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**To cite this article:** Miles Weaver, Ana Paula Fonseca, Hock Tan & Kamila Pokorna (08 Apr 2025): Systems thinking for sustainability: shifting to a higher level of systems consciousness, Journal of the Operational Research Society, DOI: [10.1080/01605682.2025.2486698](https://doi.org/10.1080/01605682.2025.2486698)

**To link to this article:** <https://doi.org/10.1080/01605682.2025.2486698>



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Published online: 08 Apr 2025.



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RESEARCH ARTICLE

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# Systems thinking for sustainability: shifting to a higher level of systems consciousness

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## ABSTRACT

The grand challenges encapsulated in the seventeen UN Sustainable Development Goals to be achieved by 2030, are complex, messy and interconnected. Fulfilling these goals necessitates a shift in mindset from ego-to-ecosystems awareness and an imperative for stakeholder collaboration. Systems thinking is crucial to address sustainability challenges and an agenda for sustainable development. While some management approaches, like Doughnut Economics and Circular Economy, have roots in systems thinking, there is limited research into system thinking for sustainability. Nevertheless, the authors suggest we can learn from many systems-based contributions in the environmental science/studies literature that address ecological/Earth issues (e.g., Gaia, autopoiesis) and the Operational Research/Systems literature rich in a tradition of engaging communities in analysis and taking action. We ask, “How can systems thinking help businesses to meaningfully engage their stakeholders in a shared sense of purpose, value and impact?” The “systemic sustainability” framework (SSF) is proposed to address this, extending Laszlo’s concept and incorporating traditional systems thinking principles. The SSF emphasises that organisations and their stakeholders engage at four levels of systems awareness, reflecting on organisational purpose, and balancing organisational viability with planetary pressures. *Interdependence, legitimacy and thriving* are highlighted as critical concepts in systems thinking for sustainability.

## ARTICLE HISTORY

Received 31 May 2024

Accepted 21 March 2025

## KEYWORDS

Systems thinking; sustainability; systemic sustainability; United Nations Sustainable Development Goals (UNSDGs); community operational research (COR)

*“Climate, the ocean and biodiversity are, in fact, part of one common planetary system that helps sustain all life on Earth. What do we do to the oceans and to nature, we ultimately do to ourselves. As stewards of this precious planet, our actions and actions alone will determine its future.”*

HM King Charles III, Coronation Concert 2023, before a rendition of “Don’t You (Forget About Me)”, original by Simple Minds (1985), BBC Studios (7/5/2023).

## 1. Introduction

In the 1990s, Elkington (1998) introduced the triple bottom line (TBL) to delineate the sustainable corporation. The TBL concept represented value creation by companies aimed at regenerating economies, societies, and the biosphere. Within management literature, the TBL established three pillars for assessing the social (people), environmental (planet), and economic (profit) performance of businesses and evaluating their activities. In 2000, the United Nations (UN) Global Compact was

launched, building on these pillars, to encourage businesses to adopt policies for sustainability and report on their implementation (United Nations Global Compact, 2024). More recently, in 2015, the United Nations adopted 17 Sustainable Development Goals (UNSDGs) as part of the 2030 Agenda for Sustainable Development (UN, 2015). These documents and initiatives not only define but also set global goals and targets for sustainable development, which are the foundation of the principles guiding meaningful action to their achievement by 2030.

The Business and Sustainable Development Commission (2017) found that companies can unlock \$12 trillion in market opportunities by 2030 while creating 380 million jobs by integrating the UNSDGs into business strategies. To this day, progress still remains slow to unlock this potential. The UNSDGs present us with “wicked problems” deeply rooted in pressing human, ecological, economic and health crises that disrupt systems (Van Tulder & Van Mil, 2022). These challenges are deemed “wicked” as they lack clarity in aims and solutions

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and are complex and deeply interconnected (a term coined by Rittel & Webber, 1973). In 2018, Elkington revisited the TBL, which was influenced by the broad uptake of people, planet, and profit to the concept of sustainable development. Linking social inclusion, ecosystem, and economic development into an integrative and interlinked way—people, planet, peace, prosperity and partnering (Elkington, 2018), realigned to the UNSDGs.

Operational Research has a long tradition of supporting the grand challenges of today and tomorrow. From early applications supporting the liberation of Europe during World War II (McCloskey, 1987) to more contemporary applications on environmental and social sustainability (Petropoulos et al., 2024). The authors argue that Operational Research (OR) and Systems Research (OR/Systems) will be vital to helping decision-makers understand, plan and develop practical solutions to build capacity for attaining the UNSDGs. The UNSDGs are complex and interconnected by their implicit nature. It requires businesses to respond appropriately and collaborate with others to allocate resources effectively and evaluate decisions on business outcomes such as environmental, economic, and social impact. Following Petropoulos et al. (2024) encyclopaedic article on OR methods and applications, this paper seeks to contribute in two areas:

1. **Method**—*systems thinking* (pp. 472–474).
2. **Application**—*Community operational research* (pp. 478–480); *multi-sector responses to net zero* (government & public sector, pg. 498; plus, business) and *stakeholder engagement in sustainability* (including supply chain management, pp. 527–531).

Keys (1991) advocates that Operational Research (OR) and Systems are inherently complementary: OR is grounded in the scientific method, while Systems research facilitates a holistic view of problems and tackles issues of organised complexity. Jackson (2019) cites the UN and its specialised agencies (e.g., UNESCO, WHO) plus prominent businesses who stress the criticality of systems thinking for sustainability and suggests applications rely on including actors who possess legitimacy. Jackson (2019) further points out that ideas such as complexity, multiple causality, interconnectedness, wholeness, and seeing things differently are synonymous with systems thinking. Reynolds et al. (2018) recognise the UN's intention to create an integrated, holistic, and multi-stakeholder approach, which implies the need for systems thinking ideas

and approaches, and this can help facilitate better stakeholder conversations and cooperation.

