Innovation theory and urban food governance: transition thinking, social innovation and transformative change

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Abstract

This chapter presents an overview of innovation and transition theory to examine urban food systems and their governance. We begin by explaining the relationship between innovation and transition and introduce transition management and 'sustainability transition'. It is possible to understand production-consumption systems and innovations to transform them at two levels: *the vertical* (i.e. strategic, system linkages) and *the horizontal* (i.e. practice, place-based linkages). Social innovation is a key process of change in both levels, particularly the horizontal. We then turn our attention to an increasingly prominent and influential way to enact social and technical change on the ground, namely experimental living labs. This new, more transdisciplinary way of working on governance topics, particularly as a medium to engage constellations of actors in creative forms of urban food governance, is significant. Living labs represent powerful epistemological tools to transform vertical and horizontal relations for citizens, cities and regions. We conclude with reflections on the COVID-19 pandemic, noting increasing calls for systemic changes to food systems and urban environments, and review work on just sustainability and food justice, which opens up important new ground for transition theorists to explore in relation to urban food governance and beyond.

Introduction

Innovation is an often-used buzzword in food policymaking. The EU's new 'Farm to Fork' strategy (European Commission, 2020), for example, calls for new 'mission-orientated' technological innovations and legislative and institutional actions, as well as behavioural changes, to transform Europe's food system to address systemic problems ('grand societal challenges'), including climate change, biodiversity loss, antimicrobial resistance and food waste (Schebesta and Candel, 2020). The emphasis is on 'system innovations' (technological, institutional, or social) that enact fundamental (as opposed to incremental) change to reconfigure food systems for environmental and social well-being (Dinesh et al., 2021). The Europe 2020 strategy (European Commission, 2010) also called for innovation, orientated at that time to address 'smart, inclusive growth', including the challenges of sustainable food security. In the UK, agri-food innovation features too in policy discourse (Herbert and Lord Taylor of Holbeach, 2010), framed through the 'sustainable intensification' paradigm (Foresight, 2011) and the utilisation of existing and new technologies (genetics, robotics, nanotechnology, digitalisation, precision agriculture, big data, etc.) to enhance yields and protect environments (Ingram and Maye, 2020). This innovation paradigm was updated via the National Food Strategy (Dimbleby, 2021), which emphasises systems thinking and calls for transformative policy and market intervention to address 'destructive feedback loops'.

Behind the 'innovation' buzzword we find contested visions for sustainable food systems, particularly the competing agendas of 'technocentric' and 'ecocentric' responses, with the latter favouring 'appropriate' technologies over 'softer' innovation options (Kneafsey et al., 2021). In food policy, innovation typically refers to technology development (Ballamingie et al., 2020), such as the design of new products and services for markets. This science and technology framework may seem somewhat removed from urban food governance, but in reality urban food sustainability sits at the confluence of two innovation contexts, namely food innovation and urban innovation, the latter otherwise known as the 'smart city' agenda, which advocates ICT and techno-science as solutions for urban growth (Maye, 2019). Urban agri-food innovation is a sub-set of smart city innovation.

Critics of techno-science innovation argue for greater recognition for grassroots innovation actors, placing more emphasis on people and the needs that innovations are addressing at a local level. As Bock (2012:60) argues, innovations are born 'from collective and creative learning processes and the mutual exchange of knowledge'. In line with this thinking, this

chapter argues that social innovations are critical 'acts of change' that enable sustainability transition in urban food systems. This does not discount the importance of technology or socio-technical combinations (Maye, 2019). Urban food systems represent heterogeneous assemblages of place-based innovation and action. This includes, for example, place-based food networks, such as those developing urban food strategies and partnerships, that connect actors and systems of food, agriculture, spatial planning, corporate strategy and state welfare support (Carey, 2013). Community and grassroots-based actors enable change through socio-technical innovations in organisations and through governance co-ordination.

