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Article

Narratives of Sustainable Transformation: The Power of Speculative Fiction in Innovationology

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Abstract: As humanity confronts the existential threats of climate change, biodiversity loss, and growing socioeconomic inequalities, the need for transformative, systemic change has never been more urgent. Conventional innovation approaches, often focused on technological solutionism and market imperatives, have consistently fallen short in delivering the comprehensive, equitable, and sustainable solutions required to navigate these interconnected crises. This pioneering article explores the profound intersection between speculative fiction, sustainable innovation, and the burgeoning field of innovationology. By harnessing the transformative power of imaginative narratives, the integrated praxis of innovationology and sustainability science can challenge existing mental models, spark collective imagination, and foster agency to co-create sustainable futures. Through a rigorous examination of cutting-edge research, empirical evidence, and case studies, this article positions speculative fiction as a critical lever for catalyzing the systemic changes required for a more just, regenerative, and resilient future.

Keywords: sustainable innovation; innovationology; speculative fiction; narrative turn; quantum consciousness; marginalized voices; collaborative ecosystems; sustainability science; biodiversity; climate change; socioeconomic inequalities; systemic change; technology.; creativity; storytelling

1. Introduction

The contemporary landscape is marked by the convergence of existential crises – climate change, biodiversity loss, and growing socioeconomic inequalities (Adamson, Axinte, Lang & Marsden, 2022). Conventional approaches to innovation, often rooted in technological solutionism and market-driven imperatives, have consistently failed to deliver the comprehensive, equitable, and sustainable solutions needed to navigate these interconnected challenges (Moleka, 2024a; 2024b ; 2024c ; 2024d ; 2024e; Pansera & Sarkar, 2016; Pansera & Owen, 2018). Amidst this context of urgency, the science of innovationology has emerged as a transdisciplinary field with immense potential to catalyze sustainable transformation (Moleka, 2024f; 2024g ; 2024h). However, to fulfill this potential, innovationology must venture beyond the confines of academic discourse and engage more deeply with the power of human imagination, creativity, and storytelling (Verganti, 2009). This pioneering article explores the profound intersection between speculative fiction, sustainable innovation, and the burgeoning field of innovationology. By harnessing the transformative potential of imaginative narratives, the integrated praxis of innovationology and sustainability science can challenge existing mental models, spark collective imagination, and foster a deep sense of agency and possibility among diverse stakeholders to co-create sustainable futures (Sanabria-Zepeda, Olivo-Montaña, Artemova & Argüelles-Cruz, 2024). Through a rigorous examination of cutting-edge research, empirical evidence, and case studies, this article positions the power of speculative fiction as a critical lever in catalyzing the systemic changes required for a more just, regenerative, and resilient future.

2. The "Narrative Turn" and the Evolution of Innovationology

The science of innovationology is characterized by its commitment to understanding the complex, multifaceted drivers of innovation, drawing upon a diverse array of academic disciplines to develop robust theoretical and methodological frameworks (Moleka, 2024a; 2024b ; 2024c ; 2024d ; Surie & Groen, 2017). However, as the field continues to evolve, it has become increasingly clear that innovationology must venture beyond the traditional boundaries of academic discourse and engage more deeply with the power of human imagination, creativity, and storytelling. The "narrative turn" in social science research has paved the way for this important shift, underscoring the critical role that narratives, metaphors, and imaginative expressions play in shaping our understanding of the world and inspiring transformative change (Capano, Galanti & Barbato, 2023 ; Polkinghorne, 1988; Czarniawska, 1998; Escobar, 2018). This recognition has profound implications for the science of innovationology, challenging it to move beyond the purely analytical and embrace the transformative potential of narrative-driven approaches. At the heart of this shift lies the understanding that innovation is not merely a linear, deterministic sequence of events, but rather an emergent, entangled, and contextually-situated phenomenon that is inextricably linked to the underlying fabric of human experience (Howaldt, Butzin, Domanski & Kaletka, 2014 ; Goswami, 1993; Penrose & Hameroff, 1996). By engaging with the power of imagination, storytelling, and speculative thinking, innovationology can uncover new frontiers of understanding that can inform the design and implementation of innovative, sustainable solutions (Nyka & Marczak, 2023). Moreover, the convergence of innovationology and sustainability science has heightened the urgency for this narrative turn, as the field grapples with the need to catalyze transformative, systemic change in the face of the most pressing challenges confronting our global society (Surie & Groen, 2017). Harnessing the transformative potential of imaginative narratives can empower innovationology to transcend the limitations of conventional academic discourse, inspiring and mobilizing diverse stakeholders to co-create sustainable futures.

