WILEY

and BEHAVIORAL

SCIENCE

Systems Research

RESEARCH PAPER OPEN ACCESS

Revisiting Critical Systems Thinking: Enhancing the Gaps Through Sustainability and Action Methodologies

Mohammed Albakri¹ | Trevor Wood-Harper²

¹Salford Business School, University of Salford, Salford, UK | ²Alliance Manchester Business School, University of Manchester, Manchester, UK

Correspondence: Mohammed Albakri (m.albakri@salford.ac.uk)

Received: 2 December 2023 | Revised: 14 October 2024 | Accepted: 2 November 2024

Keywords: action learning | action research | critical systems practice | critical systems theory | critical systems thinking | participatory action research | sustainability

ABSTRACT

Critical systems thinking (CST) is a holistic framework that has proven instrumental in understanding and addressing complex problems across various domains, including social, environmental, and economic systems. Despite its longstanding reputation for fostering a comprehensive approach, its limitations in effectively addressing contemporary sustainability issues necessitate a critical reassessment. This paper aims to explore the CST paradox, reconciling the need for critical engagement with practical constraints, while proposing a novel framework designed to enhance the efficacy of CST in practice. Insights from prominent systems thinkers, such as Jackson, Checkland Flood, and Midgley, are drawn upon to trace the evolution of CST, employing a critical analysis of existing frameworks and methodologies. Sustainability, which encompasses environmental, economic and so-cial dimensions, serves as an appropriate backdrop for the application of CST, reflecting a complex-pluralist ethos. Furthermore, the importance of addressing power dynamics, inequalities, and the ethical-political dimensions inherent in sustainability challenges aligns with the complex-coercive nature of CST. This paper advocates for the incorporation of action research, participatory action research and action learning (AR/PAR/AL) into CST, resulting in a more comprehensive toolkit for confronting today's pressing sustainability imperatives. Ultimately, the proposed framework seeks to strengthen the relevance and effectiveness of CST in tackling contemporary societal challenges.

1 | Introduction

Systems thinking, in its various forms, has long been recognised as an effective approach for understanding and solving complex problems (Jackson 2023, 2022, 2021, 2020a, 2020b, 2019). However, there is a growing need for systems thinking that goes beyond traditional models. Critical systems thinking (CST) has emerged as a response to this need, emphasising the importance of challenging established norms and engaging with diverse perspectives to address today's complex issues (Flood 1990; Flood and Jackson 1991; Midgley 1996).

The origins of systems thinking can be traced back to early thinkers such as Ludwig von Bertalanffy (1968), whose work laid

the foundation for the development of general systems theory. Since then, CST has evolved from systems thinking to include concerns about power dynamics, ethics, multiple perspectives and reflexivity, applying these principles to develop more equitable and effective solutions to complex problems. This evolution has been significantly influenced by Peter Checkland, who pioneered the Soft Systems Methodology (SSM) (Checkland 2000, 1999, 1991, 1985, 1981). As a result, CST broadens systems thinking by incorporating critical reflection, ethical considerations and an emphasis on social and political issues.

Michael C. Jackson, a prominent figure in the field, has contributed significantly to the development of CST, particularly in coining the term and producing exemplary works (Jackson

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2024 The Author(s). Systems Research and Behavioral Science published by International Federation for Systems Research and John Wiley & Sons Ltd.

2020a, 2020b, 2010, 2001). Jackson's work underscores the importance of reflexivity, ethical scrutiny and stakeholder engagement in addressing complex problems. His perspective on CST highlights the necessity to go beyond mere problem-solving, encouraging an exploration of the deeper ethical and political dimensions of the issues at hand (Jackson 2019). CST encompasses both Critical Systems Theory and critical systems practice (CSP), where CST refers specifically to 'critical systems thinking' in this paper. CSP represents the practical application of CST principles to real-world problem-solving scenarios (Jackson 2020b, 2021, 2022, 2023). This includes the System of Systems Methodologies (SOSM), which serves as a tool during the latter stages of CSP, encompassing creativity, choice, implementation and reflection. The SOSM is adaptable to various problem contexts, allowing for methodological flexibility while recognising the significance of both dominant and dependent methodologies (Jackson 2019, p.544). Thus, Jackson's contributions have been pivotal in advancing CST as a critical and reflective approach to systems thinking.

While CST is an approach that can address complex issues (Jackson 2001), it is not without challenges. One such challenge lies in balancing the critical engagement with the status quo and the practical limitations faced by systems thinkers (Flood 1990). Additionally, social theory in tackling societal inequalities has received less attention and is a crucial aspect of CST (Jackson 2019). This highlights the need to address existing challenges within the CST framework and learn from these experiences to enhance its practical application.

This paper aims to explore the CST paradox by examining the evolution of CST, Jackson's contributions and the challenges encountered by contemporary CST practitioners. It will draw upon the works of various systems thinkers and CST scholars (Banathy 2013; Midgley 1992; Ulrich 1983) who have developed critical heuristics for designing social systems. The discussion focuses on Jackson's efforts in advancing CST as a critical and reflective approach to systems thinking (Jackson 2019, 2010,

2001) to provide a comprehensive overview of the field. In subsequent sections, this paper evaluates the current appraisals and critiques of CST and present an enhanced model of CST that addresses the shortfalls of CST and enhances the practical application of CST.

Although systems thinking has been applied across various contexts, such as healthcare (Jackson 2019), business (Checkland and Scholes 1999; Senge 2006), education (Jackson 2010) and information systems (Checkland 1981; Flood 2017), complex topics such as sustainability serve as an ideal focus for this paper. This is due to sustainability's intrinsic ties to social inequality and its alignment with the core principles of CST (Jackson 2019; Green, Molloy, and Duggan 2021; Voulvoulis et al. 2022). As global challenges grow increasingly complex, interconnected and urgent, sustainability concerns have become a pivotal aspect of the modern landscape. Sustainability encompasses intricate issues such as waste management, global warming, resource depletion, biodiversity loss and social equity (Mensah 2019). These issues are characterised by nonlinear behaviours, emerging properties and profound ethical and political dimensions. CST, with its emphasis on critical reflection, ethics and diverse stakeholder engagement, is inherently suited to unravel the complexities of sustainability (Ulrich 1983). Therefore, applying CST principles within sustainability can provide a valuable framework for understanding and addressing the pressing issues at hand. Figure 1 illustrates logical model that is a prelude of the issues to be discussed throughout the paper.

By building upon the foundations of CST, including Jackson's perspectives, this paper navigates the complexities of contemporary problems with a more holistic and reflective approach. This paper serves as a starting point for reimagining systems thinking, paving the way for a more robust and dynamic approach to CST. It poses a fundamental question: *How can the challenges in the existing CST approach be addressed and learned from in order to improve its practical application in the sustainability context*?



FIGURE 1 | Logical model for integrating action methodologies in CST. [Colour figure can be viewed at wileyonlinelibrary.com]

2.1 | Conceptualisation of CST

CST does not adhere to a singular, unequivocal approach that delineates fixed principles (Flood 2010). Instead, this concept has evolved through the contributions of various systems thinkers. Jackson (2019) elucidates that the foundations of CST draw from two pivotal sources: social theory and the systems approach. Social theory facilitates a critical examination of the theoretical assumptions underpinning different systems approaches in relation to social reality and social science (Jackson and Jackson 1991). In parallel, the systems approach provides CST with a holistic philosophy, essential concepts and a diverse array of methodologies and methods. Jackson (2019) further posits that CST can harness the synergistic strengths of both social theory and systems thinking. He contends that the social sciences possess a robust theoretical underpinning, emphasising the ontological and epistemological assumptions inherent in theory construction, thereby generating new knowledge. In this regard, the social sciences enrich systems thinking by prompting critical reflection upon the theoretical foundations of interventions and enhancing its methodologies and methods. Conversely, Jackson asserts that systems thinking can reciprocate by assisting the social sciences in practical implementation, making theoretical findings more pertinent for real-world application through well-developed methodologies aimed at effecting change (Jackson 2019, p. 517). Consequently, CST emerges as a crucial bridge between theory (CST) and practice (CSP).