Systems thinking as a discipline is still evolving, which can be charted in four waves from the 1950s onwards (Cabrera et al., 2023, building on earlier contributions by Flood & Jackson, 1991; Jackson, 1991, 2019; Midgley, 2000, 2003), although its origins can be traced back much further (see Jackson, 2024). Each wave has deposited and repurposed many theories, concepts, and principles, as shown in Table 1. Likewise, table 1 adds examples of systems-based approaches that have been applied for sustainability applications, demonstrating how the emphasis placed in each wave continues to influence.

One of the foundational contributions to sustainability was by Meadows et al. (1972), who introduced the concept of the “*Limits to Growth*” as part of the first wave of systems thinking. This work significantly influenced the Brundtland Commission (1987) report that shaped early definitions of sustainability. Meadows examined the evolving dynamics between growth-driven, anthropocentric systems and the natural environment, influenced partly by the significant economic expansion observed in many countries since the Industrial Revolution (1760s onwards). This ongoing discourse remains central to debates on climate change, particularly concerning efforts to limit post-industrial global temperature increases to no more than 1.5 C (UN, 2019). While Meadows' contributions utilising a systems dynamics model were highly influential, there remains an opportunity to explore how the emphasis placed by different waves, the diversity and breadth of approaches, and how exploring systems principles can help address sustainability challenges.

The authors propose that sustainability applications will dominate the fourth wave of systems thinking and acknowledge calls made during the third wave advocating for the significance of “methodological pluralism” (e.g., Flood & Jackson, 1991; Flood & Romm, 1996; Midgley, 2000). This concerns the employment of an appropriate combination of mixed methods to effectively address a given problem situation and progress towards a viable intervention (Jackson, 1991, 2000, 2019; Midgley, 1997, 2000). The debate on methodological pluralism has introduced a diverse and comprehensive “toolbox” of systems thinking approaches and methods, reflecting the diversity of the previous two waves. In sustainability applications, this includes incorporating multiple viewpoints and the intersubjective creation of meaning and action (as noted in the second wave by Cabrera, 2021). Additionally, it is important to consider approaches highlighting the



**Table 1.** The Systems Thinking Waves, as presented in Cabrera et al. (2023), adapted to include examples of approaches that have been applied to address sustainability challenges.

System Thinking Wave		Approaches	Example applications in sustainability
First wave (1950 onwards)	"Hard" systems	Systems Dynamics, Systems Analysis, Systems Engineering, Viable Systems Model (VSM), etc.	"The limits to growth" model using a systems dynamic approach (Meadows et al., 1972); Sustainability management insights from the VSM (Panagiotakopoulos et al., 2016); Sustainable self-governance in businesses & society (Espinosa, 2022)
Second Wave (Late 1970s onwards)	"Soft" systems	Soft Systems Methodology (SSM), Interactive Planning, Strategic Assumption Surfacing & Testing (SAST), Churchman's (1979) Systems Approach etc.	Using SSM to help a fund manager unlock and release more resources into communities (Weaver et al., 2018); SDG interactions studies (Hernández-Orozco et al., 2022); Using SSM & SAST in sustainable agroindustry (Hadi et al., 2023); Using SSM to frame the problem in sustainable performance in tourism SMEs (Núñez-Ríos et al., 2023)
Third Wave (Late 1980s onwards)	"Critical" systems	Critical Systems Heuristics (CSH), Critical Systems Thinking (CST), Boundary Critique, Systemic Intervention; & theories of power, conflict, and marginalisation etc.	Making polemical boundary judgments concerning those affected but not involved while accepting that a complete comprehension of ecology is impossible (Ulrich, 1993); Midgley (1994) takes CST, combined with processes of marginalisation to prioritise boundaries and promotes the planet's well-being as a whole; CSH as a tool for emancipation and issues of sustainable development (Maru & Woodford, 2001); Weaver et al. (2020) noted the opportunity to use the systemic intervention approach and the boundary categories of CSH to facilitate co-creation in multi-stakeholder action; CSH and the practice of boundary critique to environmental planning (Ulrich & Reynolds, 2020).
Fourth Wave (from 2000)	Universality & Diversity	DSRP/Systems Thinking, VMCL/ Systems Leadership  ... <i>Systemic Sustainability</i>	Utilises DSRP in a sustainability framework for soil erosion problem (Jenkins, 2021); Using DSRP to understand interrelationships between lean and sustainability (León & Calvo-Amodio, 2017); DSRP to understand a global apparel supply chain as part of a circular economy (Wilson, 2022).

significance of understanding power dynamics and empowering marginalised communities to promote conflict resolution and strengthen community engagement (See Jackson, 2019, 2024).

While acknowledging this diversity, the authors exercise caution in responding to Cabrera et al. (2023) advocacy for "universality." However, we stimulate discourse and attempt to reinterpret systems thinking principles considering the sustainability challenge while drawing on widely accepted management approaches and language. This more pragmatic approach is adopted to equip a broader audience (e.g., management decision-makers) with a framework that highlights how systems thinking can help address sustainability challenges. Therefore, our central research question concerns:

How can systems thinking help businesses to meaningfully engage their stakeholders to establish a shared sense of purpose, value, and impact?

