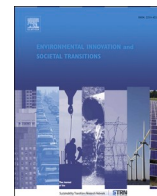




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Beyond food for thought – Directing sustainability transitions research to address fundamental change in agri-food systems

Aniek Hebinck^{a,*}, Laurens Klerkx^{b,*}, Boelie Elzen^c, Kristiaan P.W. Kok^d, Bettina König^{e,f}, Katharina Schiller^g, Julia Tschersich^h, Barbara van Mierlo^b, Timo von Wirth^{a,i}

^a Dutch Research Institute for Transitions (DRIFT), Erasmus University Rotterdam, Rotterdam, the Netherlands

^b Knowledge, Technology and Innovation Group, Wageningen University, Wageningen, the Netherlands

^c Wageningen Research, Wageningen, the Netherlands

^d Athena Institute, VU University, Amsterdam, the Netherlands

^e Research Center [Sustainability-Transformation-Transfer], Eberswalde University for Sustainable Development, Germany

^f Integrated Research Institute on the Transformation of Human-Environment Systems (IRI THESys), Humboldt Universität zu Berlin, Berlin, Germany

^g Fraunhofer Institute for Systems and Innovation Research, Karlsruhe, Germany

^h Department of Economics and Law, Carl-von-Ossietzky University Oldenburg, Oldenburg, Germany

ⁱ Wuppertal Institute for Climate, Environment, and Energy, Wuppertal, Germany

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ABSTRACT

Dominant agricultural and food systems lead to continuous resource depletion and unacceptable environmental and social impacts. While current calls for changing agrifood systems are increasingly framed in the context of sustainability transitions, they rarely make an explicit link to transition studies to address these systemic challenges, nor do transition scholars sufficiently address agri-food systems, despite their global pertinence. From this viewpoint, we illustrate several gaps in the agri-food systems debate that sustainability transition studies could engage in. We propose four avenues for research in the next decade of transition research on agri-food systems: 1) Crossscale dynamics between coupled systems; 2) Social justice, equity and inclusion; 3) Sustainability transitions in low- and middle-income countries; 4) Cross-sectoral governance and system integration. We call for a decade of new transition research that moves beyond single-scale and sector perspectives toward more inclusive and integrated analyses of food system dynamics.

1. Introduction

Today's dominant agricultural and food systems lead to continuous resource depletion and unacceptable environmental and social impacts (Crippa et al., 2021; Rockström et al., 2020). They also fail to provide universal access to healthy food, as malnutrition in all forms, ranging from undernourishment to obesity, remains a key challenge worldwide (Drewnowski et al., 2020). Societal, political, and scholarly actors continue to push for the transformation of agri-food systems (Barrett et al., 2020; Hebinck et al., 2021; Klerkx and Begemann, 2020; Zurek et al., 2021). While these calls for changing agri-food systems are increasingly framed in the context of

* Corresponding authors.

E-mail addresses: hebinck@drift.eur.nl (A. Hebinck), laurens.klerkx@wur.nl (L. Klerkx).

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sustainability transitions (e.g., Barrett et al., 2020), they rarely make an explicit link to transition studies to address these systemic challenges, nor do transition scholars sufficiently address agri-food systems, despite their global pertinence (Köhler et al., 2019).

From this viewpoint, we illustrate several gaps in the agri-food systems debate that sustainability transition studies could engage in. Despite having explored sustainability challenges in the agri-food sector for over a decade (Beers and van Mierlo, 2017; Cohen and Ilieva, 2015; Elzen et al., 2012b, 2012a; Ingram, 2018; Spaargaren et al., 2013), transitions research has remained fragmented in terms of analytical approaches and remains dispersed across disciplines (El Bilali, 2020; Gaitán-Cremaschi et al., 2019; Vermunt et al., 2020; Weber et al., 2020). In addition, its focus has been on agriculture, excluding relevant food system practices such as consumption, distribution, and processing. The engagement of transition studies in debates on broader agri-food systems change has been limited (Melchior and Newig, 2021).

2. Four avenues for transition research in the coming decade

We propose four gaps to be addressed in the next decade of transition research on agri-food systems and ways to consolidate with existing perspectives in agri-food studies (see also Table 1).

2.1. Cross-scale dynamics between coupled social, technical, and ecological systems

Agri-food systems connect distant places across various scales to one another, sometimes with profound unintended implications for sustainability. Such dynamics have been framed as ‘telecouplings’ in studies that explore interactions between coupled social-ecological systems by focusing on trade flows, information transfer, and species dispersal (Friis and Nielsen, 2019; Liu et al., 2013). Such distant connections have, to some extent, been captured in transition research on the translocal character of diffusion processes of transformative innovation (Avelino et al., 2020; Loorbach et al., 2020). Others have engaged with the spatial dynamics of sustainability transitions, underscoring the dependence and impact on social and environmental systems in certain spatial contexts (Hansen and Coenen, 2015; Truffer et al., 2015). The diffuse and elusive nature of these cross-scale dynamics and their impacts remain difficult to detect, study, and govern (Liu et al., 2018a), proving a barrier for sustainability governance.

Building upon existing work on the geography of transitions, future transitions research needs to better address these cross-scale and coupled dynamics in agri-food systems to account for interconnected consequences.

