and biological materials are returned to nature. Currently, most of these materials do not return to nature after use and lands used for growing them suffer from the lack of nutrients. *Diversity builds strength*: to build more prosperous and resilient socio-economic systems, CE thinking recognises the importance of and fosters diversity (variety of scales in businesses) in the economy. *Renewable energy sources power the economy*: in a CE the energy required should come from renewable sources only to reduce resource dependence and increase system resilience. *Think in systems*: CE thinking acknowledges the existence of many parts in a system, i.e., organisations are seen as parts of interconnected economic, ecological and social systems, and the implications this has for product and system design. A product fit for a CE is a product designed considering its interactions with economic and ecological systems along its entire lifecycle. Furthermore, any organisation wishing to move to a CE needs to consider its interactions with the wider system. *Price and other feedback mechanisms should reflect full social cost*: in a CE, prices as control and feedback mechanisms should reflect full costs of negative externalities. This more effective costing informs decision making at the production and consumption level.

The correspondence between CE principles and characteristics, and functioning principles in nature is shown in Table 3. Particularly, by removing some overlapping content (recurring themes) in relation to functioning principles in nature listed earlier in Table 2, Table 3

TABLE 3 Correspondence between CE principles and characteristics and functioning principles in nature.

Nature functioning principles	CE principles and characteristics
Roundput/recycling systems	Circulate Eliminate
Diversity	Diversity builds strength
Function over forms	Circulate
Power autonomy	Renewable energy sources power the economy Eliminate
Resilience	Diversity builds strength
Materials parsimony	Circulate Eliminate
Life supporting	Regenerate
System-based	Think in systems

Source: The authors and based on: Biomimicry for Creative Innovation, 2023; EMF (Ellen MacArthur Foundation), 2015; EMF, 2023; Korhonen, 2001; Unruh, 2010.

includes eight principles from those selected studies. The correspondence between CE principles and nature principles contributes to shed light on the conceptual foundations of the CE.

Next, the article illustrates how CE principles and characteristics can be used to inform the development of a SMT.

4 | THE SIX 'E' OF A CIRCULAR ECONOMY INSPIRED SUSTAINABILITY MANAGEMENT THEORY

Starik and Kanashiro (2013) argued that a theory of sustainability management should account for the interconnectedness between ecosystems and organisations whilst guiding managerial decision making that is both respectful of planetary boundaries and takes advantage of the more proactive stances. Particularly, they suggest that a SMT would include several aspect, which they refer to as descriptors, pertaining to sustainability and management. Firstly, such a theory should focus on both the natural and socio-economic environments "ideally describing, predicting, and prescribing their systemic existence, value, and integration" (p. 16). Secondly, a SMT would consider environmental, economic and social sustainability issues at different levels and in different contexts (ibid.). Thirdly, a SMT would incorporate systems thinking (ibid.). Fourthly, a SMT would "account for a wide range of quality of life phenomena, and do so for multiple forms of life and over various time frames" (p. 16). Fifthly, a SMT would recognise the need for transformational rather than simply incremental approaches to address the multiple sustainability challenges (ibid.). Finally, a SMT would consider the exploration and development of sustainability solutions that are "multilevel, systematically integrated (…) and multi-stakeholder-oriented" (p. 17).

Following Starik and Kanashiro's (2013) argument about what a SMT should look like and borrowing from principles in natural ecosystems as espoused in CE thinking (detailed in Tables 2 and 3), we propose some descriptors of the constructs for a CE-inspired SMT. Particularly, we argue that a SMT aiming at theoretical and practical frame breaking towards more fundamental sustainability in the Anthropocene is one that:

> *Embraces* SYSTEMS THINKING to acknowledge that organisations are only but one of the many parts in a system and that their activities influence the ecosystem and vice versa, *Enfolds* LOW ENTROPIC AND DISSIPATIVE INDUSTRIAL METABOLISM THAT MAXIMISES RESOURCES VALUE, wherein materials, products and components are cycled and recycled to feed further cycles of production and consumption and energy is derived from renewable sources, *Emboldens* COOPERATION in networked systems for positive individual and system outcomes, *Espouses* RESILIENCE through diversity, modularity and decentralisation, *Envisions* LIFE-SUPPORTING CORPORATE PRACTICES through innovation inspired by nature, and *Encourages* SYSTEM EFFECTIVENESS by balancing efficiency and resilience.