## 2. Method

This conceptual paper proposes the *Systemic Sustainability Framework* (SSF) in response to the central research question. It suggests that such a framework can contribute to the emerging fourth wave (included in Table 1). To do so, the SSF is

positioned as part of an emerging research area that we envision as "*systems thinking for sustainability*." We begin by taking the original "systemic sustainability" concept first coined by Laszlo and Laszlo (2011a) and enhanced by Laszlo (2014) to examine its core features.

The authors observe that little research has been conducted in the management literature on systems thinking for sustainability, particularly within strategic management. However, Earth and Environmental Science literature, influenced by systems theory and practice, is considerably rich. This includes theory closely aligned with living systems such as autopoiesis, Gaia, and interdependence. A key message in this paper is an acknowledgement, predominantly in the management literature, of a shift from ego-systems to eco-systems awareness (see Section 4). Therefore, drawing on Earth/Environmental science literature will assist in understanding what is truly meant by "ecosystems" awareness.

A comprehensive literature review was conducted as of 17<sup>th</sup> April 2024, employing the approach of Tranfield et al. (2003) to identify pertinent scholarly articles (discussed in sections 3 - 5). The authors do not claim to have performed a systematic literature review yet found it a helpful process to follow. This entailed initial searches in the ABI/Inform and Web of



Science databases, using specific keywords: "systems thinking" OR "systems approach" alongside "sustainability" OR "sustainable development" OR "SDG." The Boolean operator "AND" connected the two search strings. The Web of Science yielded the highest number of citations (286), exceeding ABI/Inform's total of 70. After consolidating and evaluating the citations per the research objective, 132 papers were selected from a total of 312 reviews. The analysis conducted using the Web of Sciences reveals that environmental sciences/studies made up the most contributions at 61%, compared to just 12% for business/management (35 records). Our primary focus is at the meso (firm-level), exploring an organisations' engagement with multiple stakeholders involved and impacted upon. The earliest contributions emerged in 2015, with a notable increase in 2020, leading to 48 publications recorded in 2022. Given that systems concepts and approaches are anticipated to become prevalent in sustainability, we can expect a significant expansion of research in this domain.

In [Section 5](#), we draw on the traditional principles of systems thinking and discuss them, considering an understanding of what constitutes a higher level of systems consciousness: seeing sustainability systemically, ecosystems awareness and the goal for all systems to thrive in perpetuity. This discussion identifies six key concepts incorporated into an extended framework for systemic sustainability and a set of reflective practice questions ([Section 6](#)). To promote active engagement between businesses and their stakeholders, thereby increasing levels of systems consciousness. The SSF can be used as part of a multi-methodological approach to apply systems thinking principles in sustainability, employing relevant systems approaches to analyse and take action. The authors suggest caution in using the term "intervention" as the SSF is intended to explore *purpose* (shared interests, value and values) and *impact* by acknowledging a system's legitimacy (social and environmental impact). As part of a co-creation process, it is important to put *shared values into meaningful action*.

[Section 6](#) offers two illustrative examples to demonstrate how engaging in higher levels of systems consciousness using the SSF can aid businesses with stakeholder engagement in shaping their sense of purpose and impact. The paper then offers a conclusion and implications for advancing systems thinking for sustainability as an emerging research area and practising systemic sustainability.

### 3. The origins of systemic sustainability

The concept of "Systemic Sustainability" is not new. The term was first coined by Laszlo and Laszlo (2011b) as "*developing capacity that all human*

*systems can co-exist in partnership with the living systems of our planet.*" While instances of it being used as a term exist in the literature (e.g., Hileman et al., 2020; Mouthaan et al., 2023), it has been used to describe sustainability situations and challenges. No research that applies and builds on the original concept of systemic sustainability can be found. The authors are drawn to this concept as it seeks to engage individuals, organisations, and communities in meaningful action and collaborative practices that lead to transformative change in sustainability. Along with seeing sustainability from multiple perspectives, its goal aligns with contemporary management-orientated frameworks in sustainability and business management. Particularly Raworth's (2017) Doughnut Economic model and the growing emphasis placed on public policy and business commitment to growing a Circular Economy (Ellen MacArthur Foundation, 2013). Both have roots in systems principles and ideas (Pokorna et al., 2024).

This section highlights two distinguishing features of Laszlo and Laszlo's (2011a) original systemic sustainability concept: (1) *seeing sustainability systemically* at four levels of systems consciousness and (2) its *goal* for all human and living systems to thrive in perpetuity. We start here and acknowledge Jackson (2024) observation that as new ideas emerge in systems thinking, there is a need to appreciate what has gone before, to learn from what has been achieved, or seek to learn from previous mistakes.

#### 3.1. Seeing sustainability systemically

Systemic sustainability is about connecting individuals in organisations or communities as agents for change. Laszlo's (2014) later contribution stressed that this involves a process of development that involves an adaptive strategy of emergence by developing practices at four levels of systems consciousness with: *oneself* (personal sustainability), (2) *others* (social-cultural sustainability), (3) *nature* (social-ecological sustainability), and (4) *flows of being and becoming* (evolutionary and interdependent sustainability).

Emphasis is placed on supporting a cultural shift by unfolding different levels of systems consciousness, from egosystems to ecosystem awareness. Firstly, sustainability must be seen with *oneself*, with every action, even those deemed small, having some effect on our sustainable futures. This starts with reflecting on one's own values and appreciating how we each have our own carbon footprint and contribution to the goals for sustainable development. Secondly, most actions are taken *with others*, usually within organisations, communities, and between and with each other. Our focus here is on a traditional



view of an organisation (particularly its business model as a system) and how it needs to adapt to its surrounding environment. The third level transcends the organisational, community, and interpersonal levels to see sustainability with *nature*. At this level, we begin to appreciate an ecosystems level of awareness—that business success depends upon its interdependence with nature (e.g., the extraction of raw materials).