2.2 | Fundamental Commitments of CST

In delineating the underpinning philosophy and theory of CST, Jackson (2019) identifies three fundamental commitments: critical awareness, pluralism, and improvement. These commitments are instrumental in shaping the evolving landscape of CST (Jackson 2019). However, it is noteworthy that these commitments remain subjects of ongoing debate, and consensus regarding their precise definitions is often elusive. Moreover, Flood (2010) underscores the significance of these commitments within CST, introducing an additional commitment to the notion of the systems idea. He posits that CST aligns with a perspective termed 'systemic thinking' as opposed to 'systems thinking', firmly rejecting the notion of a concrete, tangible social world comprising genuine social systems (p. 275). Subsequently, there is a need to explain these aforementioned core commitments.

Critical awareness in CST comprises two vital aspects: 'theoretical awareness' and 'social awareness' (Jackson 2013). The former involves critically examining the theoretical foundations of various systems methodologies, assessing their strengths and limitations in addressing complex issues. 'Social awareness' focuses on the societal context in which a systems methodology is applied, considering the impact of specific theories and concepts on society. This aspect is essential for understanding how systems and methodologies influence societal outcomes. Jackson (2019) emphasises the role of the contextual 'climate' in which a systems methodology is employed, suggesting that this context can influence the choice of suitable methodologies. The prevailing inclination towards a particular methodology or worldview in a given cultural context may restrict the feasibility of employing methodologies that misalign with these preferences. This limitation is exemplified by the dominance of the scientific method in Western societies, which restricts alternative methodologies that promote diverse approaches to knowledge generation (Flood 2010, p. 279).

Pluralism in CST signifies the diversity of available systems methodologies, such as the viable system model (VSM, Beer 1984), soft systems methodology (SSM, Checkland and Scholes 1999), and critical systems heuristics (CSH, Ulrich 1983). This pluralistic perspective empowers practitioners to select and combine methodologies for specific purposes, underscoring the principle of methodological variety and adaptability within CST (Flood 2010). Jackson (2019) argues that the commitment to improvement within CST encompasses various dimensions, including efficiency, efficacy, effectiveness, viability, sustainability, mutual understanding, empowerment and emancipation. While emancipation is a significant element, CST's broader aim is to fortify all three human interests identified by Habermas, not solely emancipation (Jackson 2019). In line with the commitment to pluralism, Jackson (2010) contends that improvement necessitates the inclusion of various paradigms within systems thinking, aiming for progress across all facets of improvement indicators, even as there is a need to cultivate methodologies that explicitly address emancipatory concerns.

Recent discussions on the application of systems thinking within the SOSM emphasise the importance of addressing the complex/coercive quadrant, previously regarded as a 'vacant space'. Jackson (2019) positions liberating systems theory (LST) within this quadrant, emphasising the need to confront power dynamics in complex systems. Furthermore, Ellen Lewis and Ann Stephens' gender equality, environments, and marginalised voices (GEMs) framework builds on LST's principles by addressing marginalised perspectives through intersectionality and inclusive systemic thinking. Community operational research (COR) contributes to this discourse by seeking to empower community voices. Historically, the Participatory Appraisal of Needs and the Development of Action (PANDA) framework addressed this quadrant using participatory and emancipatory methods (Taket and White 1997; White and Taket 2000). Together, these approaches offer a comprehensive set of tools for addressing challenges in complex, coercive environments and emphasising the importance of inclusive, participatory and emancipatory methodologies in systemic change.

As CST seeks to bridge the gap between theory and practice, its critical aspects of awareness, pluralism and improvement are essential for effectively tackling complex problems and societal issues. This synthesis of CST and CSP emphasises the need to explore both theoretical foundations and practical applications, particularly in the context of multifaceted sustainability challenges. This integration allows CST to adapt and remain relevant in addressing contemporary societal issues, leading to more effective and inclusive solutions.

3 | CST in Practice

In systems thinking, the diverse array of systems methodologies poses a challenge for practitioners when selecting the most suitable approach (Flood and Jackson 1991). CST, guided by its commitment to pluralism, advocates for a multimethodological approach that integrates various systems methodologies (Jackson 2001). Multimethodology (MM) involves the unified application of methodologies from different paradigms and methods, recognising the potential for synergy to enhance real-world problem-solving (Jackson 2019, p. 531). However, operating within a multiparadigm framework introduces the challenge of paradigm incommensurability, arising from fundamental disparities in the assumptions of different paradigms concerning the nature of reality and knowledge creation (Jackson 2019). While systems thinkers have proposed strategies to address this challenge (e.g., Mingers and Brocklesby 1997), this paper acknowledges the persistence of paradigm incommensurability in guiding practitioners as they navigate the selection and integration of systems approaches, particularly within social domains that may be overlooked in existing CST frameworks.

3.1 | SOSM

In his exposition (2019), Jackson introduces the SOSM, codeveloped with Paul Keys in 1984 and subsequently extended by Jackson himself, as a pivotal precursor to the multimethodological (MM) approach. The SOSM functions as a conceptual framework that presents an 'ideal type' model of problem contexts, signifying hypothetical rather than actual problem situations. This model serves as a tool for categorising systems methodologies based on their underlying assumptions about these problem contexts. It provides guidelines that not only elucidate the strengths of various systems methodologies but also suggest the contexts in which the utilisation of a particular methodology is most appropriate (Flood and Jackson 1991).

Originally, the model introduced by Jackson (2001) featured two fundamental dimensions. The first dimension categorised systems along a continuum from 'simple' to 'complex', where 'simple systems' comprise a small number of elements with predetermined interactions, while 'complex systems' involve many elements engaged in loosely structured interactions that evolve over time due to interactions and external influences. The second dimension classified relationships among participants as 'unitary', 'pluralist' or 'coercive' (Jackson 2001, p. 237). 'Unitary relationships' indicate shared interests, values and consensus on goals, with all participants actively involved in decisionmaking. 'Pluralist relationships' feature compatible interests and some shared values, allowing for debate and compromise in decision-making. In contrast, 'coercive contexts' involve intense conflicts where consensus is achieved primarily through the exercise of power (Jackson 2001) (see Table 1). Figure 2 illustrates the SOSM grid, which provides an overview of these different 'ideal type' problem contexts.

It is possible to classify these systems methodologies within SOSM, according to Flood and Jackson (1991), by thoroughly examining the underlying presuppositions of the various systems approaches and their conceptions of the problem context. In this classification, systems methodologies aligned with the hard systems paradigm are inherently associated with a perception of the problem situation as a 'simple-unitary' context. Key methodologies in this category include systems engineering (SE), operations research (OR), systems analysis (SA) and the vanguard method (VM). System dynamics (SD) is situated in the 'complicated-unitary' category, while methodologies such as the VSM and socio-technical systems (STS) find their place within the 'complex-unitary' context. Conversely, interactive planning (IP), SSM and strategic assumption surfacing and testing (SAST) are located between the 'simple-pluralist' and 'complicatedpluralist' contexts (Jackson 2001). Other methodologies, such as Critical Systems Heuristics (CSH) and Team Syntegrity (TS), occupy positions between the pluralist and coercive contexts. It is worth noting that Jackson (2001) observes a scarcity of systems methodologies founded upon 'coercive' assumptions, rendering them notably challenging to identify (Jackson 2001, p. 237). He argues that the recognition of 'coercive' context situations within management science served as a catalyst for advocating a critical approach within systems thinking.