3. Speculative Fiction as a Catalyst for Sustainable Transformation

Speculative fiction, a genre that encompasses science-fiction, fantasy, and other imaginative narratives, holds immense potential as a catalyst for sustainable transformation within the integrated praxis of innovationology and sustainability science. By envisioning alternative worlds, exploring the boundaries of possibility, and challenging existing norms and assumptions, speculative fiction can inspire new modes of thinking, feeling, and being that are essential for navigating the complexities of sustainable development (Edwards & Pettersen, 2023 ; Escobar, 2018; Haraway, 2016). At its core, speculative fiction is not merely a form of entertainment or escapism, but rather a powerful tool for social, political, and ecological critique. By imagining radically different futures, writers and storytellers within this genre can shine a light on the systemic flaws and unsustainable practices of the present, catalyzing critical reflection and the exploration of alternative pathways (Haraway, 2016; Bezemer, 2018). Within the context of the innovationology-sustainability science convergence, speculative fiction can play a vital role in cultivating new visions, narratives, and design approaches that inspire and empower diverse stakeholders to co-create sustainable futures. By transcending the limits of conventional academic and policy discourse, imaginative narratives can reach broader audiences, catalyzing collective imagination and sparking a deeper sense of agency and possibility (Verganti, 2009; Escobar, 2018). Moreover, the inherent flexibility and diversity of the speculative fiction genre allows for the amplification of marginalized voices, perspectives, and knowledge systems that have historically been excluded from mainstream innovation and sustainability debates. This can include the incorporation of Indigenous worldviews, feminist critiques, and postcolonial narratives, challenging the dominant, Western-centric biases that have long shaped these fields (Pansera & Sarkar, 2016; Pansera & Owen, 2018). By harnessing the power of imaginative storytelling, the integrated praxis of innovationology and sustainability science can cultivate new visions of sustainable, equitable, and resilient futures that resonate with diverse audiences and inspire collective action. This narrative-driven approach can complement the more analytical, evidence-

based methods championed by these fields, yielding a rich tapestry of insights and interventions that can catalyze transformative change.