This characterisation of a SMT inspired by CE thinking in its manifold relations to the natural and social environment amounts to seeing it under the unifying conceptual umbrella of the new emerging systemic paradigm in science. We think that the latter provides the conceptual tools to overcome the separation between man and nature that has been lamented by many as one of the root causes of the present ecological crisis. In the next section, we characterise the systemic nature of CE thinking showing why it provides an alternative mental model to evaluate the role of businesses in society.

5 | THE COMPLEXITY PARADIGM AND THE CIRCULAR ECONOMY ECO-SYSTEMIC THINKING: TOWARDS A POSITIVE ECOLOGY

In order to understand the complex relationships between organisations and the socio-ecosystems and provide a valuable indication to enact change in existing theories and practices, it is essential to clarify the underlying mental model that supports firms' operations. By mental model, following Johnson-Laird et al. (2018), we mean the construction of a model of the world that allows individuals to simulate future events and make prescient decisions. Framing a worldview or an image of the environment we live in is fundamental to guide our actions, however when we forget that it is "our" construction, we risk being trapped in it. In many domains of modern natural and social science, in the last 50 years, there has been the emergence of a complexity paradigm that aims at overcoming the strictures of the mechanistic worldview that has dominated modern science.

To characterise the difference between the linear, mechanistic and reductionist paradigm of classical science and the worldview

prevailing in the new complexity paradigm, we can refer to one of the leading systems theorists, Ervin Laszlo. According to Laszlo (1996), while the "worldview of the classical sciences conceptualized nature as a giant machine […] [t]he new systems sciences looks at nature as an organism" (pp. 10–11), and while the classical worldview was "atomistic and individualistic", the systems view is grounded on "connections and communications between people and between people and nature and emphasizes community and integrity in both the natural and the human world" (p. 11). Moreover, the systemic view "sees humans as organic parts within a self-maintaining and self-evolving whole that is the context and precondition of life on this planet" (p. 12).

The reason why the systemic worldview has proved so fertile in different domains of science is that it is isomorphic to the four organisational invariances (i.e., principles) that characterise natural systems (Laszlo, 1996):

1. They are wholes endowed with irreducible properties.
2. They tend to maintain themselves when the environment changes.
3. They respond to changing conditions by creating themselves ("autopoiesis") when self-creativity occurs in other systems.
4. They are coordinating interfaces in nature holarchy (i.e., multi-level flexibly coordinated structures).

When the CE proposes to replace the current industrial linear system[1] grounded on the "take-make-distribute-consume-dispose" logic with an alternative system where the last step, "dispose", is replaced with "return", which conceives of materials either as technical nutrients or as biological nutrients, it accomplishes a double critical function. First, it allows looking at the current mental model dominating in business by shifting the perspective from the production process itself to the resource being used in the production process. Second, it provides an alternative mental model that is isomorphic to the complex environment the industrial sector operates in, by linking the biotic and the physical system and providing an integrated "system of systems" approach.

By proposing to use resources in a different way, i.e., intelligently, CE thinking rejects the "cradle to grave" vision, underlying linear economy models, and replaces it with an alternative nature-inspired logic, whereby the concept of waste is designed out, since in nature any element is a nutrient for another.

According to the philosopher Luc Ferry, the two defining features of the CE project are, first, that "everything can be indefinitely recycled" and, second, that the aim must be creating a zero-pollution and earth-preserving society, not reducing growth and consumption. The latter can be achieved, thanks to the technological advancement, by "inventing infinite possibilities of growing with no limits and no pollution" (p. 206). Thus, not only should we reject the linear economy model, but also the logic of limiting harm in production processes, indeed as Braungart and McDonough (2008) say: "This is the ultimate failure of the 'be less bad' approach: a failure of the *imagination*. From our perspective, this is a depressing vision of our species' role in the world" (p. 67, italics added). This has led Ferry to inscribe the CE thinking within the "great design" (Ferry, 2021, 271) of "positive ecology", that is an ecology that does not see human activities only as a potential harm, but it sees technology and innovation at the service of an integrated vision of man and nature.