### 3.2. The goal: Systems that thrive in perpetuity

At the highest level of systems consciousness, this ecosystem's awareness is embedded into everything we do, and both humans and living systems can co-exist in harmony and thrive. This is captured aptly by Raworth's (2017) doughnut to meet *the needs of all people within the means of the living planet*. Laszlo (2014) draws on Werbach's (2009) manifesto for sustainable business that stresses that business is part of this to "*thrive in*" its environmental niche. This presents a new way of looking at organisational viability and its legitimacy. For instance, with the world's scientists warning of climate emergency (Ripple et al., 2022), business is constrained by our ecological ceiling (Raworth, 2017). This requires a mindset on the resources that nature can offer and regenerate (e.g., farming, biochemical feedstocks, renewable energy) and finite materials to be managed as part of a circular economy (See the circular economy systems diagram, Braungart & McDonough, 2009; Ellen MacArthur Foundation, 2021). Essentially, the core message of these emerging theories in sustainability is in-line with Laszlo (2014) goal with a focus on *systems that thrive in perpetuity*.

The sustainability challenge offers us an array of "wicked" problems, many of which are so complex and interconnected they can be deemed "super" wicked problems. This highlights a deep tension between individuals, organisations, and societies in addressing sustainability challenges and accelerating progress towards the realisation of the UNSDGs. However, we contend that at this highest level of systems consciousness, OR/Systems can help address the most demanding wicked problem that resonates with this paper's epigraph and in line with this paper's contribution: *That we are all stewards of this precious planet, we must see relevant interconnections that demonstrate the interdependence between a business model, its stakeholders and nature while taking action to sustain all life on Earth*. A message that is often overlooked or ignored in OR/Systems research and practice and goes to the heart of the purpose, impact and legitimacy of a system.

## 4. From ego-to-ecosystem awareness

The previous two sections emphasise that a shift in mindset is required to meaningfully engage organisations and communities (and between each other) in sustainability. This shift (or alternative thinking) has manifested itself in the literature in various debates surrounding the nature and role of business in society, such as questioning the prevalent neoliberal paradigm, the nature and criticality of the term "sustainability" itself, and systems theory and practice in general. Many authors advocating the importance of systems practice in sustainability often describe this in a call "*from ego-system to ecosystems awareness*" (e.g., Alam, Rooney & Taylor, 2022; Scharmer & Yukelson, 2015). This section seeks to locate this call within the systems literature, which is in line with thinking systematically about sustainability at the third level of systems consciousness—with *nature*.

Following the literature review in Section 2.1, most of the contributions fall within the Earth and Environmental Science literature, focused on three core concepts: *Gaia*, *autopoiesis* and *interdependence*. The management literature is underdeveloped in this area yet is rich in drawing upon the evolution of sustainability and the role of business in this context. This section uses this as a starting point, considering these three core concepts to offer some depth to seeing sustainability with nature.

The neoliberal economic paradigm is incompatible with ecocentrism due to a fundamentally different perspective and prioritising divergent goals (Labonté & Stuckler, 2016). Neoliberalism emphasises market-oriented growth, economic efficiency, individual responsibility, and globalisation (Kashwan et al., 2019). This paradigm prioritises short-term economic growth and financial returns, often at a cost to the environment (Coffey & Marston, 2013). Much of the thinking is egocentric, emphasising human welfare and economic prosperity with less regard for broader ecological concerns (Benatar et al., 2018). Ecocentrism emphasises the intrinsic value of nature, sustainability, and balance, besides systemic thinking (Alam et al., 2022). It views humans in an interconnected biosphere, emphasising long-term harmony over short-term gains (Merchant, 2020). This worldview often calls for systemic changes that question economic and industrial norms propagated by neoliberalism, with ecological health becoming a consistent priority. The points of tension are market growth versus ecological limits, commodification of nature, and short-term gains versus long-term sustainability (Baldwin et al., 2019).

Neoliberalism and ecocentrism are fundamentally mismatched in their core principles, but selective



incorporation of market mechanisms into ecocentric frameworks might provide avenues of limited compatibility (Breslow, 2015). This, however, calls for a rethinking of neoliberal policies in terms of long-term ecological health and systemic sustainability and, perhaps, an abandonment of some of the paradigm's more intransigent growth-driven assumptions (Khan, 2015).

The management literature, predominately since Hart (1995), published his seminal works on the *natural-resource-based view of the firm* and later, the now mainstream, concept for *sustainable value* creation (Hart & Milstein, 2003), has highlighted the shift from a neo-liberal to a sustainability paradigm. Hart (1995) initially stressed that traditional strategic management approaches overlooked the importance of the natural environment and that all organisational competitive advantages are deeply rooted in natural resources. Likewise, Howieson et al. (2019) have sought to reframe organisational leadership based on a sustainability paradigm. We contend that systems theory and practice, in the field of management require its own reframing. Yet recognise that we can learn from the systems literature in the Environmental and Earth Science field for ideas that resonate and can be drawn upon to gain a higher level of systems consciousness with nature.

The Gaia Theory, autopoiesis, and interdependence all give considerable insight into some of the most important philosophical and systems thinking for eco-centrism in pointing out the connectivity and self-governing aspects of life on Earth (Dussault, 2019; Latour, 2022; Schroeder & Schroeder, 2014). These reinforcing perspectives on intrinsic value, unity, and systems further support an eco-centric view of the world.