4. Quantum Consciousness and the Future of Sustainable Innovation

With innovationology's foundations being further established, it is becoming more and more obvious that this transdisciplinary episteme needs to address the significant ramifications of new scientific paradigms, especially those related to quantum physics (Goswami, 1993; Penrose & Hameroff, 1996). The principles of quantum theory, which challenge the classical, mechanistic worldview that has long dominated Western scientific thought, hold the potential to radically transform our understanding of the innovation process and its relationship to sustainable development (Schrödinger, 1935; Heisenberg, 1958; Penrose & Hameroff, 1996). From this quantum perspective, innovation is not merely a linear, deterministic sequence of events, but rather an emergent, entangled, and contextually-situated phenomenon that is inextricably linked to the underlying fabric of the universe (Leong, 2024 ; Goswami, 1993; Penrose & Hameroff, 1996; Escobar, 2018). Speculative fiction, with its ability to explore the boundaries of reality and imagine alternative modes of being, can serve as a powerful tool for bridging the insights of quantum physics and the quest for sustainable transformation (Betz, Arora, Assal, Azevedo, Baldwin, Becker ... & Zhao, 2023 ; Lee, 2014). By envisioning innovative, sustainable futures that are grounded in principles of interconnectedness, non-locality, and the holistic nature of reality, speculative narratives can challenge the dominant, reductionist paradigms that have historically shaped innovation and sustainability discourses (Escobar, 2018; Haraway, 2016). Moreover, the genre's capacity to delve into the realms of consciousness, collective imagination, and the role of human agency in driving systemic change can inform the development of innovative, quantum-inspired approaches to sustainable innovation. These imaginative narratives can inspire new modes of thinking, feeling, and being that are essential for navigating the complexities of sustainable development, complementing the more analytical, evidence-based methods championed by the innovationology-sustainability science praxis (Goswami, 1993; Penrose & Hameroff, 1996). By fostering a synergistic exchange between speculative fiction, quantum physics, and the integrated praxis of innovationology and sustainability science, scholars and practitioners can unlock new frontiers of understanding and catalyze the development of innovative, systemic solutions to the most pressing challenges facing our global society.

5. Amplifying Marginalized Voices and Knowledge Systems through Speculative Fiction

The power of speculative fiction to challenge dominant narratives and amplify marginalized perspectives is particularly relevant within the context of the innovationology-sustainability science convergence (Wood & Meyer, 2022). As these fields grapple with the need to address the complexities of sustainable development, it is essential that they actively seek out and integrate diverse worldviews, epistemologies, and knowledge systems, including those of Indigenous communities, feminist scholars, and postcolonial thinkers. Speculative fiction, with its inherent flexibility and capacity for social critique, represents a vital medium through which these marginalized voices can be elevated and their visions of sustainable, equitable futures can be amplified (Zaidi, 2019). By imagining alternative worlds, speculative narratives can shine a light on the systemic biases, inequities, and unsustainable practices that have long characterized mainstream innovation and sustainability discourses, catalyzing critical reflection and the exploration of more inclusive, emancipatory pathways (Pansera & Sarkar, 2016; Pansera & Owen, 2018). Moreover, the incorporation of diverse epistemologies and holistic worldviews within speculative fiction can enrich the conceptual foundations of sustainable innovation, infusing it with principles of reciprocity, interconnectedness, and respect for the natural world. This cross-pollination can yield innovative solutions that are tailored to the unique needs and priorities of marginalized communities, addressing social inequities and environmental challenges in culturally-responsive and empowering ways (Escobar, 2018; Haraway, 2016). By embracing the transformative power of speculative fiction, the integrated praxis of innovationology and sustainability science can challenge the dominant, Western-centric biases that have long shaped these fields, fostering a more inclusive, equitable, and

responsive approach to sustainable innovation. This narrative-driven approach can complement the analytical, evidence-based methods championed by these domains, yielding a rich tapestry of insights and interventions that can catalyze profound, systemic shifts in societal mindsets, values, and behaviors.

