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Designing transitions: A systemic mapping of current practices of agricultural systems design

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Abstract

Agricultural systems face unprecedented challenges in the Anthropocene, marked by increasing uncertainty, extreme climate events, and complex socio-ecological crises. Historically, farmers have adapted their practices to predictable conditions, but today's unknown unknowns demand innovative approaches to design resilient agricultural systems. Building on the notion of the "design turn", agricultural system design need to be reframed as a second-order process -– one that focuses not merely on end products but on purposeful performances, learning systems, and adaptive practices capable of responding to unfolding uncertainties, prioritizing biosphere integrity and social purpose. This study aims to identify common characteristics of agricultural systems design to outline a general transition approach. Methodologically, the study employs a systemic review of key papers in agricultural systems design, analyzed through Strategic Options Development and Analysis (SODA) cognitive mapping. Cognitive maps were developed for each paper and subsequently aggregated into a single, comprehensive causal map, allowing a quantitative and qualitative assessment of the complexity and interconnectedness of current design thinking in agricultural systems. As result, the aggregated causal map shows a high degree of interconnectedness, pointing to the systemic nature of agricultural design. The adoption of the SODA method identified critical features with high systemic influence on agricultural systems design, such as co-design methods, modeling approaches, and farmer participation, which can be considered critical leverage points for transformation. Results demonstrate, therefore, that innovative transitions in agricultural systems design cannot rely on isolated practices; they require systemically integrated approaches. Furthermore, required are designs for transitions based on a design imagination that avoids the traps of systematic and dualistic thinking still pervasive in current design practices. This entails creating conditions to re-engage with the complexity of the living world through new and viable trajectories. It requires recognizing the interconnectedness of humans and the biosphere, and reframing agricultural systems as human-activity systems through which human-biosphere relations are enacted and transformed. Acknowledgments: To the CNPq – National Council for Scientific and Technological Development (Grant 403843/2023-5).

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