2.2. Social justice, equity & inclusion in agri-food systems

Persistent injustices, inequities, and dynamics of exclusion are embedded throughout agri-food systems. The ethical aspects of sustainability transitions have been gaining traction in transition studies (Köhler et al., 2019): exploring the emergence of injustices (Sovacool and Dworkin, 2015), the moral dimensions of sustainability and innovation (Klerkx and Rose, 2020; Swilling and Annecke, 2012), the role of innovation in fostering just transitions (Smith and Seyfang, 2013), and the politics of transitions (Avelino and Wittmayer, 2015). However, a majority of change processes in food systems overlook these aspects of justice and risk either exacerbating or reproducing existing injustices or pursuing sustainability transitions that marginalize certain groups of people (Zurek et al., 2021). These change processes largely overlook the existing justice frameworks and perspectives (Fraser, 1998; Nussbaum, 2006; Young, 2000), as well as the rich history of agri-food research exploring such dynamics. For example, political economy research on the ‘food regime’ provides a critical analysis of what and how capitalist dynamics shaped and institutionalised injustices and inequities in

Table 1
Avenues for the next decade of transitions research on agri-food systems.

Avenues for future research	Extending previous transitions research	Potential for engagement with other research fields
1. Cross-scale dynamics between coupled social, technical, and ecological systems	Geography of Sustainability transitions (e.g., Hansen and Coenen, 2015; Truffer et al., 2015); Translocal diffusion of innovation (Loorbach et al., 2020); Translocal empowerment (Avelino et al., 2020).	Telecouplings in social-ecological systems (e.g., Crona et al., 2015; Eakin et al., 2017; Friis and Nielsen, 2019; Liu et al., 2018b, 2013), Equity and sustainability in social-ecological systems (e.g., Leach et al., 2018).
2. Social justice, equity & inclusion in agri-food systems	Just transitions (e.g., Heffron and McCauley, 2018; Smith and Seyfang, 2013; Swilling and Annecke, 2012); energy justice (McCauley and Heffron, 2018; Sovacool and Dworkin, 2015; Williams and Doyon, 2019); mobility justice (e.g., Mullen and Marsden, 2016); Politics of transition (e.g., Avelino and Wittmayer, 2015; Meadowcroft, 2011).	Political economy research on just transitions (Leach et al., 2013; Newell and Mulvaney, 2013; Raworth, 2017), Justice frameworks that explore historical, representational, and distributional justice (Fraser, 2010, 1998; Nussbaum, 2011, 2006; Young, 2000).
3 Sustainability transitions of agri-food systems in low- and middle-income countries	Just transitions (e.g., Swilling et al., 2016; Swilling and Annecke, 2012) Sustainability transitions in the global South (e.g., Hansen et al., 2018; Ramos-Mejía et al., 2018; Wiczorek, 2018).	Development sociology ((Arce and Long, 2000); Escobar, 2012), Political science perspectives on repression and counter-movement (e.g., Scott, 1985); Decolonial perspectives (e.g., Bhabra, 2014; Ndlovu-Gatsheni, 2020; Ndlovu and Makoni, 2014).
4 Cross-sectoral agri-food governance and system integration	Mission-oriented innovation systems (e.g., Hekkert et al., 2020; Klerkx and Begemann, 2020) Cross-sector and multi-regime interaction (e.g., Hassink et al., 2013; Hermans, 2018; Sutherland et al., 2015)	Financialization of the food economy (e.g., Clapp, 2021; Clapp and Isakson, 2018); Bio-economy research (Kershaw et al., 2021; Laibach et al., 2019)

agri-food systems (McMichael, 2009; Patel, 2009), or on just transitions (Newell and Mulvaney, 2013). In line with calls for addressing just transitions, scholars should address these inequities and injustices to ensure inclusive and sustainable agri-food systems.

2.3. Sustainability transitions of agri-food systems in low- and middle-income countries

Current trends in low-and middle-income countries (LMICs), such as rapidly growing economies and middle-class populations, demand rethinking the relation between development and sustainability transitions (Swilling et al., 2016). Research from fields such as political economy and anthropology has a long tradition of critical research on the relation between development and sustainability in LMICs. Many contest the notion of development and the interventions it has shaped for being primarily rooted in Western thinking (Bhambra, 2014; Escobar, 2012; Scott, 1985). While there are opportunities to accelerate sustainability transitions in LMICs, the applicability of existing transition frameworks, key concepts, and methods in these contexts has been increasingly questioned by scholars (Hansen et al., 2018; Ramos-Mejía et al., 2018; Wieczorek, 2018).

To address sustainability transitions in LMICs, there is a need to reflect on the applicability of existing transition theories and methods, given pluralising and decolonising knowledge systems. Critical research on agri-food systems can offer lessons for transition scholars on rethinking 'development' and 'innovation' beyond Global North contexts.

2.4. Cross-sectoral agri-food governance and system integration

Agri-food systems have always been intrinsically connected to other systems, such as energy, water, or mobility (Klerkx and Begemann, 2020). The agri-food sector is key in cross-sector and multi-technology interaction to enable circular and bio-economies (Hermans, 2018; Kershaw et al., 2021; Laibach et al., 2019). Recently, there have been calls to increase attention for cross-sectoral interaction in sustainability transitions, from those exploring the role of businesses and industries in transitions (Andersen et al., 2020) to mission-oriented innovation systems (Hekkert et al., 2020; Klerkx and Begemann, 2020). While some work has been done in agri-food systems on cross-sector and multi-regime interaction (Hassink et al., 2013; Sutherland et al., 2015), we deem this a critical area for future empirical research. It may elucidate how hybridization of sectors emerges through system integration (such as with the ICT sector and agriculture through digital farming), how this leads to novel technology configurations, associated industrial structures, and power (im)balances in economic systems (Clapp, 2021), and what this means for just sustainability transitions.

Agri-food system transitions offer an exciting setting to yield insights that can feed into theoretical development in transition studies on multi-technology, multi-sector, and multi-regime dynamics.

3. Conclusion

In this brief overview, we have argued that more scholarly attention should be paid to agri-food system transitions, particularly because of current social and political momentum. Given this momentum, we call for a decade of new transition research that moves beyond single-scale and sector perspectives toward more inclusive and integrated analyses of food system dynamics.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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