In fact, the CE invites us to think at production processes without assuming that technology has achieved its peak and no further progress in reducing waste is possible. It shows in a positive way that an indefinite growth is feasible in a finite world, provided that it is "intelligent", i.e., imaginative and innovative. In this sense – and in line with our proposal – Braungart & *McDonough* present an analogy with nature and in particular, the "cherry tree": "Consider the cherry tree: thousands of blossoms create fruit for birds, humans, and other animals, in order that one pit might eventually fall onto the ground, take root, and grow. Who would look at the ground littered with cherry blossoms and complain, 'How inefficient and wasteful!' The tree makes copious blossoms and fruit without depleting its environment. Once they fall on the ground, their materials decompose and break down into nutrients that nourish microorganisms, insects, plants, animals, and soil" (pp. 72–73).

The authors' concluding remarks are worth reflecting on: "If nature adhered to the human model of efficiency, there would be fewer cherry blossoms, and fewer nutrients. Fewer trees, less oxygen, and less clean water. Fewer songbirds. Less diversity, less creativity and delight. The idea of nature being more efficient, dematerializing, or even not 'littering' (imagine zero waste or zero emissions for nature!) is preposterous. The marvellous thing about effective systems is that one wants more of them, not less" (pp. 76–77). Here, we can notice that, instead of imposing a "human model of efficiency" on nature, we can learn from nature's functioning principles and develop what we can call a "human-nature" model of efficiency. The difference is that the "human model of efficiency" looks at the efficiency of the "tree" in isolation, i.e., just at one dimension of the concept of efficiency: the number of cherries that are needed for a single purpose, so that any excess production of cherries would be considered as a resource waste to be minimised in a future cycle. If, instead, the perspective is overturned and we look at nature working as part of an integrated ecosystem, we can appreciate that what seemed to be a waste becomes part of another cycle, since nature has developed a mechanism to make use of and take advantage from it.

Here is where the CE socio-eco-systemic vision could provide a normative guidance for a renewed SMT. In fact, as the authors note "The tree is not an isolated entity cut off from the systems around it: it is inextricably and productively engaged with them. This is a key difference between the growth of industrial systems as they now stand

[1]In what follows we will use interchangeably 'complexity' or 'systemic' view, in that they rely on a relational mind-set that rejects an atomistic view of the elements and sees these in their essential *relationality*. It is important to clarify that systems thinking is understood as both an epistemological and cognitive framework that considers that our thinking and practices are interrelated, and as an ontological theory that sees the world as a web of relations, as opposed to atomistic elements. In this respect, while the "linear economy" is certainly a "system" in the first sense (and in this sense it is referred to as a "linear economy system"), it is not in the second. On the other hand, instead, the CE manifests its systemic nature in both senses. For this reason, we refer to the CE thinking as "systemic", thanks to its view of the world in accordance with the "systemic paradigm".

and the growth of nature." (p. 79). In fact, "nature operates according to a system of nutrients and metabolisms in which there is no such thing as waste. [...] The Earth's major nutrients—carbon, hydrogen, oxygen, nitrogen—are cycled and recycled. Waste equals food" (p. 92), and this is the CE aim. In addition, "this cyclical, cradle-to-cradle ecosystem [...] meant more trees, more species, greater diversity, and more complex, resilient ecosystems" (p. 92) and again, the four-abovementioned main characteristic of a natural system, outlined by Laszlo (1996), are at play in the CE economy vision, in that it takes its inspiration from the cradle-to-cradle® model of natural ecosystems. On the other hand, the problem with the current industrial system is that it has ignored the existence of both biological and technical nutrients fostering a linear economy, which at best has tried to recover part of the end-of-cycle waste, without designing out waste. Yet, as noted by Braungart & *McDonough* "biological nutrients are useful to the biosphere, while technical nutrients are useful for what we call the technosphere, the systems of industrial processes." (p. 93). In fact, "we can build factories whose products and by-products nourish the ecosystem with biodegradable material and recirculate technical materials instead of dumping, burning, or burying them. We can design systems that regulate themselves. Instead of using nature as a mere tool for human purposes, we can strive to become tools of nature who serve its agenda too" (p. 156).