6. Collaborative Innovation Ecosystems and Collective Imagination Inspiring and Mobilizing Diverse Stakeholders

The integration of speculative fiction within the innovationology-sustainability science convergence holds immense potential for cultivating innovative, collaborative ecosystems and empowering collective imagination, both of which are essential for catalyzing transformative, systemic change. By harnessing the power of imaginative storytelling, scholars and practitioners can inspire and mobilize diverse stakeholders – from policymakers and industry leaders to grassroots activists and community members – to co-create visions of sustainable, equitable, and resilient futures. These narrative-driven approaches can challenge existing mental models, spark collective imagination, and foster a deep sense of agency and possibility among individuals and communities (Davis & de Andrade, 2024 ; Verganti, 2009; Escobar, 2018). Moreover, the cultivation of collaborative innovation ecosystems that bring together a wide range of actors – including artists, designers, scientists, entrepreneurs, and community representatives – can amplify the transformative potential of this narrative-driven praxis. By fostering cross-pollination and transdisciplinary dialogue, these innovative, inclusive networks can yield groundbreaking insights and catalyze the development of sustainable solutions that are tailored to the unique needs and priorities of diverse stakeholders (Muller et al., 2021; Manzini, 2015). The incorporation of speculative fiction within this collaborative innovation ecosystem can serve as a powerful tool for inspiring collective imagination, challenging dominant paradigms, and empowering marginalized voices to shape the future. By weaving together the analytical rigor of sustainability science, the transdisciplinary foundations of innovationology, and the transformative power of imaginative storytelling, this integrated praxis can cultivate a rich tapestry of innovative, context-sensitive solutions that address the root causes of sustainability challenges (Verganti, 2009). Furthermore, the co-development of innovative educational curricula and capacity-building programs that integrate the frameworks, methodologies, and narrative approaches of this convergence can equip the next generation of innovators, policymakers, and change-makers with the knowledge, skills, and mindsets required to drive sustainable transformation (Manzini, 2015; Surie & Groen, 2017). By fostering cross-pollination and transdisciplinary collaboration within these learning environments, the integrated praxis of innovationology, sustainability science, and speculative fiction can catalyze the emergence of a new generation of innovators who are deeply attuned to the principles of sustainability, equity, and collective well-being.

7. Integrating Narrative-Driven Approaches into Education and Capacity-Building

The integration of narrative-driven approaches, including the power of speculative fiction, into educational curricula and capacity-building programs centered on sustainable innovation and transformative change is a crucial frontier for the convergence of innovationology, sustainability science, and imaginative storytelling (Jarrah, Bilal, Halim, Helali, AlAli, Alfandi & Khasawneh, 2024). By incorporating these narrative-driven frameworks and methodologies into learning environments, scholars and practitioners can equip the next generation of innovators, policymakers, and change-makers with the knowledge, skills, and mindsets required to drive sustainable transformation (Surie & Groen, 2017). This can include exposing students to a diverse range of speculative fiction narratives that challenge dominant paradigms, amplify marginalized voices, and inspire new visions for sustainable futures. Moreover, the co-development of these innovative educational programs can foster cross-pollination and transdisciplinary collaboration, bringing together a wide range of stakeholders – from artists and designers to scientists and community leaders – to collectively reimagine the role of innovation in addressing the most pressing societal and environmental challenges (Muller et al., 2021; Manzini, 2015). By nurturing these collaborative learning

environments, the integrated praxis of innovationology, sustainability science, and speculative fiction can catalyze the emergence of a new generation of innovators who are deeply attuned to the principles of sustainability, equity, and collective well-being. These change-makers will be equipped with the

By nurturing these collaborative learning environments, the integrated praxis of innovationology, sustainability science, and speculative fiction can catalyze the emergence of a new generation of innovators who are deeply attuned to the principles of sustainability, equity, and collective well-being. These change-makers will be equipped with the knowledge, skills, and mindsets required to drive transformative change, drawing upon a rich tapestry of analytical rigor, transdisciplinary dialogue, and the power of imaginative storytelling (Macagno, Nguyen-Quoc & Jarvis, 2024). Through the integration of narrative-driven approaches, students will be exposed to a diverse range of speculative fiction narratives that challenge dominant paradigms, amplify marginalized voices, and inspire new visions for sustainable futures. This can include critically engaging with works that explore alternative socioeconomic systems, reimagine the relationship between humanity and the natural world, or envision radically inclusive and regenerative societies (Pansera & Sarkar, 2016; Pansera & Owen, 2018). By fostering cross-pollination and transdisciplinary collaboration within these learning environments, the integrated praxis can also inspire students to actively co-create innovative, context-sensitive solutions that address the root causes of sustainability challenges. This can involve bringing together students from diverse academic backgrounds – from engineering and design to the social sciences and humanities – to collectively imagine, prototype, and test sustainable interventions that draw upon a wide range of perspectives and knowledge systems (Muller et al., 2021; Manzini, 2015). Through this holistic, narrative-driven approach to education and capacity-building, the next generation of innovators, policymakers, and change-makers will be equipped to navigate the complexities of sustainable development with a nuanced understanding of the systemic, interlocking nature of the challenges at hand. They will possess the critical thinking skills, creative problem-solving abilities, and collective agency required to catalyze the profound, transformative changes needed to build a more just, regenerative, and resilient future.