The *Gaia Theory* of James Lovelock (1987) insists that Earth be a self-sustaining life form wherein the biological, geological, chemical, and physical processes are coupled with each other in maintaining the complex conditions necessary for life (Zukauskaitė, 2020). In support of ecocentrism, the Gaia Theory treats Earth as one dynamic, holistic system that has its regulatory process independent of human needs (Lynch et al., 2019). This agrees with the emphasis of eco-centrism on the intrinsic value of eco-systems and the planet itself (Onori & Visconti, 2012). The theory highlights the interconnectedness of all living and non-living components of the Earth, stressing that human well-being is inseparable from the health of the biosphere (Litfin, 2005). Gaia's Theory challenges egocentric views by suggesting that Earth's systems operate on scales far beyond human control or comprehension (Volk, 2002). Eco-centrism similarly advocates for humility in recognising

humanity's place within a more extensive ecological system (Kopnina et al., 2024).

*Autopoiesis*, initially developed in the context of systems biology by Humberto Maturana and Francisco Varela, refers to the self-organising and self-sustaining features of life (Maturana & Varela, 1980). An autopoietic system sustains its boundaries and internal processes through ongoing environmental interaction (Cameron, 2001). Likewise, eco-centrism regards the biosphere as a living, self-organising system (Hernández & Muñoz, 2022). Autopoiesis sets a framework within which such a system can be seen as sustaining and adapting, showing value for itself, not merely utility to humans (Dussault, 2019). Eco-centric thinking regards them as autopoietic bodies that need stability and minimum impact to continue regulating themselves (Araujo et al., 2022). Ecocentrism advocates for less interference with this natural course followed in nature. Being self-sustaining does not mean invulnerable. Too much stress or removal can overwhelm their resilience, exceeding the limits where recovery is impossible (Dussault, 2019). This is one of the focuses of eco-centric thinking.

The *interdependence* postulates that there is an interconnectedness between living and non-living things (Holman et al., 2018). It is an important concept in ecology and eco-centric philosophies (Fath, 2014). Eco-centrism regards humans as part of a more extensive ecological web (Biswas et al., 2022). Interdependence emphasises that the survival and health of one species or system depend on the well-being of others. Moral and ethical considerations from an interdependence perspective shifts from individuals or species (like humans) to entire eco-systems and the planet, a principle shared with eco-centrism (Araujo et al., 2022). Interdependence enables responsibility to extend beyond the protection of human interests to ecosystems and species upon which humanity relies (Heikkurinen et al., 2016).

The Gaia Theory, autopoiesis, and interdependence add to an expanded understanding of eco-centrism with a systemic, connected, self-regulative feature of life on Earth. They contest the egocentric point of view and underline the need for peaceful interaction between human beings and the planet. These perspectives foster systems, ethical, scientific, and practical approaches toward the sustainability paradigm founded upon the realisation that ecosystem health is essential for the survival of all life.

## 5. Exploring higher levels of systems consciousness

The systems literature is rich in principles, approaches and methods, as shown in Table 1. In addition to



**Table 2.** Key principles of a systems approach considered in the context of sustainability applications.

Key principles for a systems approach (McGonigle et al. 2021; Williams & Hummelbrunner, 2010)		Linking systems principles to identify key concepts in Systems Thinking for Sustainability
Purpose	Acknowledging the purpose of the system according to the key stakeholders	(1) Determine why it is worth doing, what the system does (2) Acknowledging the legitimacy of systems in maintaining organisational viability and its co-existence in harmony with a thriving planet.
Interrelationships	Understanding the interrelationships between entities	(3) Explore critical interdependencies between human activity and living systems, appreciating the just and safe space between not overshooting our ecological ceiling and undershooting our social foundation for human wellbeing. (4) Appreciate the potential consequences of action in places that matter (the intersection of communities and nature at local and global spatial levels) and at the right pace (transition timeframe).
Perspectives	Determining whose perspectives should be accounted for	(5) Seeing sustainability from multiple systems levels of consciousness; addressing conflict between stakeholders' interests and values to be put into meaningful action.
Boundary	Defining the boundaries of (or being conscious of which elements are included within) the system	(6) Distinguish relevant stakeholder interests, value and values judgements in balancing purpose with profit (organisational viability), to determine which elements are included/excluded.

expressing the evolution of systems thinking in waves, other attempts have sought to classify systems principles with approaches, and this still arouses debate in the systems community (see Jackson, 2019, 2024). The most recent attempt was made by Cabrera and Cabrera (2022), who offer universal rules and skills as part of their DSRP framework (i.e., Distinction, Systems, Relationships and Perspectives). The authors are cautious not to base our analysis on DSRP, which lacks testing and broader acceptance, yet find it helpful regarding capacity development (i.e., general knowledge and skills to acquire). Instead, we concur with Williams (2011), who suggests focusing on overarching systems principles rather than specific methods when starting. This is important as our concern to think systemically about sustainability is also about building capability in exploring how organisations and their stakeholders can meaningfully engage in a shared sense of purpose (i.e., interests, value, values) and impact. This will require employing a multi-methodology relevant to a given situation/action and a pragmatic practice that embraces business language.

In environmental and community applications, McGonigle et al. (2021), influenced by Williams and Hummelbrunner (2010), offer four principles to form the building blocks for any practical “systems approach”: *purpose*, *interrelationships*, *perspectives* and *boundaries*. Other than “purpose,” these principles are often cited in the broader systems community and are in keeping with those offered in DSRP. Midgley (2014), like McGonigle et al. (2021), prefers the term “boundary” over DSRP’s term of “distinctions” to recognise a long-standing tradition of boundary ideas in systems. “Purpose” is a less recognised principle in systems. However, it is in the spirit of DSRP’s usage of the term “system” that concerns the viability of a system. This has resonance with the notion of organisational purpose central to this paper’s aim and where we shall begin the

discussion (in Section 5.1). This is followed by the notion of a business “impact” and where this resonates in systems principles (in Section 5.2). Additionally, there is a need to bridge the gap between the real world and systems language (in Section 5.3). Table 2 lists these four key principles and their description and links them to identify key concepts in systems thinking for sustainability.

