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Technological Innovation from a Post-Growth Perspective: The Case of Retro-Innovation

UUniCORN Insight Series

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Summary

Technological innovation is often presented as essential for achieving sustainability. transitions. Yet growing post-growth scholarship points out that the idea of a technological fix is the problem rather than the solution. This Insight Series explores emerging debates around post-growth technological innovation and retro-innovation, asking how technologies might support sufficiency, repairability, autonomy, and long-term socio-ecological well-being instead of accelerated growth. Drawing on interdisciplinary discussions within UUniCORN, it reflects on how revisiting technologies and practices of the past may contribute to more sustainable and meaningful futures.

Contact Jasmina Nedevska if you want to know more about this research topic and ongoing developments within the group



1. Introduction

During an interdisciplinary workshop held in August 2025, a research group on retro-innovation and post-growth technologies was formed based on the idea initiation from prof. Wijnand Boonstra. The discussions continued within the broader, later developed UUniCORN research program Technology and Society, which explores the tensions, paradoxes, and societal implications of technological development in sustainability transformations.

From the beginning, the initiative developed along two interconnected paths. One focused on identifying future research directions and developing external funding proposals around retro-

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innovation, technological resistance, and post-growth transitions. This work is ongoing, with the group currently preparing a collaborative research application.

The second path developed through a more conceptual and exploratory discussion around innovation, technology, and sustainability. Led by Jasmina Nedevska, these discussions evolved into an emerging article draft examining how technological innovation might be rethought beyond growth-oriented paradigms. Early reflections from this work were presented and discussed during the **Breakfast at UUniCORN** seminar series, where the concept of retro-innovation generated interdisciplinary dialogue around sufficiency, aesthetics, autonomy, and ecological limits.

This Insight Series builds on these ongoing discussions, as well as literature reviews, and collaborative reflections within the research group. It invites readers to reflect: how societies might rethink technological development under conditions of ecological crisis, and whether revisiting past technologies, practices, and forms of knowledge could contribute to more sustainable and meaningful futures.

2. Innovation Beyond Growth

Technological innovation occupies a central role in dominant visions of sustainable development. From renewable energy and artificial intelligence to smart infrastructures, technological solutions are often presented as pathways toward greener and more efficient societies (Stoknes and Rockström, 2018). Underlying these visions is the taken-for-granted narrative that technological change is "always good and desirable" as well as "inevitable" (Robra et al., 2023: 1).

At the same time, growing criticism has started to challenge such narrative and its underlying assumption that sustainability can be achieved primarily through technological acceleration and economic growth (e.g., Pansera and Fressoli, 2021). While new technologies may improve efficiency, they also tend to increase overall consumption and resource extraction. This dynamic is known as the **Jevons paradox** or rebound effect (Polimeni and Polimeni, 2006).

These tensions have become increasingly visible within post-growth scholarship. **Post-growth** is an umbrella term encompassing approaches such as "doughnut" economics (Raworth 2018), wellbeing economics (Coscieme et al 2019), steady state economics (Daly 2014) and "degrowth" (Kallis et al 2018). Despite their differences, all these perspectives share the view that societies must find ways to secure human and more-than-human well-being without depending on continuous GDP growth and the expanding material throughput it entails.

A central debate in this scholarship concerns the distinction between "green growth" and post-growth. **Green growth** assumes that technological innovation can decouple economic growth from environmental degradation (Stoknes and Rockström, 2018). Underlying such vision is that growth can but with less use of and impact on the natural environment. Post growth instead challenges the idea that growth is required for human progress. Referring to the rebound effect, they argue that the logic of growth will always encourage excessive consumption of energy and resources, thereby risking the stability of the biosphere (Parrique et al., 2019).

Rather than asking how technological innovation can make societies more effective and provide green-growth solutions, post-growth perspectives question types and purposes of technology in the first place. They ask instead: *What kinds of technologies support sufficiency rather than economic and material expansion? Which technological innovations strengthen*

autonomy, resilience, and socio-ecological sustainability?