For the sake of argument, what is conceived as 'critical' is located in the SOSM's complex-coercive space, which includes methodologies aimed at emancipation and liberation. Examples of such methodologies include LST and the GEMS framework (Stephens, Lewis, and Reddy 2018). According to Jackson (2019), CST, as represented by SOSM, seeks to capitalise on the strengths of each tradition within systems thinking. This recognition, in turn, has led to a notable emphasis on 'emancipation', ultimately becoming a defining hallmark of CST (Jackson 2010, p. 237).

Werner Ulrich's critical systems heuristics (CSH) centres on emancipation, emphasising the importance of considering the perspectives of those affected by system design. CSH addresses boundary judgements that define relevant perspectives, shaping the problem's context (Ulrich 2003, 2012, 2005). Ulrich's taxonomy aims to uncover diverse stakeholder reference systems, identify beneficiaries and promote mutual understanding (Ulrich 2012). Although Ulrich's CSH provides a valuable means to elucidate the diverse reference systems adhered to by stakeholders and facilitate constructive dialogue aimed at cultivating a shared comprehension of the problem at hand, it

TABLE 1		Jackson's	SOSM	grid
---------	--	-----------	------	------

		Participants		
		Unitary	Pluralist	Coercive
Systems	Simple	Simple-unitary	Simple-pluralist	Simple-coercive
	Complex	Complex-unitary	Complex-pluralist	Complex-coercive



FIGURE 2 | Critical systems practice: Positioning of major systems methodologies on the SOSM. Abbreviations: CSH, critical systems heuristics; GEMS, gender equality, environments, and marginalised voices; IP, interactive planning; LST, liberating systems theory; OR, operations research; SA, systems analysis; SAST, strategic assumption surfacing and testing; SD, system dynamics; SE, systems engineering; SSM, soft systems methodology; STS, sociotechnical systems; TS, team syntegrity; VM, vanguard method; VSM, viable system model. [Colour figure can be viewed at wileyonlinelibrary.com]

faces criticism for perceived deficiencies. This criticism centres on the absence of a comprehensive social theory that can elucidate the origins and perpetuation of societal inequalities (Jackson 2019, p. 502). Hence, Jackson (2019) contends that insufficient focus has been directed towards nurturing the emancipatory dimension within CST. The vacant space on the right-hand side of SOSM, particularly in the upper-right quadrant, as shown visually in Figure 2 (Jackson 2019, p. 590), supports this claim.

3.2 | Addressing the Vacant Space in CST: A Clarion Call From CSP

Thus far, the roots of CST have been explored and elucidated its approach to engaging with practical applications. However, the current CST debate has unveiled several limitations that require attention:

1. Insufficient Emphasis on Emancipation: Despite its emphasis on emancipation, there is scope for more attention to be paid to nurturing the emancipatory dimension within CST. This is particularly evident in Jackson's SOSM, which remains relatively underdeveloped, leaving a void in addressing societal inequalities (Jackson 2019, p. 590). For example, Checkland (1981) used SSM to link information systems and CST in the context of sustainability. SSM provides a structured approach to understanding complex STS encountered in sustainability challenges by employing models to represent various perspectives and stakeholders' viewpoints. This allows for more holistic problem-solving, the identification of interventions and the evaluation of their feasibility and systemic impact. Checkland's integration of information systems concepts into CST creates a systematic approach to addressing interconnected sustainability challenges while considering the perspectives of various stakeholders

2. Absence of a Comprehensive Social Theory: Jackson has critiqued Ulrich's CSH for overlooking social theory that can explain the origins and perpetuation of societal inequalities. This limitation restricts the ability to effectively address and rectify such inequalities within the current CST approach (Jackson 2019, p. 502).

To address these limitations, there is a need to first examine Jackson's existing SOSM, which has furnished valuable guidelines for selecting appropriate systems methodologies, equipping practitioners with the tools to effectively intervene in complex problem scenarios. Second, the pivotal role of sustainability in CST was duly acknowledged in the introductory section, and the research question holds promise for yielding insights with direct relevance to sustainability practice. In light of the insufficient emphasis on emancipation, it is reasonable to speculate that the introduction of new systems methodologies positioned within the SOSM may be wellsuited for practical engagement in sustainability. However, a more comprehensive argument is warranted. This argument is reinforced by Jackson's assertion that this absence has been noted for over 30 years (Jackson and Jackson 1991), implying that it is high time for it to receive increased attention. To this end, a theoretical framework is needed that can expand on the existing CST approach, and this is precisely where the concept of sustainability becomes relevant. In the subsequent sections, the concept of sustainability is introduced, and connections to the discipline of CST are systematically drawn to determine suitable systems methodologies, thereby laying the foundation for a robust and well-justified framework that elucidates the intricate web of sustainability.

4.1 | Current Model Overview

CST establishes a bridge between theoretical concepts (critical systems theory) and practical applications (CSP) by offering a variety of systems methodologies (Jackson 2020b, 2021, 2022, 2023). The SOSM grid serves as a valuable tool, providing guidance for selecting the most appropriate methodology for practical application. However, it is important to note that the SOSM does not include any systems methodologies that are explicitly based on the assumptions of complex-pluralist and complexcoercive problem situations (see Figure 2). As previously mentioned, Jackson (2019) critiques Ulrich's CSH methodology for its ineffectiveness in addressing and rectifying societal inequalities, citing an insufficient emphasis on emancipation and the absence of a comprehensive social theory. Furthermore, Flood and Jackson (1991) assert that for such a methodology to exist, it would need to address several critical issues, including the sources of power within organisations, the influence of organisational culture on the feasibility of changes, the role of bias mobilisation within organisations and the relationship between hierarchies in organisations and divisions related to class, gender, race and status in broader society (Flood and Jackson 1991, p. 41). It can therefore be argued that these critical issues point to sustainability.

4.2 | Sustainability Nexus

When considering the term 'sustainability', it is often associated with environmental concerns, including critical issues such as global warming, greenhouse gases, and waste management. However, sustainability represents a multidimensional and holistic concept that transcends traditional notions of environmental sustainability (Green, Molloy, and Duggan 2021; Voulvoulis et al. 2022). It encompasses economic and social dimensions, as highlighted by Jackson (2019) in his recent textbook. These dimensions interconnect and interact, contributing to the complexity of sustainability. Jackson's extensive body of work (Flood and Jackson 1991; Jackson 2013, 2019, 2001, 2010) underscores the critical need to understand and address power dynamics within organisations, the impact of organisational culture on sustainable practices and concerns related to bias and social divisions.