### 5.1. Purpose

Beginning with “purpose,” it must be made clear that this has a distinct meaning and importance in business compared to its general usage in systems. In management, an organisational purpose is widely accepted as “*WHY it is worth doing, WHAT we are doing*” (Mackey & Sisodia, 2013). Sinek (2011) emphasises that purpose is about finding the “why,” going to the core of the reason for an organisation’s existence. Organisations should start with this “why” before moving to specific actions taken to realise this why (the “how”), followed by describing the results of the why (the “what”). Profit, for instance, is not a purpose; it is a result (a “what”) that must not be confused.

An organisational purpose is at odds with a general understanding of a system’s purpose. This is an important distinction as the “business model concept” is suggested to align with systems thinking (Halecker & Hartmann, 2013). However, in systems terms, purpose focuses upon “*what the system does*” (McGonigle et al., 2021), usually articulated as the products or services offered. The need to bridge business and systems language is evident in Hindle & Vidgen (2018) attempt to combine Osterwalder and Pigneur (2010) “Business Model Canvas” (that uses recognisable business language and terms) with the systemic epistemology and associated modelling language in SSM. Moving between the real world



**Table 3.** Seeing sustainability at four levels of systems consciousness.

Seeing sustainability	Systems consciousness (adapted from Laszlo & Laszlo, 2011a; Laszlo 2014)
With oneself	Every little action, even how small, contributes to a sustainable future. Sustainability must always reflect one's values. It includes appreciating and understanding how to positively impact one's carbon footprint and contribute to societal goals.
With others	Most sustainability actions are taken with others, usually within the workplace and with communities.
With nature	The third level transcends the community and interpersonal to sustainability with nature. This practice involves communing – being at one with all forms of nature by listening and acknowledging our interdependence and ultimate unity.
With flows of being and becoming	Embeds eco-thinking into everything we do, recognising that ecosystems are <i>interdependent</i> to meet the needs of all people (including future generations) within the means of the living planet. For humanity to <i>thrive</i> , we must seek genuinely regenerative and distributive systems by design (Raworth, 2017).

and systems thinking about the real world (see Checkland & Scholes, 1990).

Mackey and Sisodia's (2013) definition of purpose is helpful here as it combines the WHY and WHAT. Similarly, Carney (2021) stresses that a business purpose comprises an understanding of "value" and "values;" both are interconnected but must not be conflated or confused. Value is "perceived and determined by the customer based on value-in-use" (Vargo & Lusch, 2004, p. 7). Values articulate the desired culture and serve as a compass (the preferences for behaviour or attitudes) that provides principles on right and wrong and how to act in various situations (Maio, 2016). Value is a traditional measure of business, and its essential understanding is critical in management discourse, yet this term has yet to be embraced in systems thinking language and modelling. This makes a helpful distinction and highlights a disconnect between an organisational sense of "purpose" and that of a system. This can be summarised as *people have a WHY, not a system*.

Reconciling different stakeholder interests, value and values judgements in determining purpose and impact is an important "boundary" consideration (key concept six). This corresponds to an essential management consideration of the firms' boundary and goes to the heart of organisational viability (e.g., the "profit motive"). This debate continues to evolve as companies increasingly aim to align themselves with environmental and societal goals while exceeding traditional corporate responsibility efforts (Porter & Kramer, 2011; Scagnelli & Cisi, 2014). This is especially pertinent when examining what Midgley (2023) refers to as a system's primary and secondary boundary to include or exclude relevant stakeholders, their interests, and values while also recognising marginalisation and conflict.

## 5.2. Impact

"Impact" is also widely used in business yet not typically recognised in a systems language. However, we contend that this term aligns with Ulrich (1996)

description of the stakeholder group defined as those affected (but not involved). In business contexts, an organisation's purpose usually concerns appreciating those involved (in value creation processes) and affected by an organisation's activities and outputs. Moreover, Ulrich (1996) and Ulrich & Reynolds (2020) discuss a system's legitimacy, which is more akin to our understanding of business "impact." This addresses the core of the original notion of "systemic sustainability," which involves viewing sustainability from various perspectives (key concept five) and the system's legitimacy in preserving organisational viability while coexisting harmoniously with a flourishing planet (key concept two).

The question of legitimacy gives prominence to the criticality of the need for human activity and living systems that can thrive in perpetuity (see the goal, in Section 3.2). Hardin (1968) captures this dilemma in the "*Tragedy of the Commons*," whereby conflict arises between individual and collective needs when it comes to shared resources, which Hardin calls "the commons." When there are "limits to growth" (Meadows et al., 1972), organisational viability and humanity depend upon abundant resources (key concept three). This dilemma could be stressed as the "ultimate" wicked problem to avoid potential catastrophe if the just and safe space for humanity, as depicted by Raworth (2017), is not realised.