To develop this argument, the chapter presents an overview of innovation and transition theory, using data from European and UK research projects that examine urban food systems and their governance (i.e. their ways of organising, working and doing to enact change). The innovation and transition literature is burgeoning and not always easy to navigate, so we begin by explaining the crucial relationship between innovation and transition and then introduce transition management and 'sustainability transition' (Hinrichs, 2014). This provides a useful way to understand production-consumption systems and innovations to transform them, which we then categorise at two levels: *the vertical* (i.e. strategic, system linkages) and *the horizontal* (i.e. practice, place-based linkages). Social innovation is a key process of change in both levels, particularly the horizontal. The analysis shows how transition theory is mobilised and helpful to understand processes of urban food governance. In the next section, we turn attention to an increasingly prominent and influential way to enact social and technical change on the ground, namely experimental living labs. The living lab methodology is seeping into most innovation spaces, from early testing of transformative technologies in real-world conditions to more diverse contexts, including smart cities, digital finance and sustainability transitions. This new, more transdisciplinary way of working on governance topics, particularly as a medium to engage constellations of actors in creative forms of urban (food) governance, is important to recognise. It sits alongside an emerging critique of living labs, particularly the surrender of public space to commercial interests to develop technologies (Pfotenhauer et al., 2021). This is important to recognise, but if designed in the right way, living labs we argue are powerful epistemological tools to transform vertical and horizontal relations, co-generating strategic and practice-orientated governance innovations for citizens, cities and regions. We use data from the ROBUST project to illustrate these points. We conclude with reflections on the COVID-19 pandemic, noting increasing calls for systemic changes to food systems and urban environments and what this means for transition theory and urban food governance.

Transition management and sustainability transition: system change through vertical and horizontal linkages

Transition has become a powerful way to think about change and the challenges involved in making systems - in this case urban food systems - more sustainable (Darnhofer, 2015). The term describes a gradual process of change (Maye, 2018), or, as Hinrichs (2014:145) puts it, 'a gradual, pervasive shift from one state or condition to something different'. 'Transition' as a concept is also mobilised differently across sub-disciplines and epistemic communities. Food nutritionists, for example, use the term 'nutrition transition' to describe changing diets in emerging economy populations as countries grow wealthier and can afford more processed foods, fats and meat. To avoid confusion, this chapter aligns with the sustainability transition approach, which argues that innovation is essential to initiate change, disrupt the status quo and develop resources and pathways to greater sustainability. Transition studies initially examined socio-technical transitions, combining ideas from technology studies and innovation studies to examine the consequences of a new technology for social change and its potential to lead to shifts in a system. Under 'sustainability transition' studies, the focus is on examining socio-technical innovations that are aligned with sustainability agendas (Hinrichs, 2014). As Westley et al. (2011:774) observe, the goal is to use '…innovative capacity to change the current unsustainable trajectories and support transformations toward global sustainability'. Societies, places, communities, citizens and businesses are not passive agents who experience transitions to sustainability (Maye et al., 2021); they may 'intentionally act to construct them' (Hinrichs, 2014: 145). However, transforming socio-technical regimes is not an easy task, in that socio-economies have established ways of operating, with alternatives often 'locked out' or marginalised (Seyfang and Haxeltine, 2012).

The transition management approach constitutes a governance approach that focuses on pragmatic processes 'of taking action and facilitating change' (Hinrichs, 2014: 145) (policies, planning instruments, grassroots interventions) that have been applied to a number of policy fields in recent years, such as nature, the environment and 'low-carbon' transitions. Sustainability transition researchers study these new socio-technical systems. Socio-technical regimes (systems of rules and principles) provide a reference for actions and behaviours and

the transition approach examines processes of changing those regimes (Maye, 2018). Following Hargreaves et al. (2013) and Hinrichs (2014), the rest of this section reviews two key approaches in sustainability transition thinking: the multi-level perspective (Geels and Schot, 2007) and social practice theory (Shove and Pantzar, 2005, Shove, 2003), which respectively focus on different forms of system linkage (i.e., vertical or horizontal).

The multi-level perspective: vertical linkages

The multi-level perspective (MLP) is a useful approach to help understand the complexity of transitions. It conceptualises patterns of long-term change, with a focus on socio-technical regimes, which are situated at three levels and labelled respectively as 'landscape factors', 'regimes' and 'niches' (Geels and Schot, 2007). In the MLP framework, the mainstream agri-food system and its governance mechanisms at different scales, including the city, represent the socio-technical regime. Niche innovations are small-scale initiatives (organic farming in its infancy in the UK, for example) which during times of 'dynamic stability' may not be directly putting pressure on the dominant regime to change; yet may have the potential to do so. The socio-technical landscape represents pressures that are exogenous to the niches and regimes below but can significantly impact them (a zoonotic disease or health outbreak, for example, or rocketing food prices, as seen in 2007-08, or concerns about climate change). The landscape level can destabilise regimes and niches and act as a catalyst for transition (by this we mean a catalyst for change; think, for example, about ruminant livestock and meat eating which is increasingly linked to climate change and planetary boundaries). From an MLP perspective, understanding the relationship and linkages between niche and regime levels is key to understanding the nature of transitions (Darnhofer, 2015). Transition occurs because of the interactions at the different levels as well as between, thereby creating opportunities for change. In some cases, relations between niche-innovation and the existing regime are 'symbiotic' and the niche can be adopted or incorporated to improve the functioning of the regime (i.e. incremental innovation). A 'competitive relationship' is when the niche is intent on replacing the existing regime (i.e. radical innovation) (Geels and Schot, 2007).