In the pursuit of sustainability within a broader societal context, addressing inequalities and promoting social justice becomes paramount. These efforts are intrinsically linked to issues of class, gender, race and status, extending beyond the scope of purely environmental matters (Jackson 2019). While various attempts have been made to overcome the misperception of sustainability, these efforts have met with limited success. The complexity of sustainability necessitates a robust framework that accommodates its multifaceted nature, encompassing both complex-pluralist and complex-coercive aspects. The grid conceptually places 'major' systems methodologies within a framework that favours established approaches over transient 'fashion fads'. However, it is essential to recognise that specific ST approaches have indeed cycled in and out of popularity over time (e.g., HST, Viable VSM, SSM, CSH and PANDA) (Jackson 2019, 2001). The grid aims to counteract this trend by showcasing a variety of methodologies that practitioners can select from based on context and the progression of systemic inquiry. A critical challenge lies in overcoming the allure of these fashionable approaches, which may detract from more established methodologies. In this regard, the integration of action methodologies such as action research (AR), participatory action research (PAR) and action learning (AL) methodologies into the CST framework is particularly relevant. AR, PAR and AL have demonstrated resilience and adaptability in addressing sustainability challenges, positioning them as strong contenders in this landscape. Consequently, sustainability, as conceptualised within Jackson's SOSM and other works by systems thinkers (e.g., Checkland 2000, 1999, 1991, 1985, 1981; Flood 1990; Midgley 1992, 1996), represents a framework that adequately captures these intricate dimensions while promoting enduring, evidence-based approaches to social and environmental issues.

4.2.1 | Complex-Pluralist Aspect

Sustainability necessitates the consideration of multiple interconnected dimensions, including environmental, economic and social aspects. This interconnectedness reflects a complex pluralist characteristic. Pluralism in CST, as articulated in Jackson's work, signifies the diversity of available systems methodologies and the latitude for practitioners to judiciously select and combine various methodologies to suit distinct purposes (Jackson 2019, 2001). In the context of sustainability, this pluralism is particularly evident, as it acknowledges the range of dimensions that must be addressed to achieve true sustainability.

Engaging with diverse perspectives is essential for sustainability, which aligns with the pluralism commitment of CST. Addressing sustainability issues involves considering a wide range of stakeholders, each with their unique viewpoints and concerns (Jackson 2019). CST emphasises the importance of incorporating these various perspectives when approaching complex problems, thus fostering an environment conducive to collaborative solutions. This inclusivity enriches the decisionmaking process and enhances the legitimacy of outcomes, as stakeholders feel a sense of ownership over the processes and results.

Moreover, sustainability efforts are intrinsically connected to issues of class, gender, race, and status. This connection underscores the pluralist nature of sustainability, which requires addressing diverse and often conflicting societal concerns and values (Midgley 1992). In line with its pluralist commitment, CST emphasises the importance of considering the social context and its impact on system interventions. By recognising these interconnections, practitioners can develop more holistic and effective strategies that tackle the root causes of sustainability challenges, leading to more equitable and just outcomes.

4.2.2 | Complex-Coercive Aspect

Jackson's work emphasises the importance of comprehending and addressing power dynamics within organisations, as well as issues related to bias and social divisions in the context of sustainability. These concerns are indicative of complexcoercive characteristics. In CST, coercive situations are marked by intense conflict, with consensus achieved primarily through the exercise of power (Jackson 2019). Sustainability often necessitates addressing power imbalances and coercive factors within societal structures. This requires not only an understanding of existing power dynamics but also a commitment to transforming these structures to foster equitable outcomes.

The pursuit of sustainability within a broader societal context, particularly with a focus on addressing inequalities and promoting social justice, aligns with the coercive nature of sustainability. Coercive situations frequently involve struggles for power and resources, which are prevalent in discussions surrounding social justice and inequality (Midgley 1992). In this context, methodologies such as AR, PAR and AL can play a critical role by engaging marginalised stakeholders in meaningful dialogue and decision-making processes, thereby addressing these coercive dynamics head-on.

Moreover, the complex-coercive nature of sustainability is evident in the deep ethical and political dimensions discussed in the literature. These characteristics closely mirror the challenges CST aims to address, often involving coercive dynamics related to power and decision-making (Flood 1990). By integrating ethical considerations into the sustainability discourse, practitioners can ensure that their approaches are not only effective but also just and equitable, thereby aligning with the core principles of CST. Recognising and addressing both the complex-pluralist and complex-coercive aspects of sustainability are essential for developing a comprehensive understanding of the challenges at hand and crafting effective solutions.

4.2.3 | Reflection

Sustainability encompasses both complex-pluralist and complex-coercive aspects. It involves the interplay of multiple interconnected dimensions and diverse perspectives, reflecting a complex pluralist character. At the same time, it entails addressing power dynamics, inequalities and deep ethical and political dimensions, aligning with the complex-coercive nature of CST. This classification highlights the intricate and multifaceted nature of sustainability, making it an ideal concept to apply to CST and related methodologies. Given the absence of complex-pluralist and complex-coercive aspects of sustainability in the current CST approach, it is argued that methodologies such as AR, PAR and AL can more inclusively and effectively address and learn from the challenges of sustainability.

4.3 | Addressing the Sustainability Nexus: An Action Approach

Conducting a research project is a multifaceted endeavour that resides at the crossroads of theoretical concepts and their practical applications. It represents the juncture where abstract theories find real-world relevance, leading to the generation of novel insights and the expansion of our knowledge base. CST, as expounded by Jackson (2019), emerges as a promising framework for engaging with complex, real-world problems. This approach is particularly well-suited to addressing the enduring challenge of navigating intricate, complex and often coercive contexts. Jackson (2019) further underscores the necessity to emphasise the emancipatory dimension within CST, which directly confronts the complexities inherent in management science (Jackson 2010). While the tools at our disposal may not be ideal for tackling these complex and coercive contexts, our commitment to engaging with them remains of paramount importance. By immersing ourselves in these intricate, pluralistic and sometimes coercive environments, new perspectives can be introduced and gain a deeper understanding of the challenges they pose. Hence, it can be contend that AR, PAR and AL can effectively address the sustainability nexus (see Table 2).

AR, initially introduced by Kurt Lewin in 1946, is a dynamic research approach aimed at generating fresh insights and improving practical interventions to address pressing social issues (Jackson 2019; Lewin 1946). The relationship between CST and AR has evolved over time, with contemporary perspectives recognising their inherent connection (Flood 2017). CST and AR synergise effectively, as systemic thinking aids in understanding the unknowable, while AR generates knowledge and enables purposeful action (Flood 2010). AR manifests differently across various academic disciplines, contributing to its diverse nature. Definitions of AR can vary, but Baskerville and Wood-Harper (1998) and Greenwood and Levin (2008) offer some of the most concise definitions. Baskerville and Wood-Harper (1998) refer to AR as a cognitive process reliant on the social interaction between observers and individuals in their immediate environment (p. 91), while Greenwood and Levin describe it as collaborative social research conducted by professional action researchers and stakeholders to enhance participants' wellbeing (Greenwood and Levin 2006). Consequently, AR consistently comprises elements of action, research and participation (Cornish et al. 2023; Kemmis and Wilkinson 2002).

Different orientations exist within AR, such as pragmatic and critical orientations (Johansson and Lindhult 2008). The pragmatic approach focuses on practical knowledge development and collaboration to improve human praxis, aligning with the broad dialogue promoted by scholars like Greenwood and Levin (2006). In contrast, the critical orientation aims at emancipation and reflective knowledge generation to unveil hidden ideologies and discourses in situations marked by unequal power dynamics (Johansson and Lindhult 2008). The AR process, as depicted by Kemmis, McTaggart, and Nixon (2014), forms a selfreflective spiral involving iterative stages of planning, acting, observing and reflecting. This cyclic pattern guides objectivesetting, action, observation and reflection, leading to ongoing practice improvements based on insights gained from reflection (Kemmis, McTaggart, Nixon, Kemmis et al. 2014; Kindon, Pain, and Kesby 2007).

