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ORIGINAL PAPER

Living Labs as Ethical Spaces: Fostering Innovation and Sustainability in Food Systems

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Abstract

We examine the role of living labs as ethical spaces in driving sustainability transitions in food systems through participatory experimentation, stakeholder engagement, and knowledge exchange. We conceptualise living labs as dynamic environments that integrate diverse actors, including policymakers, researchers, farmers, and consumers, into co-creative processes that foster inclusive governance. While ethical spaces have traditionally been associated with Indigenous worldviews, which emphasise respect, reciprocity, and dialogue, living labs differ in their proactive approach to innovation and systemic change. Living labs facilitate collaborative problem-solving to address food sovereignty between real-world experimentation and social innovation, contributing to food sovereignty and social justice. We argue that ethical governance within food systems requires frameworks that balance economic efficiency with social equity, mitigating power imbalances that often favour corporate-dominated models. We analyse living labs' contributions to sustainability transitions and highlight the potential of experimental governance in fostering resilient food systems and innovation. We advocate for the need for policy mechanisms that support community-led food initiatives rooted in knowledge exchange and experimentation while ensuring equitable access to resources and decision-making power. Living labs, if structured inclusively, can serve as transformative ethical spaces that bridge the gap between scientific knowledge, grassroots innovations for new product development, and policy frameworks, ultimately fostering just and sustainable food futures.

Keywords Social justice · Living lab · Food systems · Social innovation · Food sovereignty · Experimentation

Introduction

Climate shocks, biodiversity collapse, and food injustice are converging to make sustainable food system transformation an urgent global priority. Yet innovation in food systems often remains technocratic and depoliticised, ignoring the normative tensions embedded in decisions about whose knowledge counts, whose voices are heard, and whose values shape the future. Living labs have emerged as a participatory alternative to traditional top-down innovation models, yet their ethical dimensions remain under-theorised and under-leveraged.

This conceptual paper addresses a critical gap. While living labs are increasingly adopted in food system innovation, their normative underpinnings, the ethics of participation, inclusion, and justice, are rarely articulated or operationalised. Scholars have called for deeper integration of ethics into experimentation and transition governance, but few frameworks offer a way to do so systematically. Our novelty lies in introducing and conceptualising ethical spaces within

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living labs as infrastructures for ethical governance and value co-creation rather than only as platforms for technical innovation. This contribution extends beyond food systems, pushing the knowledge boundaries into broader debates on sustainability transitions, participatory governance, and ethical innovation across sectors.

This study draws on insights from sustainability transitions and food justice literature to highlight how experimental spaces can contribute to equitable food policies and empower communities (Shilomboleni, 2017). Living labs challenge dominant corporate models, offering an alternative paradigm where local actors co-develop sustainable solutions to food insecurity and injustice (Hernandez et al., 2023).

Our paper's novelty lies in introducing ethical spaces into the living labs discourse within food systems, i.e. an area that has largely overlooked the normative dimensions of experimentation. This framing encompasses issues of inclusion, justice, and legitimacy in co-creation processes. Furthermore, we apply an innovation lens to sustainability transitions, deriving important implications for sustainable consumer behaviour and value chains, contributing to the business ethics literature with a fresh perspective on how ethical considerations shape stakeholder engagement and innovation in food systems.

Sustainable food systems are increasingly recognised as central to addressing climate change, biodiversity loss, and social inequality. Food sovereignty refers to the right of people and communities to control their own food systems, ensuring that production, distribution, and consumption align with local needs, cultures, and environmental sustainability. It prioritises small-scale farmers, local economies, and agroecological practices over corporate-dominated food supply chains.

Ethical dilemmas in food systems arise from conflicts between economic efficiency, environmental sustainability, and social equity. For instance, fair trade initiatives seek to address labour exploitation and economic marginalisation but may still struggle with issues of accessibility and affordability for low-income consumers (Newholm, 2007). Similarly, the trade-offs between local food production and organic certification highlight tensions between sustainability goals and market constraints (Low & Davenport, 2007).

Corporate control over food production and distribution exacerbates inequities (Bull et al., 2021), undermining food sovereignty and ethical decision-making in food governance (Mugnaini, 2022). This is a cause of a lack of social justice. Social justice in the context of food systems means ensuring fair access to healthy, culturally appropriate food while addressing systemic inequalities related to land ownership, labour rights, and environmental sustainability. Together, the principles of food sovereignty and social justice advocate for an ethical, inclusive, and sustainable approach to food governance. Experimentation and participatory governance models, such as living labs, offer a promising approach to transforming food systems by fostering inclusivity and innovation (Pereira et al., 2015).

The concept of ethical space provides a critical framework for understanding the intersection of different knowledge systems, values, and governance structures in food systems (Ermine, 2007). Ethical spaces emerge when disparate worldviews engage in dialogue, allowing for meaningful collaborations that respect diverse perspectives and cultural narratives (Low & Davenport, 2007). In the context of food systems, ethical spaces create opportunities for participatory governance where marginalised communities can actively contribute to decision-making processes, thereby countering the dominance of corporate interests (Barnett, 2005). These spaces facilitate knowledge-sharing and power redistribution, as well as ethical deliberation. This contributes to policies and practices that reflect broader societal values rather than narrow economic interests.