3. Critical Innovation Theory and Post-Growth Technologies

Emerging work within **critical innovation theory** has sought to address the relationship between technological innovation and post-growth. Scholars in this field argue that **innovation is not neutral,** but shaped by specific social and economic values, particularly those connected to growth, productivity, and capital accumulation (Walsh, 2021; Sheehan, 2021).

From this perspective, much contemporary innovation can be understood as "innovation under capital", technological development primarily driven by profitability, market expansion, and competitive advantage (Robra et al., 2023). Critical innovation theory therefore asks whether alternative forms of technological innovation could instead be organized around values such as *care, repairability, accessibility, ecological balance*, and *collective well-being*.

One influential contribution comes from Vetter's (2018) concept of "convivial technologies," drawing on Ivan Illich's concept of "convivial tools" (Illich, 1973). Convivial technologies are understood as technologies that empower users rather than making them dependent on centralized systems, expert control, or continuous consumption. Building on this contribution, recent scholarship has explored dimensions such as *accessible knowledge*, *adaptability, repair and maintenance*, and *eco-sufficiency* as **important criteria for post-growth innovation** (Vetter, 2018; Robra et al., 2023).

At the same time, an important dimension often remains underdeveloped: the **aesthetic** and **experiential** relationship between people and technologies. Vetter (2018:1784) mentions technological qualities such as "low-tech and inspiring aesthetics" and "allowing joyful (work)time". Yet, there's lack of discussion about how those affective dimensions connect with socio-ecological sustainability.

From **relational perspectives** within Science and Technology Studies (STS) and environmental humanities, technology, humans, and nature are not understood as separate, but mutually constitutive and deeply entangled. Technologies do not simply function as neutral tools used by humans upon an external environment; they **actively mediate** how people perceive, experience, and inhabit the world, while ecological conditions, material environments, and embodied practices simultaneously shape how technologies are designed, maintained, and given meaning (Verbeek, 2005; Lemmens, 2022). From this perspective, **experiential** and **aesthetic** dimensions become important because they influence the kinds of relationships technologies enable — whether fostering relations of care or encouraging exploitation.

This raises broader questions: *how do we distinguish between good technological innovations and bad ones, from a post-growth perspective? How would innovation look like under post-growth criteria?*

4. What Could Innovation Look Like Under Post-Growth?

Emerging scholarship within critical innovation theory suggests that post-growth technologies would likely be evaluated differently from mainstream growth-oriented innovation. Post-growth approaches increasingly emphasize qualities such as ecological sufficiency, repairability, durability, accessibility, and collective usefulness (Kerschner et al., 2018, Pansera and Fressoli, 2021; Robra et al., 2023) – comparing to growth-driven technological innovation that prioritizes speed, scale, productivity, and market expansion.

One important criterion concerns **material and energy use**. Technologies aligned with post-growth would need to reduce overall ecological pressure rather than merely improving efficiency. This shifts attention toward *low-resource solutions, longer product lifespans, maintenance, reuse*, and *repair cultures*. The growing "right to repair" movement reflects this broader shift away from disposability and planned obsolescence (Ozturkcan, 2024).

Another important aspect concerns **autonomy** and **organization**. Scholars inspired by Ivan Illich's concept of "convivial tools" argue that technologies should strengthen people's capacities for local problem-solving, autonomy and participation (Illich, 1973; Vetter, 2018) instead of deepening dependence on centralized infrastructures. Questions of *transparency, accessible knowledge,* and *community control* therefore become increasingly important within post-growth discussions.

At the same time, recent debates suggest that technologies should not only be sustainable in a material and relational sense, so they are meaningful and desirable to live with. This opens questions about sensuous experiences and affective dimensions — aspects that have often remained marginal within sustainability debates dominated by techno-managerial concerns with efficiency and carbon accounting (Fry, 2009).

One emerging concept that brings many of these dimensions together is **retro-innovation.**

5. Retro-innovation as a Post-Growth Possibility

Retro-innovation refers to the purposeful and creative revival and reconfiguration of past technologies, tools, practices, or knowledge to address contemporary challenges (Zagata et al., 2020). Comparing to conventional understandings of innovation that are future-oriented and privilege novelty, retro-innovation sees the past in a positive light, asking whether older technology, practices and knowledge may contain overlooked qualities relevant for ecological futures.