AR has proven particularly useful for studying mainstream social science disciplines such as information systems (IS) (Baskerville and Wood-Harper 1996; Wood-Harper and Wood 2005; Ali, Wood-Harper and Wood 2023). For example, a recent study conducted by Ali, Edghiem and Alkhalifah (2023) offers contemporary empirical support for the application of AR in the examination and mitigation of social disparities, specifically focusing on cultural challenges associated with

10991743a, 0, Downloaded from https://onlinelibrary.wiley.com/doi/10.1002/sres.3107 by Test, Wiley Online Library on [06/12/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

Action research (AR)	Participatory action research (PAR)	Action learning (AL)
1946	Built on the foundation of AR (1970s)	Developed in the 1940s, popularised in the 1980s
Generate fresh insights and improve practical interventions to address social issues.	Emphasis on firsthand experiential knowledge to address inequitable social structures.	Solve real problems while simultaneously learning from the process.
Emphasises the active involvement of individuals.	Emphasises the active involvement of individuals working together or collaboratively.	Focuses on small groups called 'action learning sets' working on real problems, reflecting and learning from each other.
Pragmatic and critical orientations. Pragmatic orientation focuses on practical knowledge development and collaboration. Critical orientation aims at emancipation and reflective knowledge generation to unveil hidden ideologies and unequal power dynamics.	Built upon the AR foundation to include collaborative, systematic research to enhance well-being.	Emphasises practical problem-solving, leadership development and collective learning.
Forms a self-reflective spiral involving iterative stages of planning, acting, observing and reflecting.	Built upon the AR foundation to include collaborative, systematic research processes, actively involving individuals to address challenges and work towards transformative social changes.	Involves cyclical processes of action and reflection in small groups, focusing on problem-solving, questioning, and learning.
Generating knowledge and enabling purposeful action to address social issues.	Unveiling and addressing hidden ideologies and power dynamics, seeking the empowerment of individuals to actively work towards emancipatory solutions.	Practical problem- solving, professional and organisational developmen through collective learning and reflection.

Aspect

Introduction year

Orientations within

Process structure

Emphasis

the approach

Primary aim

Elements

the deployment of enterprise resource planning (within the Middle Eastern oil and gas sector. This in the formulation of action plans aimed at addressing social and cultural issues related to workplace technophobia and the scarcity of technical skills. Furthermore, Baskerville and Wood-Harper (1998), in their genealogy of IS AR, have shown a link between Checkland's systems thinking and Jackson's critical systems theory (p. 94). The argument concerning the absence of robust social theory within the extant CST approach, alongside the established connections between systems thinking and CST articulated by pioneering AR and systems thinking scholars, presents a persuasive rationale for considering the integration of AR as a means to rectify the evident gap in addressing social dimensions.

PAR, on the other hand, builds upon the existing preconceptions of the AR methodology. Cornish et al. (2023) refer to PAR as a research methodology that emphasises the significance of firsthand experiential knowledge in addressing challenges arising from inequitable and detrimental social structures. It centres on the active involvement of individuals directly affected by these at creating novel insights and understanding. PAR seeks to empower individuals not only to identify and comprehend the issues they face but also to actively work towards emancipatory solutions. Moreover, a key aspect of PAR that distinguishes it as a subset of AR is the nature of participation by team members in collaborating to overcome social disparities (Gaffney 2008, p. 10).

Action learning (AL) is a dynamic and practical educational process, wherein participants solve real-world problems in real time, gaining firsthand experience and insights. Developed and popularised by Reg Revans (1981), AL differs from traditional academic approaches by emphasising active, problemoriented engagement over passive learning. Participants, typically managers or professionals, form small groups known as 'sets' to address and analyse real-world operational challenges. This method promotes deep reflection and mutual support, encouraging participants to rethink their value systems and develop practical solutions through iterative cycles of

8 of 14

action and reflection (Pedler and Abbott 2013). Revans (1981) identified four core activities underpinning AL: applying the scientific method, making rational decisions, exchanging sound advice and criticism and learning new behaviours. By engaging directly with real-world issues, participants enhance their problem-solving abilities and deepen their understanding of their work environment. This experiential learning approach has been employed across various industries worldwide, including healthcare, manufacturing, information technology, education, finance and banking, nonprofit and social enterprises, as well as government and public sector organisations, demonstrating its adaptability and effectiveness in diverse contexts (Pedler 2024).

AR, PAR and AL are methodologies that aim to solve realworld problems through active participation and reflection. They share a commitment to practical problem-solving, stakeholder engagement and iterative cycles of action and reflection. However, their focus and purpose differ; AL primarily centres on individual and team development within organisational contexts, whereas AR and PAR emphasise generating actionable knowledge for social change and empowering participants. Furthermore, AR and PAR possess a stronger research orientation, frequently producing formalised knowledge, while AL is more practice-oriented, emphasising immediate learning and application. AR and PAR participants work as co-researchers with a critical perspective on power dynamics and social justice, whereas AL participants focus on solving specific problems and learning from the process rather than engaging in broader social critique.

It can be argued that AR, PAR and AL provide a suitable fit as systems methodologies for addressing the social disparities that have received less attention in the existing CST approach. These methodologies are particularly adept at addressing and learning from the multifaceted challenges of sustainability through their participatory, adaptable and inclusive nature, thus enabling practitioners to navigate complexities, engage stakeholders, consider diverse dimensions, address power dynamics and effectively navigate ethical and political considerations. Integrating AR, PAR and AL within the CST approach offers a holistic and dynamic means of addressing and learning from the challenges of sustainability more inclusively and effectively.

4.4 | Mapping AR/PAR/AL in CST

The integration of AR, PAR and AL methodologies into the existing CST approach is particularly crucial, given the intricate and multifaceted nature of sustainability issues that transcend traditional notions of environmental sustainability and encompass economic and social dimensions. These methodologies provide a dynamic approach that aligns with both complex-pluralist and complex-coercive aspects within the context of sustainability (see Table 3).

TABLE 3 | CST and AR/PAR mapping.

Aspect	AR/PAR/AL application	Sustainability (CST/SOSM) example
Complex-pluralist aspects	 Interconnected dimensions: Facilitate exploring the interconnected aspects of sustainability through iterative problem-solving approaches. Engagement with diverse perspectives: Excel at involving a broad range of stakeholders, promoting deeper collaboration and co-creation and ensuring continuous feedback and adjustment. Inclusivity and social justice: Prioritise inclusivity and social justice, aiming to empower marginalised stakeholders and address societal inequalities. 	 Stakeholders use AR/PAR/AL to investigate social issues such as community cohesion, access to healthcare and education and social disparities, creating programmes for social well-being. In a long-term urban renewal project, AR/PAR/AL methodologies involve urban planners, architects, environmentalists, residents and community leaders in collaborative workshops and co-design activities. In a sustainable agriculture project, AR/PAR/AL methodologies engage farmers, indigenous communities and low-income agricultural workers in decision-making and resource allocation.
Complex-coercive aspects	 Power dynamics and inequalities: Address power dynamics and inequalities within organisations and society, empowering marginalised stakeholders and reducing power imbalances. Social justice and inequalities: Promote social justice, address systemic inequalities and resolve coercive aspects within sustainability issues. Ethical and political dimensions: Explore the ethical and political dimensions of sustainability challenges, challenging prevailing ideologies and structures. 	 In a community development project cantered on sustainable urban planning, AR/PAR/AL methodologies engage historically marginalised residents in planning and decision-making processes. An AR/PAR/AL project in a diverse school district involves teachers, parents and students from various backgrounds to address educational disparities and foster social justice. An AR/PAR/AL initiative in a healthcare organisation involves healthcare professionals, ethicists, patients and policymakers to address ethical healthcare practices and promote equitable healthcare access.