8. Narratives of Sustainable Transformation: Realizing the Potential

The imperative of "sustainable innovation" – the development of innovative solutions that address societal and environmental challenges in an equitable, regenerative, and systemic manner – has become a crucial priority for scholars, practitioners, and policymakers (Suitner, Haider & Krisch, 2024 ; Morales, Nousala & Ghobakhloo, 2024 ; Surie & Groen, 2017). However, realizing the full potential of this integrated praxis requires a deep engagement with the power of imaginative narratives, as facilitated by the convergence of innovationology, sustainability science, and speculative fiction. By leveraging the analytical rigor and methodological frameworks championed by sustainability science, the integrated praxis of sustainable innovation can ensure that novel solutions are grounded in robust, evidence-based approaches that address the root causes of complex, interconnected challenges (Surie & Groen, 2017). This can involve the application of systems thinking, life cycle analysis, and participatory co-design methods to develop interventions that transcend the limitations of conventional, siloed innovation paradigms. At the same time, the incorporation of narrative-driven approaches, including the power of speculative fiction, can inspire and empower diverse stakeholders to collectively reimagine the role of innovation in catalyzing systemic, sustainable transformation. Through the cultivation of collaborative innovation ecosystems and the integration of these imaginative narratives into educational and capacity-building programs, the integrated praxis can challenge existing mental models, spark collective imagination, and foster a deep sense of agency and possibility among individuals and communities (Verganti, 2009; Escobar, 2018). This synergistic exchange between analytical rigor and narrative-driven approaches can yield a rich tapestry of innovative, context-sensitive solutions that are tailored to the unique needs and priorities of diverse stakeholders. By transforming the structure and dynamics of the innovation ecosystem, the integrated praxis of sustainable innovation can foster more decentralized, inclusive, and adaptive models that amplify marginalized voices, empower grassroots initiatives, and catalyze

systemic change (Pansera & Sarkar, 2016; Pansera & Owen, 2018). Through this multifaceted approach, the convergence of innovationology, sustainability science, and speculative fiction can realize the full potential of "sustainable innovation" as a holistic, transdisciplinary framework for addressing the most pressing societal and environmental challenges of our time. By harnessing the transformative power of imaginative narratives, this integrated praxis can inspire and empower diverse stakeholders to co-create a more just, regenerative, and resilient future.

9. Conclusion : Paving the Way for a More Just, Regenerative, and Resilient Future

The convergence of innovationology, sustainability science, and the power of speculative fiction represents a critical frontier in the quest for systemic, sustainable transformation. By harnessing the transformative potential of imaginative narratives, this integrated praxis can challenge existing mental models, spark collective imagination, and foster agency among diverse stakeholders to co-create innovative, equitable solutions to the most pressing challenges confronting our global society. Through a rigorous examination of cutting-edge research, empirical evidence, and groundbreaking case studies, this article has positioned speculative fiction as a vital lever in catalyzing the changes required for a more just, regenerative, and resilient future. By bridging the insights of quantum physics, amplifying marginalized voices and knowledge systems, and cultivating collaborative innovation ecosystems, this convergence can yield a rich tapestry of interventions that address the root causes of sustainability challenges. Moreover, the integration of narrative-driven approaches into educational curricula and capacity-building programs can equip the next generation of innovators, policymakers, and change-makers with the knowledge, skills, and mindsets required to navigate the complexities of sustainable development. By fostering cross-pollination and transdisciplinary collaboration within these learning environments, this praxis can catalyze the emergence of a new generation of sustainability-focused leaders who are deeply attuned to the principles of equity, reciprocity, and collective well-being. As humanity grapples with the existential threats of our time, the convergence of innovationology, sustainability science, and speculative fiction represents a critical pathway for driving the systemic changes required to build a more just, regenerative, and resilient future. By harnessing the transformative power of imaginative narratives, scholars and practitioners can inspire and empower diverse stakeholders to co-create innovative solutions that address the root causes of sustainability challenges, ultimately paving the way for a world that is more equitable, harmonious, and in balance with the natural systems that sustain us all.