A system's legitimacy will heighten following engagement with higher levels of systems consciousness, giving prominence to marginalised issues and absent voices (e.g., representing nature and future generations, as suggested by Herron et al. 2025). To remedy this dilemma to an extent, the dimensions of *place* and *pace* are advocated. Recognising that it is in places (represented by people and their communities) that demonstrate an evident interdependence between people, their communities and nature at local (e.g., a dining table, neighbourhood, office, campus, city) and global spatial scales (e.g., a nation, continent). On the other hand, the pace of change recognises the importance of a transition, with some issues, such as combating climate change, being



timebound. In business contexts, this transition can only be attained when purpose is balanced with the need to profit, following the prevalent neo-liberal paradigm towards the sustainability paradigm, discussed in Section 4.

### 5.3. Bridging the gap

The previous discussion presents OR/Systems with an opportunity to support purposeful businesses in appreciating stakeholder interests and balancing purpose, profit, and impact. The goal of *thrivability* to address the sustainability challenge and the importance placed on *interdependence* (closely aligned to the interrelationship principle) reframe the notion of a system's viability and *legitimacy*. This will become increasingly important, emphasising a shift to a circular economy that aims for zero-avoidable waste and the regeneration of resources that all human and living systems depend on.

To bridge the gap between management and systems language, we propose that the value and impact created by a system is given meaning by *putting shared values into meaningful action*. These values are *shared* amongst relevant stakeholders within organisations, a community, or in partnerships between the two. Action is *meaningful* when relevant issues, value and values judgement are reconciled by exploring different perspectives on their purposes as part of a co-creation process.

## 6. Systemic sustainability framework (SSF)

In advocating for interdependent systems that co-exist in harmony and thrive, we introduce the systemic sustainability framework (SSF)—aimed at facilitating meaningful engagement of various stakeholders by promoting a higher level of systems consciousness in determining an organisation's (or cross-sector partnership) sense of purpose (i.e., interests, value, values) and impact. In pursuing this aim, we pose the following inquiries: *Why is it worth doing what the system does? How is value and impact determined? For whom? Where does legitimacy lie?* These questions aim to initiate dialogue and encourage an exploration of diverse perspectives by iterating through each level of systems consciousness, as illustrated in Figure 1. Seeing sustainability with *oneself*, *others*, and *nature* and towards seeing systems that *thrive in perpetuity* (detailed in Table 3).

At the highest level of systems consciousness, eco-thinking is embedded and acknowledges that an organisation's business model is *interdependent* on relevant human and living systems that coexist in harmony and *thrive*. By addressing fundamental

questions of *what*, *how*, *who*, and *where*, we propose that an organisational purpose—the *WHY*—can be better articulated. The SSF utilises traditional business understandings of purpose-making—stakeholder interests, value and values—following a style adopted by pragmatist system thinkers (e.g., Raworth, 2017; Scharmer, 2018) while being grounded in systems theory and principles. This dimension and its associated reflective questions are represented in light blue.

The output of a business model is not just business value but its broader impact (social and ecological value), which is difficult to define and measure. This concerns broader stakeholder interests and values that are often marginalised yet influence an organisation's purpose. We contend that systems thinking can play a significant role in appreciating how to safeguard a system's legitimacy. This is achieved by embedding ecosystem awareness to recognise a business model's interdependence in the natural environment. Acknowledging the inputs of a system depends on an abundance of natural resources and materials, plus human resources and skills. The SSF represents impact in two dimensions (represented in light green in Figure 1):

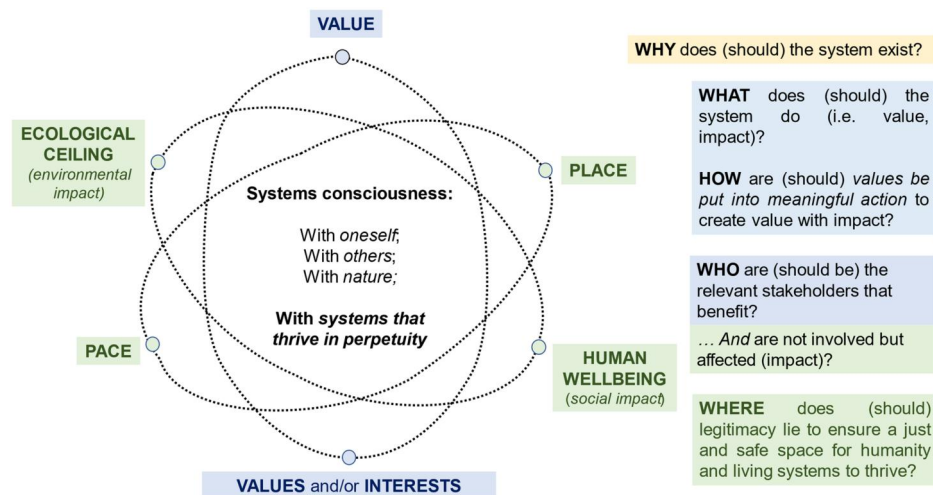
1. *Is ecologically safe and socially just*: a space where humanity can thrive within the means of a living planet (Raworth, 2017 central proposition)
2. *Matters in places and at the right pace*: acknowledging that people, their communities and nature are interwoven in places - it is here that action matters (local to global). Plus, sustainability is time-bound, yet the pace of change is critical to bringing people and businesses on board (i.e., a "just" transition to decarbonisation).

The SSF does not intend to prescribe a singular method or enforce a specific perspective. It seeks to balance *purpose*, *profit*, and *impact* while offering a critique of a system's *legitimacy*. The following section illustrates how the SSF can be applied and add value to a given analysis/action—first, drawing on a well-known situation regarding the UK Government's handling of the pandemic and one from the author's own practice.