The concept of retro-innovation first emerged in agricultural and rural development research, where Marian Stuiver (2006) used it to describe farmer-led innovations that combined marginalized historical practices with contemporary ecological and economic needs. However, for nearly two decades, retro-innovation remained loosely defined and largely empirical, lacking a clear conceptual characterization or consistent criteria for determining what qualifies as retro-innovation. Moreover, its connection to sustainable development only began to be explicitly articulated in more recent scholarship, particularly through the work of De Noni, Blasi, and Sabbadin (2025), who further developed the concept theoretically and analytically.

Examples already exist across multiple sectors. In architecture, renewed interest in Roman concrete, stone construction, timber structures, and natural ventilation reflects concerns about durability, repairability, and material longevity. Research on Roman concrete, for example, suggests that its environmental sustainability partly stems from its exceptionally long lifespan compared to modern reinforced concrete (Martinez et al., 2025). In food systems, traditional fermentation, seed-saving practices, and climate-resilient grains are being revisited as alternatives to highly energy-intensive industrial systems.

What makes retro-innovation particularly interesting from a post-growth perspective is that it often prioritizes **maintenance** over replacement, **longevity** over speed, and **local adaptation** over large-scale standardization. It also reopens questions about the **cultural** and **aesthetic** dimensions of technology, showing how the creative reconfiguration

of past technologies, tools, and practices can respond to broader socio-cultural challenges. An example is provided by Zagata et al. (2020: 654), who describe how organic farming in the post-war Czech Republic became "[...] *a means of correcting the injustices of the socialist period and reasserting family ties and a positive connection to the pre-war past*." In this sense, retro-innovation can carry important cultural, symbolic, and identity-related meanings alongside its practical functions.

At the same time, retro-innovation should not be romanticized because not all of its forms are socially or ecologically sustainable. For example, reintroducing old models of cars or household appliances to the modern market may fulfil many of the criteria of retro-innovation — creative innovation, the reconfiguration of past technologies, and temporal discontinuity — without being environmentally sustainable. This type of retro-innovation emerges within marketing strategies aimed at selling products that evoke consumers' emotions through a sense of nostalgia (De Noni et al., 2024).

Taken together, these examples suggest that **retro-innovation** may be a promising candidate for **post-growth innovation**, particularly because of its emphasis on durability, repairability, local adaptation, and the recovery of past knowledge. However, the concept remains underdeveloped, and not all retro-innovations are necessarily socially or ecologically sustainable. For this reason, the research group aims to **develop analytical framework** that can help identify the conditions under which retro-innovation may contribute to post-growth forms of technological development.

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About UUniCORN

Uppsala University Conflicting Objectives Research Nexus (UUniCORN) is the first of Uppsala University's Future Institutes (UUniFI), dedicated to advancing world-leading research on complex societal challenges through a transdisciplinary lens. UUniCORN seeks to initiate, facilitate and conduct research on goal conflicts in sustainability transformations, and to contribute to societal transition through collaborative action.

References

Coscieme, Luca, Sutton, Paul, Mortensen, Lars F., Kubiszewski, Ida, Costanza, Robert, Trebeck, Katherine, Pulselli, Federico M., Giannetti, Biagio F. and Fioramonti, Lorenzo (2019). Overcoming the Myths of Mainstream Economics to Enable a New Wellbeing Economy. Sustainability, 11(16), p. 4374, doi:1

Daly, Herman E. (1992). Steady-state economics: with new essays. 2. ed. London: Earthscan-Publ.

De Noni, I., Blasi, S. and Sabbadin, E. (2025). Retrovation typology: Exploiting and exploring past knowledge for nostalgic and sustainable innovation. Research Policy, 55(2), p. 105406, doi:10.1016/j.respol.2025.105406.