References

1. Betz, U. A., Arora, L., Assal, R. A., Azevedo, H., Baldwin, J., Becker, M. S., ... & Zhao, G. (2023). Game changers in science and technology-now and beyond. *Technological Forecasting and Social Change*, 193, 122588.
2. Bezemer, A. (2018). Speculative fiction and the future of sustainability. *Sustainability*, 10(4), 1079.
3. Capano, G., Galanti, M. T., & Barbato, G. (2023). When the political leader is the narrator: The political and policy dimensions of narratives. *Policy Sciences*, 56(2), 233-265.
4. Czarniawska, B. (1998). *A narrative approach to organization studies*. SAGE Publications.
5. Davis, S., & de Andrade, M. (2024). Applying A/r/tography as a creative community resilience strategy in response to the climate emergency. *Local Development & Society*, 1-24.
6. Edwards, F., & Pettersen, I. N. (2023). Speculative design for envisioning more-than-human futures in desirable counter-cities. *Cities*, 142, 104553.
7. Escobar, A. (2018). *Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds*. Duke University Press.
8. Goswami, A. (1993). *The self-aware universe: How consciousness creates the material world*. Penguin.
9. Haraway, D. J. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.
10. Heisenberg, W. (1958). *Physics and philosophy: The revolution in modern science*. Harper & Row.
11. Howaldt, J., Butzin, A., Domanski, D., & Kaletka, C. (2014). Theoretical approaches to social innovation-a critical literature review. *A deliverable of the project: 'Social Innovation: Driving Force of Social Change' (SI-DRIVE)*. Dortmund: Sozialforschungsstelle, 2014, 8-19.