A CE-inspired systems thinker, by looking holistically at the production process, since its initial design, and taking into account the entire socio-eco-system, including future generation that will inhabit our planet, must ensure that products and services are integrated within a circular model, where landfill plays no role. For this reason, the CE eco-systems thinking can provide a compelling new narrative that fits Waddock's call for systemic change in current business models and practices in which a new narrative grounded on circularity and cyclicality replaces the take-make-waste production and business models (see Waddock, 2020, pp. 6–7).

However, as noticed by Werhane (2002), stepping out of an existing mental model requires an effort in imagination that enlarges our horizons by looking critically at the limitations of the current model. When a moral evaluation of the current system leads to an alternative worldview, we see the productive power of *moral imagination* at work, to which we are devoting the next section.

6 | CIRCULAR ECONOMY AS AN EXERCISE IN MORAL IMAGINATION: STEPPING OUT OF THE LINEAR ECONOMY THINKING

In a series of seminal contributions, Werhane (1999, 2002, 2008) has shown the relevance for management theory of moral imagination when coupled with systems thinking. Moral imagination is a complex thought process involving several dimensions as self-reflection on an accepted worldview to grasp its limits, disengaging from it when envisioning possible moral conflicts, imagining new possibilities and evaluating from a moral standpoint both the dominating mental models and the envisioned alternative model. Werhane (2002) notices that moral imagination should not be confined to the individual level, since it "operates on organizational and systemic levels as well" (p. 34).

Whereas Werhane (2008) uses moral imagination at the firm's level, showing how a change in a mental model may allow looking at the same business reality from a different perspective (e.g., instead of centring the analysis on Wal-Mart in its interaction with suppliers, stakeholders, etc., the analysis of the same phenomenon would be considered differently if centred on "sweatshop" workers in their interactions with Wal-Mart, customers and other stakeholders), we propose to extend the power of moral imagination to the business model level.

Following Werhane (2008, p. 466)'s approach to self-reflective thinking as a means of stepping out of the mental model in which a firm may be trapped and which blinds it to becoming aware of alternative possible mental models, we can translate her questions to the level of business models by asking ourselves:

- What mental models are at play?

  A linear, atomistic and product centred model.

- What moral conflicts are operative?

  Those involving the relation between man and his environment, but also current and future generations.

- What is left out or ignored?

  A consideration for the limitedness of natural resources and the working of ecosystems.

- What are other, new possibilities?

  A holistic approach that sees production processes as an integral part of the socio-eco-system where the concept of waste is designed out.

One should be aware of, but not deterred by, the fact that mental models, conceptual frameworks and paradigms are at play even when challenging an existing or dominating paradigm. However, the self-reflective activity of the subject can overcome the limits of a paradigm at the very moment in which one is aware of it. This self-reflective activity is at work when a firm revaluates its mission, practices, and mental models becoming aware of its weaknesses.

Imagination, therefore, plays a central role in envisioning new possibilities that are not merely context-dependent, but can involve another cognitive framework designed to overcome the strictures of the existing framework. First by disentangling the logic of the current linear industrial production system and then by reconceptualising the entire production process, the CE thinking can be thought of as an effort in moral imagination. According to the philosopher Luc Ferry, the CE is the "only conception of the economy that can make the project of ecomodernism plausible and, more generally, the only one that allows to reconcile market economy, growth, productivism, and finally

an effective care for the environment" (Ferry, 2021, p. 203). It is for these reasons that an economic model, such as the CE, which from its design and throughout its development envisions planning, resourcing, production and reprocessing "to maximise ecosystem functioning and human well-being" (Murray et al., 2017, p. 377), can integrate *moral* decision-making into ordinary business, overcoming some doubts on the missing moral dimension of the CE (ibid. p. 376).