MLP thus provides a heuristic framework that helps to position, in this case, urban food systems and governance innovations (as novelties/niches) within a wider schematic that examines their ability to interact and transform the mainstream food regime (Maye et al., 2021). MLP has been criticised, not least because of the need to examine in more detail the dynamics both between

levels and between actors at the same levels (Darnhofer, 2015). The conceptual emphasis towards regimes, niches and landscapes can seem overly deterministic and 'can crowd out the importance of human agency and mute inevitable contest and politics of sustainability transitions' (Hinrichs, 2014: 149). Nevertheless, MLP is still valuable to capture the key features of socio-technical transition and to understand that transition is not linked to single causes but alignment of multiple processes at different levels (Geels, 2019).

Two forms of innovation also emerge from this MLP perspective (Maye, 2018): first, 'incremental innovations' (technological or social) that do not disrupt and are generated by the existing rules of the regime; and second, 'radical innovations' which respond to contradictions or negative side effects within the regime and seek to change it through the incorporation of socio-economic rules that have been generated outside the regime or by developing a new regime. In other words, sustainability transition only takes place when new ones replace the old socio-technical principles and the innovation develops coherency (Maye et al., 2021). Smith's work on the organic food sector is a good example of how a radical innovation can transform the mainstream regime, particularly the way that organic products are now sold in supermarkets, the product of an on-going engagement with the mainstream food regime that created new organisational arrangements and tools (Smith, 2006). The transition to a new regime is thus highly contingent on a range of different processes and constituent parts, not least due to the 'multi-level dynamics' that are likely to be involved (Wiskerke, 2003).

The social practices approach and social innovation: horizontal linkages

Attention within transition studies is focusing increasingly on further analysis of interactions between levels (Seyfang and Haxeltine, 2012, Maye, 2018), as well as combining it with complementary theoretical frameworks. Much of this work moves beyond understanding interactions between levels (i.e. vertical linkages, which is common in MLP studies) towards *social practices* as they take place at a local level within existing systems, which Hargreaves et al. (2013) characterise as 'horizontal linkages'. The social practices approach analyses 'the social organisation, continuities and possible ruptures in people's everyday practices' (Hinrichs, 2014: 149). Practices are about describing more than what people do; it is about understanding *how change takes place*; in other words, changes in practice cannot be explained and reduced to changes in status, attitude and behaviour (Maye et al., 2021).

Social practice theory examines how everyday practices (e.g. forms of cooking or commuting) become normal and routine events, which in turn reveal what might be possible and what happens when sustainable innovations are introduced. Shove's (2003) work is particularly useful, showing how practices within the home, such as showering, have evolved and become normalised as social expectations about cleanliness and comfort have emerged in parallel with new home technologies. Practices comprise three elements (Shove and Pantzar, 2005): materials (e.g. objects, tools), competence (practical knowledge to perform practices) and meaning (i.e. the social significance of the practice). Innovation is crucial to the performance of practices because it can reconfigure constituting elements e.g. a new practice can emerge, practices may persist or practices may disappear. This shifts the scale of analysis from an individual to a social stance, with practices rather than individuals the centrepiece of analysis (Hinrichs, 2014: 150). A 'systems of practice' perspective is also taking shape to understand the opportunities to change the practices of associated systems e.g. wider institutions and legislation governing the food system (Maye et al., 2021). This shows how a particular practice (e.g. cycling or urban gardening) can influence the meanings and discourses around it. As Langendahl et al. (2014:5) put it, 'it is increasingly accepted that innovation does not emerge from a linear process, which proceeds from plan to implementation'.