4.4.1 | Complex-Pluralist Aspects

Sustainability necessitates the consideration of multiple dimensions that are intricately interconnected. AR, PAR and AL all employ iterative problem-solving approaches that enable stakeholders to investigate the interrelationships among these dimensions. For instance, these methodologies can be instrumental in exploring social issues such as community cohesion, access to healthcare and education and social disparities. By leveraging AR, PAR and AL, stakeholders can develop and implement programmes that enhance social well-being, including initiatives like community centres, educational programmes and healthcare clinics. This iterative approach not only aligns with the recognition of interconnected dimensions within sustainability but also exemplifies how collaborative efforts can lead to comprehensive solutions that consider the social determinants of health and education.

Furthermore, sustainability involves a wide range of stakeholders, each with unique perspectives and concerns. While bringing together various parties is standard practice in the UK and other contexts, AR, PAR and AL methodologies distinguish themselves by not only involving diverse perspectives but also encouraging deeper collaboration and co-creation among stakeholders throughout the research process. This inclusivity ensures that all relevant viewpoints are considered, which aligns with CST's commitment to pluralism and fosters collective ownership of outcomes. Unlike other methodologies, AR, PAR and AL emphasise iterative cycles of reflection and action, allowing for continuous feedback and adjustment-an essential feature when tackling complex sustainability challenges. By actively engaging a diverse range of stakeholders, these methodologies address the myriad societal concerns and values inherent in sustainability.

Consider a long-term urban renewal project as an illustrative example. In this context, AR, PAR and AL methodologies would convene urban planners, architects, environmentalists, residents and community leaders. Through collaborative workshops, feedback sessions and co-design activities, these methodologies would ensure that all stakeholders' perspectives and needs are integrated into project design and execution. By fostering ongoing dialogue and collaboration among these diverse stakeholders, AR, PAR and AL ensure that the project comprehensively addresses all sustainability aspects. This results in a more inclusive and effective urban renewal strategy, enhancing the project's legitimacy and acceptance within the community.

Sustainability is inextricably linked to questions of class, gender, race and status. AR, PAR and AL methodologies prioritise inclusivity and social justice, aiming to empower marginalised stakeholders and address societal inequalities. These methodologies provide platforms for confronting power imbalances and coercive structures that frequently hinder social justice in sustainability contexts. For example, in a sustainable agriculture project, these methodologies would actively engage farmers, indigenous communities, and low-income agricultural workers. By incorporating these marginalised stakeholders into decision-making and resource allocation processes, the project aims to address inequalities, empower underrepresented groups and challenge power imbalances within the agricultural sector. This underscores the potential of AR, PAR and AL methodologies to promote social justice and inclusivity in sustainability efforts.

By integrating AR, PAR and AL methodologies, which have proven effective in both educational and healthcare contexts, this framework highlights how these approaches can be adapted to address sustainability challenges. This alignment not only reinforces the argument for incorporating action research approaches into sustainability practices but also illustrates their applicability across various domains, thus enriching the discussion on the potential of these methodologies to foster holistic and inclusive solutions to contemporary issues.

4.4.2 | Complex-Coercive Aspects

AR, PAR and AL methodologies specifically address power dynamics within organisations and society. These methodologies aim to empower marginalised stakeholders and create a forum for questioning coercive power structures, aligning with Jackson's focus on understanding and addressing power dynamics and inequalities in the context of sustainability. By facilitating active participation in decision-making processes, AR, PAR and AL methodologies work to reduce power imbalances. For example, in a community development project focused on sustainable urban planning, these methodologies can be employed to actively engage local residents, particularly those from historically marginalised neighbourhoods, in planning and decision-making. This engagement enables residents to voice their concerns and aspirations, thereby addressing the power disparities that previously prevented them from influencing their communities. This illustrates the potential of AR, PAR and AL methodologies to effectively tackle power dynamics and inequalities while promoting sustainability in urban planning contexts.

While AR, PAR and AL methodologies emphasise active participation and reflection, their overarching goals and scopes differ significantly. AL is commonly utilised in organisational settings and emphasises individual and team development through realtime problem-solving. In contrast, AR and PAR methodologies are deeply committed to addressing systemic inequalities and promoting social justice within broader societal contexts. For instance, an AR/PAR project in a diverse school district may convene stakeholders from various backgrounds—such as teachers, parents and students—to collaboratively address educational disparities. This initiative not only enhances educational outcomes but also fosters a sense of community and shared responsibility among participants.

Despite the differences in focus, both approaches contribute to addressing sustainability issues, with AL promoting practical solutions in specific organisational contexts while AR and PAR advocate for transformative societal change. Furthermore, AR, PAR and AL methodologies provide platforms for investigating the complex ethical and political dimensions of sustainability issues. They enable stakeholders to engage in reflective processes, identify dominant ideologies and discourses, and work towards



FIGURE 3 | Adapted critical systems practice: A repositioning of major systems methodologies on the SOSM. Abbreviations: AL, action learning; AR, action research; CSH, critical systems heuristics; GEMS, gender equality, environments, and marginalised voices; IP, interactive planning; LST, liberating systems theory; OR, operations research; PAR, participatory action research; SA, systems analysis; SAST, strategic assumption surfacing and testing; SD, system dynamics; SE, systems engineering; SSM, soft systems methodology; STS, sociotechnical systems; TS, team syntegrity; VM, vanguard method; VSM, viable system model. [Colour figure can be viewed at wileyonlinelibrary.com]

more ethical and just solutions. For example, an AR/PAR initiative in a healthcare organisation addressing sustainability issues related to ethical healthcare practices involves stakeholders such as healthcare professionals, ethicists, patients, and policymakers. By working collaboratively, these stakeholders examine and address ethical dimensions, aiming to expose and challenge existing ideologies and power structures. This collaboration seeks to improve ethical decision-making and promote equitable healthcare access, while also navigating the complexities inherent in the coercive aspects of sustainability challenges.

According to the adapted model (see Figure 3) and the discussions herein, AR, PAR and AL methodologies are characterised as more coercive and pluralist than unitarian due to their inclusive and participatory nature. In contrast to unitarian approaches, which may prioritise top-down decision-making or overlook diverse stakeholder perspectives, AR, PAR and AL methodologies actively engage a variety of stakeholders throughout the research or problem-solving process. These methodologies aim to empower stakeholders from different backgrounds, including marginalised groups, to participate meaningfully in decision-making processes, thereby challenging power imbalances and coercive structures within organisations and society.

AR, PAR and AL promote stakeholder collaboration and cocreation, facilitating the exploration of interconnected dimensions and consideration of multiple viewpoints. This dynamic and participatory approach aligns with CST's commitment to pluralism, recognising the significance of diverse perspectives when addressing complex issues such as sustainability. Consequently, AR, PAR and AL methodologies are less unitarian and more coercive and pluralistic, actively tackling power dynamics, promoting inclusivity and involving stakeholders in long-term problem-solving efforts. AR, PAR and AL methodologies are well-suited to address the complex-pluralist and complex-coercive aspects of sustainability within the current CST approach based on Jackson's (2019) SOSM (see Figure 3). These methodologies address interconnected dimensions, diverse perspectives and issues of inclusivity, social justice, power dynamics and ethical and political concerns. They provide a dynamic, participatory and inclusive approach to addressing the multifaceted challenges of sustainability, resulting in a more comprehensive and holistic problemsolving process. By actively engaging stakeholders, including marginalised groups, in decision-making and problem-solving activities, AR, PAR and AL methodologies promote equity, empowerment, and long-term sustainability. This integrated approach aligns with CST principles and fosters collaborative efforts to systematically and effectively address sustainability challenges.