De Noni, Ivan, Blasi, Silvia and Sabbadin, Elisa (2024). From Nostalgia to Sustainability: Developing an Original Typology of Retrovation. https://papers.ssrn.com/abstract=4917574

Fry, Tony (2009). Design futuring: sustainability, ethics, and new practice. English ed. Oxford ; New York: Berg.

Illich, Ivan (1973). Tools for conviviality. New York Evanston London: Harper and **Row.**

Kallis, Giorgos, Kostakis, Vasilis, Lange, Steffen, Muraca, Barbara, Paulson, Susan and Schmelzer, Matthias (2018). Research On Degrowth. Annual Review of Environment and Resources, 43(Volume 43, 2018), p. 291–316, doi:10.1146/annurev-environ-102017-025941.

Kerschner, Christian, Wächter, Petra, Nierling, Linda and Ehlers, Melf-Hinrich (2018). Degrowth and Technology: Towards feasible, viable, appropriate and convivial imaginaries. Journal of Cleaner Production, 197, p. 1619–1636, doi:10.1016/j.jclepro.2018.07.147.

Lemmens, P. (2022). 'The Entanglement of Technology and Nature' In Swierstra, T.& Lemmens, P. (ed.), The Technical Condition: The Entanglement of Technology, Culture, and Society, pp. 203-237

Martinez, Daniela M., Miller, Sabbie A. and Monteiro, Paulo J. M. (2025). How sustainable was ancient Roman concrete? iScience, 28(8), p. 113052, doi:10.1016/j.isci.2025.113052.

Ozturkcan, Selcen (2024). The right-to-repair movement: Sustainability and consumer rights. *Journal of Information Technology Teaching Cases*, 14(2), p. 217–223, doi:10.1177/20438869231178037.

Pansera, Mario and Fressoli, Mariano (2021). Innovation without growth: Frameworks for understanding technological change in a post-growth era. Organization, 28(3), p. 380–404, doi:10.1177/1350508420973631.

Parrique, T. et al (2019). Decoupling Debunked. Evidence and arguments against green growth as a sole strategy for sustainability. A study edited by the European Environment Bureau EEB. Available from: https://eeb.org/library/decoupling-debunked/

Polimeni, John M. and Polimeni, Raluca Iorgulescu (2006). Jevons' Paradox and the myth of technological liberation. Ecological Complexity, 3(4), p. 344–353, doi:10.1016/j.ecocom.2007.02.008.

Raworth, Kate (2022). Doughnut economics: seven ways to think like a 21st-century economist. Dublin: Penguin Books.0.3390/su11164374.

Robra, Ben, Pazaitis, Alex, Giotitsas, Chris and Pansera, Mario (2023). From creative destruction to convivial innovation - A post-growth perspective. Technovation, 125, p. 102760, doi:10.1016/j.technovation.2023.102760.

Sheehan, H. (2021). Marxism and Science and Technology Studies, SftP Magazine.

Science for the People Magazine, 2021-12-10.https://magazine.scienceforthepeople.org/online/marxism-and-sts/

Stoknes, Per Espen and Rockström, Johan (2018). Redefining green growth within planetary boundaries. Energy Research & Social Science, 44, p. 41–49, doi:10.1016/j.erss.2018.04.030.

Stuiver, Marian (2006). Highlighting the Retro Side of Innovation and its Potential for Regime Change in Agriculture. Research in Rural Sociology and Development, 12, p. 147–173, doi:10.1016/S1057-1922(06)12007-7.

Vetter, Andrea (2018). The Matrix of Convivial Technology – Assessing technologies for degrowth. Journal of Cleaner Production, 197, p. 1778–1786, doi:10.1016/j.jclepro.2017.02.195.

Walsh, Shannon (2023). Marx, subsumption and the critique of innovation. Organization, 30(2), p. 345–360, doi:10.1177/13505084211015377.

Zagata, Lukas, Sutherland, Lee-Ann, Hrabák, Jiří and Lostak, Michal (2020). Mobilising the Past: Towards a Conceptualisation of Retro-Innovation. Sociologia Ruralis, 60(3), p. 639–660, doi:10.1111/soru.12310.