Innovation processes are thus the co-evolution of practices and social practice theory emphasises understanding how practices co-evolve across places. In urban food systems, there is already recognition and consensus that social innovation is a critical lever for urban food governance (Ballamingie et al., 2020). There is no consensus regarding how best to define social innovation (Neumeier, 2012). This requires understanding how social practices and associated systems change in combination with forms of collaborative action that enable social change (Marques et al., 2017). Social innovation typically delineates a fuzzy concept. Neumeier (2012: 55) provides the clearest definition, which he defines as: '[c]hanges of attitudes, behaviour or perceptions of a group of people joined in a network of aligned interests that in relation to the group's horizon of experiences lead to new and improved ways of collaborative action within the group and beyond'.

Social innovation occurs then when a network of actors changes its way of doing things and the consequence is some form of tangible improvement for those actors involved and possibly beyond. Social innovations signify 'acts of change'. Change in attitudes, behaviour or perceptions result in a new form of collaborative action. Social innovations are non-material

(Box 1), with complementary material outcomes (e.g. fresh food or a new community building); the focus is asset building, not needs realisation. This explains why, in contrast to technology-based and economic innovations, social innovations are difficult to identify and evaluate but 'soft changes' and 'alignment of interest' if carefully tracked are equally transformative (Maye et al., 2021). Work on community-led 'grassroots innovations' and the development of social innovations at the community level shows, for example, how local and urban food movements are a vehicle for building collective capacity. This happens through facilitating community cohesion, healthy eating, educational enhancement and integrating disadvantaged groups into mainstream society and economy (Kirwan et al., 2013).

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Box X.1: Spaces of sanctuary and innovation – De Site

Living labs and rural-urban food system innovation

This section considers action-orientated research that is using the experimental living labs concept as a way to co-develop governance solutions and engage constellations of actors in on-the-ground social and technical innovations. The living lab concept is prominent in urban governance settings. Living labs have potential to advance urban food governance research. We evidence this by drawing on sustainable food experiments conducted as part of a Horizon 2020-funded project, ROBUST (2016-2021), which used living labs to action governance innovations to strengthen rural-urban linkages in 11 European regions.[i]

Living lab definitions, origins and capacities to enable change

Living labs are arenas 'devised to design, test and learn from social and technical innovation in real time' (Marvin et al., 2018: 1). They have been applied in the co-creation of innovation between four main sectors – research, civil society, public institutions and the private sector. One historical origin of living labs is user-driven ICT systems design and development, such as smart city technologies today. Other origins focus on interdisciplinary and knowledge-sharing connections between research communities and broader society (Anderson et al., 2013), or on improving public service effectiveness in relation to citizens' expectations (Gascó, 2017). No uniform definition of living lab exists, although several authors have highlighted

distinctions between living labs and other forms of innovation. For example, Bergvall-Kareborn et al. (2009) highlight the importance of external, consumer/user input into technology innovations which have potential societal benefits, in contrast to the generally internal, firm-centric focus of open innovation prioritising market advantage. Similarly, Leminen et al. (2015) review user roles in innovation and suggest that they crucially shape innovation through real-life experiences, in contrast to more conventional R&D-based innovation, which relies on scientific or technical expertise. Thus, living labs constitute experiments that draw on real-life experience and situations, including the active involvement of prospective users to inform prototype development and refinement. Consequently, living labs have been framed as a pragmatic innovation methodology co-produced by users to solve complex challenges (Ballon and Schuurman, 2015). When complex challenges require governance innovations, for example in tackling inequality or in community development, and are led by local authorities (Edwards-Schachter et al., 2012, Kronsell and Mukhtar-Landgren, 2018), then users are reframed as citizens. The European Network of Living Labs (ENoLL), for example, positions living labs as 'intermediaries among citizens, research organisations, companies, cities and regions'.[ii]

Another important distinction of living labs, in addition to openness and user-participation, is their focus on whole systems, rather than on partial improvements for example in services, products or business models. This has led to their application in agri-food technology where whole chain transparency is vital and requires the input of multiple actors from farmers to consumers and beyond (Wolfert et al., 2010). Living labs are 'partnerships between sectors (often between public, private and people)' (Voytenko et al., 2016:46), and universities often play a key role in facilitating and managing experimental iterations. Other definitions describe living labs as pilot and demonstration projects, acting as supportive tools for private actors and industry to commercialise their services, products and technologies.