It must be stressed that this exercise in moral imagination is not an exercise in "fantasy", since the "imagined future" is a cognitive framework instrumental to the emergence of a "credible imaginary of environmentally, economically and socially sustainable production and consumption systems" (De Angelis & Ianulardo, 2020, p. 147). This involves looking at the same business activities, institutional and technological context from a different perspective. If we use Werhane's definition of moral imagination as "the ability in particular circumstances to discover and evaluate possibilities not merely determined by that circumstance, or limited by its operative mental models" (Werhane, 1999, p. 93) and "think creatively within the constraints of what is morally possible" (Werhane, 2002, p. 34), then the CE socio-eco-systemic thinking with its sound awakening to the limitedness of natural resources and concern for future generations incorporates also an ethical dimension. This shows itself also in the creativity and wealth of initiatives undertaken at the level of business, public, government to cope with an environment with limited resources, focusing in particular on the various intellectual means to design production and consumption processes that prevent a waste of available resources and make use of alternative resources.

7 | CONCLUSION

This article contributes to the Management Studies and CE literature, in the contexts of management research striving for practical relevance and CE research longing for conceptual clarity. Particularly, this article demonstrates how the functioning principles of nature are reflected in CE thinking and characteristics, thereby advancing its conceptual foundations. Clarity is essential to enable theory building, effective communication and field development (Pfeffer, 1993; Suddaby, 2010). This article also proposes some descriptors of the constructs that could contribute to a SMT drawing from the functioning principles of nature as embodied in CE thinking and practice, showing that CE socio-eco-systemic thinking is isomorphic to the emerging complexity paradigm. By enlarging our conceptual horizons to answer some moral shortcomings of the current linear economy system and proposing an alternative "circular" conceptual scheme, the CE represents a genuine effort in moral imagination. Nonetheless, this article does not claim to have built a SMT. Conceptual schemes and mental models, in fact, although essential in the process of constructing strong theories, are not a substitute for theory (Sutton & Staw, 1995), but they provide the framework or paradigm within which theories can be developed. Responding to management scholars' calls for redefining the foundations of management theories in the wake of the current planetary crisis, we also hope that this article enlightens management practitioners' understanding of the role of business in society, and consequently assists them to move towards corporate strategies that deliver substantial sustainability outcomes.

By showing how the functioning principles of nature are reflected in CE thinking and by providing a different conceptualisation of the relation between human beings and their social and natural environment, the CE elaborates a richer socio-eco-systemic thinking that enlarges one's horizons. This represents an effort in imagination. Some authors have lamented a lack of imagination in the "doing less bad" approach that has characterised not only traditional linear economy models but also some responses to the ecological crisis. Instead, the CE model, inspired by an ideal of a "positive ecology" that proposes to produce goods differently, with potentially zero waste, aims at overcoming this failure of imagination that holds societies trapped in the current linear production system. It invites researchers to think of the concept of effectiveness in a holistic manner, as it happens in nature, and to integrate this systemic approach with the capacity of human beings to use their creativity to devise possible solutions to current challenges within the limits of what is morally possible, i.e., using moral imagination. The latter is particularly evident in the CE sound awakening to the limitedness of natural resources, which is absent in the linear economy thinking.

The CE literature has received limited contribution from scholars in business and management fields (Khitous et al., 2020). This is surprising given that businesses have a key role to play in the transition towards a more resource efficient economy and so management scholars need to provide them with some guidance. Other scholars in the CE, management and business and natural environment fields, could take this research as a starting point to add further conceptual and theoretical clarity to the CE field. Additionally, scholars could refine and/or add to the constructs suggested in this article: what else can be borrowed from the natural sciences to develop a SMT?

Also, as a conceptual study, this research has a fundamental role in providing an awareness of the current traps and how to overcome them. On the other hand, by enlarging a conceptual framework and allowing seeing the current problems differently, one can cope with the cultural, historical and social context one is embedded in. Therefore, this study can provide some inspirations to scholars for applications to more specific contexts asking: What are the context-dependent barriers that prevent stepping outside the current linear economy system and, thus, impede the full deployment of CE moral imagination? Finally, as argued by De Angelis and Peattie (2022), for CE principles to inform a SMT, a thorough questioning of the existing management principles that work against principles in nature is also necessary.

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