In this context, living labs play a pivotal role in shaping sustainable food systems by fostering collaborative experimentation and innovation (Labellarte et al., 2021) and various initiatives worldwide are emerging. Living Labs' core activities comprise the experimentation of ideas and solutions to problems, stakeholder engagement, and knowledge dissemination.

A key example is the FOOD 2030 Initiative (https://food2030.eu), which connects multiple living labs across Europe to develop innovative food system solutions. This initiative aligns with broader networks such as the European Network of Living Labs (ENoLL) (https://enoll.org), which supports knowledge-sharing and collaboration among living labs worldwide. According to ENoLL, as of 2024 there are over 460 living labs worldwide that provide real-life settings for participatory innovation. These networks enhance food sovereignty, sustainability, and resilience, empowering communities to take an active role in shaping their food environments.

These initial thoughts raise two main questions: how can living labs serve as ethical spaces for sustainability transitions in food systems? And in what ways do they contribute to food sovereignty and social justice? Finally, what implications do they have for food sovereignty, social justice, and marketing ethics?

These are important questions if we want to understand what ethical implications arise from experimental approaches in food system innovation.

Recent scholarship confirms that living labs are gaining traction as participatory platforms for food system innovation, yet the field remains emergent and methodologically diverse, particularly in relation to governance, sustainability, and the rural–urban integration (Galli et al., 2024a, b;

Habermann et al., 2024; Luger et al., 2025; Schafer et al., 2024; Trivellas & Mavrommati, 2023).

The underlying assumption leading this study is that despite extensive research on sustainability transitions, little attention has been given to the ethical dimensions of food system experimentation. This paper bridges this gap by conceptualising living labs as ethical spaces that enhance sustainability with a particular focus on food sovereignty, and social justice (Baudish et al., 2024). In this paper, we examine their contributions at multiple levels, and we contribute to the discourse on ethical governance and justice-oriented sustainability transformations.

This study, which frames living labs as ethical spaces, contributes to the improvement of our theoretical understanding of ethical spaces themselves. First, originally grounded in indigenous knowledge and reconciliation processes (Ermine, 2007), the concept of ethical spaces has primarily been applied to contexts that emphasise intercultural dialogue and epistemic pluralism, applicable to marketing theory.

This normative shift also has direct implications for marketing and consumption, as co-created innovations are often perceived by consumers as more trustworthy and authentic, particularly when developed through transparent and inclusive processes. By embedding ethical deliberation within innovation processes, living labs can influence market narratives and brand perceptions, challenging traditional top-down marketing strategies. Thus, our contribution extends beyond governance by highlighting the ethical reorientation of marketing and branding logics within sustainability transitions.

Our contribution also extends this concept into the domain of participatory innovation and sustainability governance by reframing living labs as dynamic ethical spaces. Unlike traditional applications that focus on dialogic interaction alone, we argue that living labs operationalise ethical spaces through structured experimentation, stakeholder engagement, and knowledge exchange. These labs not only host ethical deliberation. They institutionalise it within iterative, co-creative processes that actively redistribute voice and influence. This functional expansion of the concept allows ethical space theory to be applied to practical, innovation-driven governance contexts that require both normative framing and procedural structures.

Second, we position living labs as mechanisms for distributive justice in food systems. Living labs integrate historically marginalised stakeholders, such as small-scale farmers, Indigenous communities, and low-income consumers, into the design, experimentation, and governance of food innovations. This redistributes not just material resources (e.g. access to tools, funding, knowledge) but also epistemic and decision-making authority (e.g. indigenous agricultural knowledge or the lived experiences of urban food-insecure communities actively shape research agendas and influence design parameters). In this sense, living labs function as embedded mechanisms of justice within food systems and create pathways for co-ownership, culturally appropriate food production, ethical consumption, and regionally anchored innovation. We advance our theoretical understanding of distributive justice by linking living labs' structural components (e.g. stakeholder deliberation, co-design processes) with concrete justice outcomes such as equitable access, representation, and culturally appropriate innovations. Thus, in our study, we transcend normative aspiration and frame how labs' design features can function as procedural levers of justice.

Finally, we contribute to sustainability transitions literature by embedding an ethics-centred lens within the widely used multi-level perspective (MLP) framework. While the MLP has been effective in explaining socio-technical change, it often neglects normative values and justice implications. We integrate ethical governance, food sovereignty, and marketing ethics into transition thinking. Thus, we reframe sustainability by focusing on the idea of who benefits, who decides, and whose knowledge counts in the system. Living labs function as both niche-level actors and intermediaries that operationalise ethical experimentation, offering alternative logics to dominant corporate regimes. Living labs challenge incumbent systems and catalyse transitions grounded in fairness, legitimacy, and inclusivity.

This paper is structured as follows: the next section introduces a conceptual framework rooted in the concepts of food sovereignty, social justice, and experimentation and their relationship with sustainability. The "Integrating Living Labs with Food Sovereignty and Social Justice" section introduces the role of living labs as ethical spaces fostering equitable and fair food systems. "The Ethical Implications of Living Labs in Food System Sustainability" section analyses the ethical implications of living labs in food system sustainability, and the "Conclusion" section concludes the paper.