Of particular interest here, is the burgeoning literature on 'urban living labs' and specifically their application to address urban governance challenges. Voytenko et al (2016:46) define urban living labs as 'an *arena* (i.e. geographically or institutionally bounded spaces), and as an *approach* for intentional collaborative experimentation of researchers, citizens, companies and local governments'. Five urban living lab characteristics (following Voytenko et al., 2016) are:

1. *Geographical embeddedness* – which may be territorial (such as a community or district) or institutional (including contracts).
2. *Experimental learning* – using real world conditions and time to prompt changes to governance, including testing technologies, ideas, solutions and policies.
3. *Participation and user involvement* – using the quadruple helix of government, industry, citizens and researchers to co-create solutions at all stages of design.
4. *Leadership* – clear leadership and ownership of the lab is crucial. Although participatory, labs need to be carefully coordinated.
5. *Evaluation and refinement* – it is vital that the autonomy and experimental spirit of a living lab is matched with transparency, openness to external scrutiny, and refinement of goals and outcomes as the experiment proceeds.

Urban living labs are emerging then as a form of collective urban governance and experimentation in response to sustainability challenges and opportunities created via urbanisation. Many social and environmental projects are now applying living lab methodologies, including innovation partnerships which support sustainable urban food and resource transition or low carbon objectives (in addition to ROBUST, see for example, REPAiR, FoodShift, FoodTrails).[iii] Associated changes are needed in how systems of innovation and services are designed, organised and delivered and, as a result, different forms of urban governance are being developed and tested. These forms of urban living lab signify a 'form of experimental governance, whereby urban stakeholders develop and test new technologies, products, services and ways of living to produce innovative solutions to the challenges of climate change, resilience and urban sustainability' (Voytenko et al., 2016: 45-46). These labs are not just technology-focused. They address also issues of consumption, civic behaviour and lifestyle (i.e. social practices and innovation, linking them with earlier forms of participative and collaborative governance, including Local Agenda 21).

In summary, living labs have origins as distinctive open innovations employed by tech-firms, researchers, public authorities and civil society networks, working together to pursue transformations beyond initial market advantage, to achieve societal improvements. In practice, urban food transformations are achieved through user behaviour, market developments and the regulation of food provisioning by city authorities whose functional food remits cover public health, waste management, spatial planning and market infrastructure. External, user-led input, combined with transparent and iterative refinement of experiments,

are essential living lab characteristics that can accelerate systemic change. This has lent living labs potential, utility and popularity among governance and social innovators such as city councils, research funders and policymakers seeking multi-actor solutions to complex urban sustainability challenges, for which multiple solution pathways are be possible (Marvin et al., 2018: 5). There are limitations too, of course, including their co-option and manipulation as mechanisms which in reality are little more than new ways to rebrand technology investment (Pfotenhauer et al., 2021). Here we emphasise their potential transformative capacity to help urban food system actors enact change when designed in the right way.

Food governance experiments: creating mechanisms to strengthen rural-urban linkages

In this sub-section, we explain how the ROBUST project applied living labs in 11 European regions to strengthen rural-urban relations, focusing on sustainable food system innovations. Living labs by definition are place-based and horizontally embedded, which aligns with the approaches noted in social innovation approaches, but innovations below were also in some case more strategic (vertical, multi-level) in their governance reach.

The ROBUST project aimed to develop functional synergies between rural and urban areas. It constituted 11 living labs in different European locations, including three national capital regions (Helsinki, Lisbon and Ljubljana), two major second-tier city regions (Frankfurt and Valencia) and a range of provincial and rural settings, including Tukums (LV), Gloucestershire and Mid-Wales (GB), Lucca (IT), Ede (NL) and Styria (AT). Each living lab was a collaboration between researchers and practice partners (a local authority or regional municipal network). Experiments to improve rural-urban linkages covered five themes: sustainable food systems, public infrastructure and social services, new business models and labour markets, cultural connections, and ecosystems services.

In each lab, a common four-stage methodology was applied. Each team made use of a participatory methods toolkit compiled by the authors. The four stages were:

- Envisioning: this included the joint development of a research and innovation agenda, following rounds of engagement with local stakeholders;

- Experimenting: here living labs tested initial ideas and scenarios through extended stakeholder engagement, and refined initial objectives accordingly;
- Experiencing: more detailed experiments and ideas were implemented and tested, often at a more granular level (e.g. testing a particular approach to public procurement); and
- Evaluation: the living lab partners continually reflected on the effectiveness of the process, experiments and innovation outcomes (worked as feedback loops).