5 | Conclusion

The CST framework presented in this paper offers a novel approach to addressing the multifaceted concept of sustainability. This adapted framework is a refined version of Jackson's (2019) initial work, which contends that insufficient focus has been directed towards nurturing the emancipatory dimension within the existing CST approach based on SOSM. This is illustrated by the empty space on the right-hand side of SOSM, particularly in the upper-right quadrant (see Figure 2, Jackson 2019, p. 590).

Sustainability encompasses a variety of environmental, economic and social factors that necessitate a proactive and inclusive approach to problem-solving. It includes both complex-pluralist and complex-coercive aspects, recognising the importance of simultaneously addressing interconnected dimensions, diverse perspectives, power dynamics, social justice and deep ethical and political concerns. Recognising the complexities of sustainability, it became clear and necessary to identify methodologies that were missing from the current CST approach. These methodologies should thoroughly examine and address the complexpluralist and complex-coercive aspects of sustainability to close the framework gap highlighted by Jackson (2019).

This paper proposes integrating AR, PAR and AL methodologies into CST as they provide a dynamic, participatory and inclusive approach to addressing sustainability issues. Their applications are diverse, ranging from sustainable urban planning and education to agriculture and healthcare. These established methodologies aim to empower stakeholders, engage marginalised voices, challenge coercive structures and promote social justice, all in line with the fundamental principles of sustainability. This novel integration not only enhances CST but also acts as a vital link between theoretical concepts and practical applications, emphasising the importance of the emancipatory dimension within CST (Jackson 2019).

The proposed CST approach highlights the absence of systems methodologies in the complex-pluralist and complex-coercive aspects while also redefining our strategy for addressing these complex challenges in the context of sustainability. It underscores the significance of interdisciplinary, participatory and adaptive methodologies as key drivers of sustainable endeavours. Immersing ourselves in the pluralistic, interconnected and sometimes coercive environments of sustainability reveals new perspectives and deepens our understanding of the challenges they present. As a result, the combination of CST and AR/PAR methodologies creates a robust and versatile toolkit for navigating sustainability. This integration is more than just a theoretical concept; it is a call to action, emphasising the importance of CST in shaping a sustainable world.

References

Ali, M., F. Edghiem, and E. S. Alkhalifah. 2023. "Cultural Challenges of ERP Implementation in the Middle-Eastern Oil and Gas Sector: An Action Research Approach." *Systemic Practice and Action Research* 36, no. 1: 111–140.

Ali, M., T. Wood-Harper, and B. Wood. 2023. "Understanding the Technical and Social Paradoxes of Learning Management Systems Usage in Higher Education: A Sociotechnical Perspective." *Systems Research and Behavioral Science* 41: 1–19.

Banathy, B. H. 2013. *Designing Social Systems in a Changing World*. Germany: Springer Science and Business Media.

Baskerville, R., and T. Wood-Harper. 1998. "Diversity in Information Systems Action Research Methods." *European Journal of Information Systems* 7: 90–107.

Baskerville, R. L., and T. Wood-Harper. 1996. "A Critical Perspective on Action Research as a Method for Information Systems Research." *Journal of Information Technology* 11: 235–246.

Beer, S. 1984. "The Viable System Model: Its Provenance, Development, Methodology, and Pathology." *Journal of the Operational Research Society* 35, no. 1: 7–25.

Checkland, P. 1981. *Systems Thinking, Systems Practice*. United Kingdom: John Wiley and Sons.

Checkland, P. 1985. "From Optimizing to Learning: A Development of Systems Thinking for the 1990s." *Journal of the Operational Research Society* 36: 757–767.

Checkland, P. 1991. "From Framework Through Experience to Learning: The Essential Nature of Action Research." In *Information Systems Research: Contemporary Approaches and Emergent Traditions*, edited by H. E. Nissen, H. K. Klein, and R. Hirschheim, 397–403. North-Holland, Amsterdam.

Checkland, P. 1999. Systems Thinking, Systems Practice. United Kingdom: John Wiley.

Checkland, P. 2000. "Soft Systems Methodology: A Thirty-Year Retrospective." *Systems Research and Behavioral Science* 17, no. S1: S11–S58.

Checkland, P., and J. Scholes. 1999. *Soft Systems Methodology in Action*. United Kingdom: John Wiley and Sons.

Cornish, F., N. Breton, U. Moreno-Tabarez, et al. 2023. "Participatory Action Research." *Nature Reviews Methods Primers* 3, no. 1: 34.

Flood, R. L. 1990. "Liberating Systems Theory: Toward Critical Systems Thinking." *Human Relations* 43, no. 1: 49–75.

Flood, R. L. 2010. "The Relationship of 'Systems Thinking' to Action Research." *Systemic Practice and Action Research* 23: 269–284.

Flood, R. L. 2017. "Thirty Years of Systemic Practice and Action Research." *Systemic Practice and Action Research* 30: 209–211. Springer.

Flood, R. L., and M. C. Jackson. 1991. *Creative Problem Solving: Total Systems Intervention*. United Kingdom: Wiley.

Gaffney, M. 2008. "Participatory Action Research: What Makes It Tick?" *Kairaranga* 9, no. 3: 9–15.

Green, C., O. Molloy, and J. Duggan. 2021. "An Empirical Study of the Impact of Systems Thinking and Simulation on Sustainability Education." *Sustainability* 14, no. 1: 394.

Greenwood, D. J., and M. Levin. 2006. *Introduction to Action Research: Social Research for Social Change*. United States: SAGE Publications.

Jackson, M. 2020a. "Critical Systems Thinking and Practice: What Has Been Done and What Needs Doing." *Systems Research and Behavioral Science* 41: 31–61.

Jackson, M. C. 2001. "Critical Systems Thinking and Practice." *European Journal of Operational Research* 128, no. 2: 233–244.

Jackson, M. C. 2010. "Reflections on the Development and Contribution of Critical Systems Thinking and Practice." *Systems Research and Behavioral Science: The Official Journal of the International Federation for Systems Research* 27, no. 2: 133–139.

Jackson, M. C. 2013. Systems Methodology for the Management Sciences. US: Springer.

Jackson, M. C. 2019. Critical Systems Thinking and the Management of Complexity. United Kingdom: John Wiley and Sons.

Jackson, M. C. 2020b. "Critical Systems Practice 1: Explore—Starting a Multimethodological Intervention." *Systems Research and Behavioral Science* 37, no. 5: 839–858.

Jackson, M. C. 2021. "Critical Systems Practice 2: Produce— Constructing a Multimethodological Intervention Strategy." *Systems Research and Behavioral Science* 38, no. 5: 594–609.

Jackson, M. C. 2022. "Critical Systems Practice 3: Intervene—Flexibly Executing a Multimethodological Intervention." *Systems Research and Behavioral Science* 39, no. 6: 1014–1023.

Jackson, M. C. 2023. "Critical Systems Practice 4: Check—Evaluating and Reflecting on a Multimethodological Intervention." *Systems Research and Behavioral Science* 40, no. 4: 617–632.

Jackson, M. C., and M. C. Jackson. 1991. Creative Problem Solving: Total Systems Intervention. United Kingdom: Wiley.

Johansson, A. W., and E. Lindhult. 2008. "Emancipation or Workability? Critical Versus Pragmatic Scientific Orientation in Action Research." *Action Research* 6, no. 1: 95–115.