### 6.1. UK Government response to the Covid-19 pandemic

Jackson (2024) offered a critique of the UK Government's response to the COVID-19 pandemic, noting it fell short from a systemic view. While the National Health Service (NHS) is highly esteemed,





**Figure 1.** The systemic sustainability framework (SSF) extends Laszlo and Laszlo's (2011a, 2011b, 2014) original concept.

its initial strategy during the pandemic emphasised "Saving the NHS," which unintentionally sidelined crucial care services, including screenings for severe illnesses. This emphasis led to detrimental policies, such as sending unscreened vulnerable patients into care homes (Dyer, 2021). Jackson (2019) referred to Midgley's (1992) study, highlighting the perception of the NHS as "sacred" in contrast to care homes seen as "profane," which reinforces a clear division (conflating value and value judgements). Further research using the SSF could shed light on the distinctions and overlaps between value and values judgment, implying that the NHS's core principles of universality and life enhancement were at risk (human wellbeing). Different regions encountered diverse challenges, particularly in procuring and distributing PPE, often neglecting local environmental factors (ecological ceiling). This situation underscores the pressing need for innovative, place-based solutions (place) and the strategic use of natural resources to address pandemics effectively (pace).

## 6.2. Sustainability in a construction supply chain

In the construction industry, Balfour Beatty, a prominent UK infrastructure company, completed Scotland's first net-zero college in 2024 and is set to build a prison (HMP Highland) in 2026, adhering to the Scottish Government's Net Zero Public Sector Buildings standard (refer to Zero Waste Scotland, 21/2/24). Throughout these initiatives, the authors have utilised the SSF to facilitate discussions with Balfour Beatty suppliers, enhancing their sustainability practices by focusing on decarbonisation and integrating circular economy principles through the "Regenerative Futures" programme. The SSF was employed during workshops centred on a perceived trade-off between cost and social and environmental impacts (reconciling value and values, this will continue to be a barrier influencing the pace of

change—a wicked problem). The result positively impacted the eco-awareness and engagement in analysis surrounding Scotland's circular economy strategy and a comprehension on planetary pressures (ecological ceiling). Nevertheless, further work is required to engage the supply base at a level of systems consciousness regarding the notion of thriving while emphasising best value as part of a "just" transition (pace).

## 7. Conclusion and implications

The paper proposes a SSF that can help businesses meaningfully engage their stakeholders in a shared sense of purpose, value and impact. The SSF incorporates six key concepts that draw on an examination of system thinking principles in the context of addressing sustainability challenges and an agenda for sustainable development. This includes seeing sustainability from four levels of systems consciousness with the goal to embed ecosystems awareness and focus on systems that thrive in perpetuity. This is in line with the central messages offered by mainstream management theories such as Doughnut Economics and the principles and practices of the circular economy. Helping to develop the capacity for all human systems to co-exist in harmony with living systems. Recognising that our ultimate wicked problem is to live within a just and safe space, where humanity can thrive, by not overshooting its ecological ceiling and undershooting its social foundation (Raworth, 2017, central proposition).

Systems thinking has a considerable role to play in exploring how businesses, with their stakeholders, can systemically address the complex challenges of sustainability and the agenda for sustainable development (i.e., the United Nations Sustainable Development Goals). Addressing these issues requires a holistic approach that integrates diverse perspectives and fosters collaboration across sectors



and stakeholders. However, this paper has identified that systems thinking for sustainability is an undeveloped research area. Nevertheless, many of the theories and ideas associated with ecosystem awareness are in abundance within the Earth/Environment science literature. These ideas have yet to gain resonance in the management literature and offer an opportunity to learn about the regeneration of natural resources and the efficient use of raw materials as part of a circular economy.

The SSF adopts common business language and terminology, such as purpose, value and impact, and compares these to the principles that have emerged in systems theory and practice. By adopting accepted business language and concepts, it is intended that the SSF can be employed by a broader set of decision-makers with their stakeholders to undertake business analysis. The authors suggest that to address the sustainability challenges, a greater emphasis needs to be placed on a business model interdependence with nature (e.g., natural resources as business inputs) and the system legitimacy by considering often marginalised issues and absent voices on those affected by action but not involved (e.g., the social and environmental impact).

Further work is suggested to advance the SSF to enable businesses to effectively engage with stakeholders in establishing a shared sense of purpose, value, and impact. By shifting to higher levels of systems consciousness, from ego-to-ecosystems level of awareness, OR/Systems can help build capacity to realise the message offered in this paper epigraph. Emphasising that businesses are social, human activity systems guided by their sense of purpose, value and impact, interdependent of our common planetary system that helps sustain all life. To act as stewards to protect this precious planet and improve human wellbeing will be shaped by how individuals, organisations and communities implement their *shared values into action*.

By fostering interdependence, thriving and acknowledging legitimacy, the SSF enables organisations and their stakeholders to align their purpose with planetary boundaries, ensuring both organisational viability and ecological balance. The area of systems thinking for sustainability is expected to grow providing further avenues for research in developing multi-sectoral responses to achieving net-zero and the UN SDGs, plus enhancing stakeholder engagement within sustainability and the circular economy.

## Acknowledgements

The authors would like to thank Professor Gerald Midgley for his warm encouragement in pursuing this topic and recognise his commitment to emphasising the role systems thinking can play in sustainability and

sustainable development. Additionally, the authors thank Balfour Beatty (Scotland) for inviting the research team to participate in its “regenerative futures” initiative and providing a case.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

The fourth author's work was supported by the European Union and from the Czech Republic's state budget under Project Materials and Technologies for sustainable development [number CZ.02.01.01/00/22\_008/0004631]; and Ministry of the Environment of the Czech Republic under Project CirkArena [number CZ.10.03.01/00/22\_003/0000045].

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