Not all living labs in ROBUST worked on sustainable food innovations. We focus here only on those that did and the innovations outcomes from that work. In broad terms, five types of governance mechanism emerged from deliberations and exchanges within and between the labs (i.e. as common learning resources). Table 1 summarises each mechanism, including the governance objective and some examples at lab level. At face value, none of the examples are all that new, however the way the objectives were developed and deliberated are important (collective ownership). City and regional authorities developed the innovations as a range of instruments, including food strategies, supply contracts and infrastructural investments to enhance rural-urban synergies. Consumer surveys, focus groups and direct interactions with citizens and local producers (e.g. at public festivals), formed part of participatory 'user' assessments carried out by researchers and municipalities, leading to further interventions, such as investments in market and IT infrastructure by local authorities, and the revision or development of food strategies in city-regional food systems. In each case then 'users' have been the local authorities themselves, as well as other food sector stakeholders, including where innovations were eventually framed by national agendas. In Ede, for example, the local council directed its living lab towards national aspirations for circular farming and economy.

<Table x.1 here>

Table X.1: Sustainable food system governance for rural-urban relations

In forging experimental approaches to food governance to strengthen rural-urban synergies, three types of innovation from the five mechanisms listed above really stand out. They reflect types of system linkage described earlier (vertical and horizontal), as well as technological and social interventions. Table 2 summarises each and a corresponding case study description below provides a more place-embedded account to bring to life how labs worked creatively to change their urban food system. These types align to some extent with the urban living lab

typology (Marvin et al., 2018: 8), which they label as 'strategic', 'civic' and 'organic' living labs. In Marvin et al's framework the urban arena for each type is a test-bed, an historically-produced context, and a geographical framing by a community group or grouping. In ROBUST, urban components were part of larger territorial experimental arenas, with the governance experiments designed to foster closer functional connection between urban, peri-urban and rural places. In that sense, all are strategic and territorially embedded, with rural-urban relations strengthened through institutional, technological or social innovation. Orientations also differ in terms of where system change is targeted. Lucca, for example, is a process of food re-territorialisation via strategic multi-level policy design across five municipalities. We introduce each innovation in more detail below.

<Table x.1 here>

Table X.2: Food governance innovation type and linkages

In **Lucca**, five municipalities in the Plain of Lucca had been collaborating on the development of an Intermunicipal food policy (IFP). The area enjoyed a well-developed network of institutional, research and grassroots organisations that were already engaged in long-standing discussions about the benefits of and multi-functional possibilities linked to local food (including in the lucrative tourism market), but also including spatial and environmental dimensions linked to soil sealing and urban sprawl. The LL devised a new governance model, bringing together the *gestione associate* (joint municipal management structure) the food policy office, the Agora (a public forum concerned with the IFP), the Food Council and the assembly of mayors. The model represents the first exemplar of institutional, territorial strategy implementation in the Plain of Lucca, and the IFP governance model is the first case in Italy of the joint management model for sharing functions on food policies.

In **Gloucestershire**, the emergence in the food retail market of an IT innovation combined with a government-initiated trial to establish regional public procurement infrastructure crystallised the focus of the living lab. The Dynamic Procurement System (DPS) uses complex algorithms to organise supply and demand of regional food on a daily basis, allowing for seasonal supply, quality and price variations, while ensuring efficient logistics. This tech breakthrough enables smaller-scale producers to benefit from stable, consistent and lucrative public sector demand,

when consolidated across institutions. The Gloucestershire living lab led resulted in wording in the tender document for the catering supply which will link the contract for 18,500 daily school meals to the DPS and the regional logistics hub pilot.

In **Lisbon**, specially trained teachers are employed to consider school food nutritional standards. In one of several innovations achieved by the living lab, these specialist teachers worked together with parent groups to institutionalise five sustainable food themes in a number of classroom subjects including science, geography and citizenship. Food topics included the productive (agricultural) cycle, ecosystems services and food, sustainable consumption, nutrition and food waste management.

ROBUST links rural and urban food spaces by creating governance innovations, designed and refined through iterative, transparent 'user-led' living labs. The project has also highlighted challenges, such as the limited capacity of local authorities for being experimental, especially when managing vital public services such as safe and healthy school meals. In addition, when extended territorial considerations are at play, for example in inter-regional food systems, it can be difficult to balance living lab stakeholder input within geographically and democratically fixed democratic and administrative boundaries. In this respect, cities are useful focal points for regional innovations, because they need to secure food system resilience for their citizens, while depending substantially on agriculture outside the city limits.