Kemmis, S., R. McTaggart, and R. Nixon. 2014. *The Action Research Planner: Doing Critical Participatory Action Research*. Singapore: Springer Singapore.

Kemmis, S., and M. Wilkinson. 2002. "Participatory Action Research and the Study of Practice." In *Action Research in Practice*, 21–36. United Kingdom: Routledge.

Kindon, S., R. Pain, and M. Kesby. 2007. *Participatory Action Research Approaches and Methods: Connecting People, Participation and Place.* United Kingdom: Taylor and Francis.

Lewin, K. 1946. "Action Research and Minority Problems." Journal of Social Issues 2, no. 4: 34–46.

Mensah, J. 2019. "Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review." *Cogent Social Science* 5, no. 1: 1653531.

Midgley, G. 1992. "The Sacred and Profane in Critical Systems Thinking." In *Systems Thinking in Europe*, 397–405. United Kingdom: Springer.

Midgley, G. 1996. "What Is This Thing Called CST?" In *Critical Systems Thinking: Current Research and Practice*, 11–24. United Kingdom: Springer.

Mingers, J., and J. Brocklesby. 1997. "Multimethodology: Towards a Framework for Mixing Methodologies." *Omega* 25, no. 5: 489–509.

Pedler, M., ed. 2024. Action Learning in Practice. United Kingdom: Gower Publishing, Ltd.

Pedler, M., and C. Abbott. 2013. Facilitating Action Learning: A Practitioner's Guide. United Kingdom: McGraw-Hill Education.

Revans, R. W. 1981. "The Nature of Action Learning." Omega 9, no. 1: 9–24.

Senge, P. M. 2006. The Fifth Discipline: The Art and Practice of the Learning Organization. United Kingdom: Random House Business Books.

Stephens, A., E. D. Lewis, and S. Reddy. 2018. "Towards an Inclusive Systemic Evaluation for the SDGs: Gender Equality, Environments and Marginalized Voices (GEMs)." *Evaluation* 24, no. 2: 220–236.

Taket, A., and L. White. 1997. "Working With Heterogeneity: A Pluralist Strategy for Evaluation." *Systems Research and Behavioral Science* 14, no. 2: 101–111.

Ulrich, W. (1983). Critical Heuristics of Social Planning: A New Approach to Practical Philosophy. Switzerland: Wiley.

Ulrich, W. 2003. "Beyond Methodology Choice: Critical Systems Thinking as Critically Systemic Discourse." *Journal of the Operational Research Society* 54: 325–342.

Ulrich, W. (2005). A Brief Introduction to Critical Systems Heuristics (CSH). ECOSENSUS project site. United Kingdom: Open University.

Ulrich, W. 2012. "Operational Research and Critical Systems Thinking—An Integrated Perspective: Part 1: OR as Applied Systems Thinking." *Journal of the Operational Research Society* 63: 1228–1247.

von Bertalanffy, L. 1968. General System Theory: Foundations, Development, Applications. G. United Kingdom: Braziller.

Voulvoulis, N., T. Giakoumis, C. Hunt, et al. 2022. "Systems Thinking as a Paradigm Shift for Sustainability Transformation." *Global Environmental Change* 75: 102544.

White, L., and A. Taket. 2000. "Exploring the use of Narrative Analysis as an Operational Research Method: A Case Study in Voluntary Sector Evaluation." *Journal of the Operational Research Society* 51, no. 6: 700–711.

Wood-Harper T., and B. Wood. 2005. "Multiview as Social Informatics in Action: Past, Present, and Future." *Information Technology and People* 18, no. 1: 26–32.

Appendix

Summary of Paper Originality and Contribution

The current paper offers a significant advancement in the field of CST by exploring the integration of various methodologies, specifically AR, PAR and AL, within the context of sustainability. This integration not only emphasises the practical application of CST but also addresses key criticisms of existing frameworks, particularly the insufficient focus on emancipation and the need for a comprehensive social theory.

Application of Mike Jackson's Ideas

The paper builds upon Mike Jackson's foundational ideas in CST, particularly his advocacy for pluralism and the necessity of addressing power dynamics within social systems. By examining Jackson's SOSM framework, the paper highlights its strengths, such as providing a structured approach to selecting appropriate methodologies for complex problem-solving, while also addressing its limitations. For instance, Jackson's SOSM has been critiqued for its lack of methodologies specifically tailored for complex-coercive and complex-pluralist contexts. The paper argues that incorporating AR, PAR and AL can fill this void, thus demonstrating how Jackson's ideas can be expanded and practically applied to enhance the relevance and effectiveness of CST in contemporary sustainability challenges.

Advancing Mike's Thinking

This paper extends Jackson's SOSM framework by proposing a new integrative model that incorporates AR, PAR and AL methodologies as essential components for effectively addressing sustainability issues. By drawing from real-world examples and aligning these methodologies with the complex-pluralist and complex-coercive dimensions of sustainability, the paper advances Jackson's thinking on the need for critical engagement with social issues. This proposition not only enhances the theoretical landscape of CST but also provides practitioners with practical tools to facilitate inclusive decision-making processes and empower marginalised voices.

Argument Against Mike's Position

While Jackson's emphasis on CST's reflexivity and ethical scrutiny is acknowledged, the paper argues that there remains a gap in addressing systemic inequalities within the current framework. By critiquing the existing CST methodologies for their inadequate attention to the emancipatory dimension, the paper advocates for a more robust approach that includes the social theory necessary to confront these inequalities. This critique is essential, as it calls for a re-evaluation of how CST can evolve to remain relevant in tackling complex societal issues, particularly in sustainability contexts.

Recommendation

To significantly enhance the impact and applicability of CST in addressing the intricate challenges of sustainability, it is imperative that practitioners adopt a more robust multimethodological approach. This entails the integration of diverse methodologies such as AR, PAR and AL, which can facilitate a more nuanced understanding of complex social issues. By actively employing these methodologies, practitioners can tailor their interventions to specific contexts, thus increasing their relevance and effectiveness. Additionally, this approach must prioritise themes of emancipation and social justice, ensuring that marginalised communities are actively engaged in the decision-making processes. Such engagement not only enriches the dialogue surrounding sustainability initiatives but also ensures that solutions reflect the diverse perspectives and needs of all stakeholders involved. Failure to incorporate these voices risks perpetuating existing inequalities and undermines the transformative potential of CST.

Furthermore, there is a pressing need to develop and integrate comprehensive social theories within the CST framework to address systemic inequalities and power dynamics effectively. Future research should focus on exploring how these theories can inform CST practices, thereby bridging the gap between theoretical constructs and practical applications. Interdisciplinary collaboration among scholars, social scientists and practitioners is essential to cultivate a richer understanding of the complexities surrounding sustainability. Educational institutions must also play a critical role by embedding CST principles into their curricula, fostering the next generation of leaders equipped to navigate multifaceted challenges. Additionally, leveraging technology for stakeholder engagement can facilitate more inclusive and transparent decision-making processes, allowing for broader participation. By implementing these recommendations, the field of CST can significantly enhance its capacity to create meaningful and equitable solutions, addressing the urgent sustainability challenges of our time.

Conclusion

The originality and contribution of this paper lie in its critical engagement with Jackson's work, providing a nuanced understanding of how CST can evolve to address contemporary challenges. By integrating AR, PAR and AL methodologies, the paper not only enhances theoretical discourse but also offers practical solutions that address pressing sustainability issues, thereby fulfilling the need for a comprehensive and inclusive approach to CST. This contribution is particularly valuable to scholars and practitioners aiming to navigate the complexities of social systems and promote equitable solutions in their respective fields.