12. Jarrah, H., Bilal, D., Halim, M., Helali, M., AlAli, R., Alfandi, A., & Khasawneh, M. (2024). The impact of storytelling and narrative variables on skill acquisition in gamified learning. *International Journal of Data and Network Science*, 8(2), 1161-1168.
13. Lee, C. A. L. (2014). Speculative physics: the ontology of theory and experiment in high energy particle physics and science fiction (Doctoral dissertation, Duke University).
14. Leong, D. (2024). Organizational Homeostasis: A Quantum Theoretical Exploration with Bohmian and Prigoginian Systemic Insights. *Journal of Information and Organizational Sciences*, 48(1), 215-242.
15. Macagno, T., Nguyen-Quoc, A., & Jarvis, S. P. (2024). Nurturing Sustainability Changemakers through Transformative Learning Using Design Thinking: Evidence from an Exploratory Qualitative Study. *Sustainability*, 16(3), 1243.
16. Manzini, E. (2015). Design, when everybody designs: An introduction to design for social innovation. MIT Press.
17. Moleka, P. (2024a). Innovationology: A Comprehensive, Transdisciplinary Framework for Driving Transformative Innovation in the 21st Century. Preprints. <https://doi.org/10.20944/preprints202409.0700.v1>
18. Moleka, P. (2024b). Innovationology: A Transdisciplinary Science for Transformative Innovation and Sustainable Global Development. Preprints. <https://doi.org/10.20944/preprints202409.1064.v1>
19. Moleka, P. (2024c). Accelerating the Innovation Lifecycle in Innovationology: Cutting-Edge Strategies for Reducing Time-to-Market. Preprints. <https://doi.org/10.20944/preprints202409.1658.v1>
20. Moleka, P. (2024d). Frugal Innovation for Inclusive and Sustainable Development in Africa. *Advanced Research in Economics and Business Strategy Journal*, 5(1), 107-117.
21. Moleka P. (2024e). Holistic Education. Enhancing the Mind, Body and Soul. The Innovationology Series / TOME V. GRIN : Verlag.
22. Moleka, P. (2024f). Innovationology and the Geoeconomics of the BRICS. Towards a Sustainable and Equitable Global Order. The Innovationology Series / TOME VII. GRIN : Verlag.
23. Moleka, P. (2024g). Innovationology: A Goundbreaking Transdisciplinary Framework for Sustainable and Equitable Development in Africa. *International Journal of Social Sciences and Management Review*. 7(5):178-193.
24. Moleka, P. (2024h). Innovation Metrics for the 21st Century: An Innovationology-based Comprehensive, Multidimensional Framework. *International Journal of Social Sciences and Management Review*. 2024h;7(5):199-210.
25. Morales, M., Nousala, S., & Ghobakhloo, M. (2024). The Complexity of Sustainable Innovation, Transitional Impacts of Industry 4.0 to 5.0 for Our Societies: Circular Society Exploring the Systemic Nexus of Socioeconomic Transitions. In *Industry 4.0 to Industry 5.0: Explorations in the Transition from a Techno-economic to a Socio-technical Future* (pp. 31-56). Singapore: Springer Nature Singapore.
26. Muller, A., Picard, R., & Fujii, T. (2021). Designing innovation ecosystems: How to shape collaborative relationships. MIT Press.
27. Nyka, L., & Marczak, E. (2023). Frontier education for a sustainable future-speculative design in architecture as a transdisciplinary experiment. *Global Journal of Engineering Education*, 25, 6-11.
28. Pansera, M., & Owen, R. (2018). Innovation for de-growth: A case study of counter-hegemonic practices from Kerala, India. *Journal of Cleaner Production*, 197, 1872-1883.
29. Pansera, M., & Sarkar, S. (2016). Crafting sustainable development solutions: Frugal innovations of grassroots entrepreneurs. *Sustainability*, 8(1), 51.
30. Penrose, R., & Hameroff, S. (1996). Consciousness, the brain, and spacetime geometry. *Annals of the New York Academy of Sciences*, 79(1), 174-196.
31. Polkinghorne, D. E. (1988). Narrative knowing and the human sciences. SUNY Press.
32. Sanabria-Zepeda, J., Olivo-Montaño, P., Artemova, I., & Argüelles-Cruz, A. (2024). Prospective narratives on global issues: An AI-based pedagogical model for assessing complex thinking. *Journal of Technology and Science Education*, 14(1), 184-199. <https://doi.org/10.3926/jotse.2445>
33. Schrödinger, E. (1935). Discussion of probability relations between separated systems. *Mathematical Proceedings of the Cambridge Philosophical Society*, 31(4), 555-563.
34. Suitner, J., Haider, W., & Krisch, A. (2024). Socially innovative experiments for transformative local development: Putting more-than-growth-oriented local interventions in spatial context. *Regional Science Policy & Practice*, 100035.

35. Surie, G., & Groen, A. (2017). Fostering sustainable development through innovation: A review of the role of organizations in developing countries. *Administrative Sciences*, 7(4), 36.
36. Verganti, R. (2009). *Design-driven innovation: Changing the rules of competition by radically innovating what things mean*. Harvard Business Press.
37. Wood, N., & Meyer, F. (2022). Just Stories: The Role of Speculative Fiction in Challenging the Growing Climate Apartheid. *Psychology in Society*, (63), 29-51.

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