Towards transformative change: 'just sustainabilities' and food justice

The previous section ended with a discussion of sustainable food governance innovations that enhance rural-urban linkages. This highlighted the value and potential of living labs as an important socio-technical innovation to inform sustainability governance, as well as indicating an important shift in urban research and policy priorities. Critical in this regard is realisation that urban sustainability challenges cannot be addressed through the collection of more data or the creation of technical fixes or new institutions. As Marvin et al. (2018:3) put it, 'transitions are required in the ways in which systems of provision and services are designed, organised and delivered in diverse urban contexts'. New technology or infrastructure fixes will not suffice; changes in markets, practice and culture are needed. This echoes earlier definitional discussions and raises a further important distinction between 'radical' and 'targeted'

complementary innovations. The former seeks to significantly change the way goods or services are produced and delivered and challenges the status quo by addressing asymmetrical power relationships and inequality (Marques et al., 2017: 77). The latter describes activities that 'seek to improve the production and delivery of certain goods and services, without radically reshaping current institutional arrangements or power structures' (ibid.: 8). Activities aim then to include end-users as citizens in the 'design and delivery of goods and services'.

The boundaries are not necessarily as clear-cut as implied here, but it draws attention to innovation, and specifically social innovation, as a concept, term and normative guide that needs to be carefully defined and problematised. The ROBUST cases, for example, arguably fall within the instrumental innovation category. This points to an important extension in socio-technical transition thinking, in the sense that we need to consider more how such innovations connect and enable transformation of, in this case, urban food systems and associated patterns of governance. In multi-level innovation theory, one focus to address these concerns has been strategic niche management and the potential of niches to lead to regime transition (Smith and Raven, 2012, Maye, 2018). Other research calls for closer engagement with the spatial and political contexts that innovations evolve and their relationship to systemic contexts, with an emphasis on the influence of city regions in the governance of transition pathways (Marvin et al., 2018). Emphasis on the city region also provides a territorial approach to urban food systems. As Ballamingie et al. (2020: 232-233) put it, '[j]ust and sustainable food systems aimed at mitigating food insecurity among the most vulnerable (among other goals) must … be enacted where they can achieve the greatest effect: the city-region'. Crucial to this is recognition that a diversity of models may be needed rather than a one-size-fits-all approach, respecting the specificity of place and scale and the promotion of place-based approaches to urban governance (Sonnino et al., 2016), including the translation of food policy council and food partnership models. Urban sustainability and resilience are also framed in terms of climate change, but food system scholars argue that 'food serves as a portal to myriad socio-economic and environmental issues' (Ballamingie et al., 2020: 238). This means innovation must include social and ecological innovations. With municipal food systems this is best realised through a city-region lens and participatory and collaborative place-based governance processes.

The COVID-19 pandemic has magnified in multiple ways the need to adopt this system perspective, as well as bringing into sharp focus the vulnerability of food systems, and interconnections with other systems, particularly social welfare. COVID-19 strengthens the

case for food system planning, city-region thinking and social innovation to enable just and sustainable urban food provisioning. It also requires reflection on what exactly we mean, what we need, and who is best placed to implement 'transformation'. In the final paragraphs, we review COVID-19 urban food system impacts and introduce new work which links urban food systems to 'just sustainabilities', 'food justice' and 'transformative social innovation'. These new themes offer important avenues for future urban food studies scholarship. As Carey et al. (2020) note, cities are centre stage in the COVID-19 food response, with municipal governments and city authorities critical in the promotion of equitable access to healthy food. Those already food insecure in the Global South are most at risk, including smallholder producers, but food insecurity is a serious and intensifying problem in the Global North, particularly for low income and vulnerable populations. Soaring demand for emergency food relief has created real pressure and revealed significant weaknesses in a system that relies on the charitable sector to address food insecurity. This has also led to wider questions about the vulnerability of cities that depend on global food chains, with increasing calls for some element of food system re-localisation and the need to build diversity in sources of food. Carey et al (2020) note that some city authorities have already taken a lead role in initiatives to address food insecurity (e.g. New York), whilst others are collaborating with civil society organisations (e.g. Toronto), some are creating food vouchers (e.g. Seattle) and others are building online maps so citizens can find food services and food relief (e.g. Milan). Policy tools that cities and local governments can use to strengthen their food systems are also noted, which include developing plans to respond to the immediate needs of cities in the event of future sudden shocks and the need to have well-established networks of actors from across the food system to coordinate rapid responses (Palmer et al., 2020).

What we see emerging in these responses to COVID-19 are inspiring stories of innovation, often led by citizens who 'have actively created territorialized and community food economies that champion diversity and redistribution of value to deliver wide societal and material benefits' (Moragues-Faus, 2020: 583). They are actioned through the mobilisation of physical, social and increasingly digital infrastructures, with city food networks at the heart of this. These distributive structures also lack the capacity to replace globalised food chains and concerns are raised about the wider social and economic systems and structural problems which need to be tackled, including, for example, the living wage, the price of property and rent, income support and so on. To create 'liveable and just futures for all (ibid.: 584) this requires investment and support to create distributive food systems, which includes careful thought about how those

innovations can best create fair redistribution of value, knowledge and power in cities and regions and across actors to deliver sustainable food security.

Transformative social innovation is a valuable guide here, if we think of social innovation as changing social relations and transformative change as 'the process of challenging, altering, or replacing dominant institutions in a specific socio-material context' (Pel et al., 2020: 2). Increasingly, discussion about justice and equity, particularly in relation to how urban food policy councils, address the dual crises of COVID-19 and structural racism, foresees these organisations modifying their principles and practices to reflect values related to racial equity, food justice and food sovereignty (Palmer et al., 2020). This emphasises the need for innovation theory to connect more directly with questions of ethics and justice. Such discourse is evident in urban sustainability transition studies, but it is important to develop a more critical governance framework for urban food studies. Particularly useful in this regard is work by Coulson and Milbourne (2020) which, informed by US food justice literature, adopts a 'justice multiple' approach, conceptualising multiple ways justice intersects with food system issues. This starts by pluralising justice in terms of distributive justice, highlighting the politics of recognition (as a feature of justice and prerequisite for fair distribution) and emphasising the importance of participatory justice in terms of the need for emancipatory strategies to empower citizens and enable participatory policy-making and democratic governance. This pluralised conceptualisation of food justice 'is not based on the top-down application of abstract norms, but enacted in situated contexts in response to multidimensional embodied injustices' (ibid., p. 4). This is a useful new way to examine social innovation transformation, particularly as it relates to urban food governance, noting too that empowerment can come through multi-scalar geographies of food justice (i.e. forging co-operative relations with networks in other localities), in line with local and trans-local linkages in social innovation networks to empower people and to gain capacity to mobilise resources for social change (Avelino et al., 2019).

This indicates also the importance of trans-localism and asserts the need for a wider interpretation of food justice that includes distribution, recognition, participation and capability-based dimensions, and that examines sustainability and justice together, as 'just' (Agyeman et al., 2003). As COVID-19 has highlighted, this requires the extension of understandings of 'alternative', 'local' and 'urban' food to address 'the structural processes the reproduce socio-environmental inequality within and beyond the food system' (Coulson and Milbourne, 2020: 13). This involves re-orientating analytical focus beyond food itself 'towards

issues of (in)justice, rights and sustainable livelihoods' to create collective solutions (social and technical innovations) that tackle structural injustices through 'shared political responsibility' (Young, 2011). This new context requires urban food scholarship to combine contextualised micro-analysis of social innovation with a focus on structures of society, including social and environmental injustices and new forms of economy.

Conclusion

For governance theory and practice, this chapter shows four key things. First, sustainability transition is a key approach to understand urban food systems. Second, innovation, institutional, technical and especially social, is critical for sustainable urban food system transition. Governance, as collaborative collective modes of action, is central to this, allowing a shift from people being consumers to citizens who create new forms of social justice. Third, living labs are emerging as a key epistemology and methodology to enact technical and social change, including for urban food systems (as shown here using selected examples from ROBUST) and what is needed now is more understanding and appreciation of the different modalities (strategic, multi-level and policy-orientated compared with specific, internal and practice-orientated, for example). Finally, COVID-19 has highlighted systemic inequalities, including for urban food systems, and this requires new theoretical frameworks. To support social and spatial transformation future theoretical alignments should be strengthened between urban food governance and urban sustainability and 'just sustainabilities' and 'food justice'.

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