Theoretical Engagement: From Ethical Spaces to Social Innovation and Sustainability Through Living Labs Integration

Food Sovereignty, Social Justice, and Sustainability: The Role of Ethical Spaces

Sustainability cannot be achieved without addressing food sovereignty and justice, as ethical governance and equitable food systems are prerequisites for long-term resilience (Holt-Giménez, 2011). Currently, the dominant industrial food system prioritises economic efficiency and global trade over local food autonomy, exacerbating inequalities and

undermining environmental sustainability. Food sovereignty, on the contrary, places decision-making power in the hands of local communities, allowing them to shape agricultural and food policies that reflect their social, cultural, and ecological realities (Patel, 2009). This aligns with broader social justice principles, ensuring that access to food is not merely a function of market forces but a fundamental right rooted in equity and sustainability at the community level.

Ethical spaces can be assimilated to the normative dimensions of communities of practice, as both frameworks prioritise the co-construction of shared values, inclusion, and participatory governance (Cacciolatti & Lee, 2022). Communities of practice, originally theorised by Wenger (1998), are grounded in social learning processes where meaning is negotiated through collective engagement, identity formation, and shared purpose. Similarly, ethical spaces create a discursive arena in which divergent worldviews and epistemologies are acknowledged and bridged through mutual respect, enabling pluralistic participation (Ermine, 2007). In the context of food systems, these spaces help establish locally meaningful norms that can guide deliberation, conflict resolution, and the development of alternative practices. Both frameworks foster a culture of reciprocal accountability, supporting iterative learning and institutional reflexivity essential for sustainability transitions (Schäpke et al., 2018a, b). In our conceptual framework, we align ethical spaces with communities of practice, as we recognise their potential to build cohesive, justice-oriented governance structures that empower marginalised voices while embedding sustainability in practice.

The relationship between food sovereignty and sustainability is deeply intertwined with issues of power, governance, and environmental stewardship. As a matter of fact, industrial food production has led to biodiversity loss, soil degradation, and increased greenhouse gas emissions, reinforcing the urgency of alternative economic models that integrate ecological principles with social justice goals (Altieri & Toledo, 2011). Ensuring that food sovereignty contributes to sustainability requires policies that support agroecological practices, fair land distribution, and equitable access to food markets. In this sense, social justice is not only about food access but also about empowering marginalised groups, including smallholder farmers, indigenous communities, and food-insecure populations, to participate meaningfully in food system governance (Carolan, 2018). Food sovereignty presents a transformative vision for sustainability that extends beyond environmental considerations and encompasses broader ethical and justice-related issues. Thus, ethical spaces provide a good frame to explore sustainability, enhancing food sovereignty and social justice.

We propose a conceptual framework that traces the evolving relationship between ethical spaces, living labs, social innovation, and food sovereignty. At its foundation, ethical spaces establish the normative and epistemic conditions necessary for inclusive dialogue, cross-cultural collaboration, and pluralistic engagement. These spaces enable mutual respect and shared accountability, forming the ethical grounding from which new collaborative practices can emerge.

Building upon this foundation, living labs serve as structured, experimental arenas in which these normative commitments are put into practice. Living labs embed co-creation and stakeholder engagement while offering opportunities for iterative learning. Thus, living labs become operational expressions of ethical spaces, translating values such as equity, justice, and inclusivity into real-world experimentation that catalyses social innovation by reimagining how communities can interact, produce, and govern in just and sustainable ways. Thus, living labs transform relationships, institutions, and cultural norms. These innovations may take the form of community-supported agriculture schemes, participatory food policy platforms, or regionally rooted supply networks, each advancing a more equitable and resilient food system. When scaled or institutionalised, such innovations contribute directly to the pursuit of food sovereignty, empowering communities to reclaim agency over how food is grown, processed, distributed, and consumed.

Ethical Spaces and Living Labs: Stakeholder Engagement and Experimentation

In this paper, we distinguish among three related but analytically distinct concepts: ethical spaces, ethical infrastructures, and ethical governance. Ethical spaces refer to the relational, deliberative zones created for epistemic and normative negotiation, typically within living labs, where plural values and knowledges are actively engaged. Ethical infrastructures denote the institutional and procedural mechanisms (e.g. living labs, participatory platforms) that sustain these spaces and allow ethical deliberation to be embedded in practice. Ethical governance, by contrast, encompasses the broader normative orientation of decision-making processes, concerned with justice, inclusion, and accountability in food system innovation.

Ethical spaces are conceptual frameworks ideated to facilitate dialogue, collaboration, and mutual understanding between distinct knowledge systems and worldviews (Ermine, 2007). The origin of the concept emerged from the Indigenous literature, where ethical spaces provide a setting where different cultural and epistemological perspectives can interact without one overpowering the other. In food systems and governance, ethical spaces act as platforms where diverse stakeholders, i.e. policymakers, researchers, industry representatives, and community members, engage in equitable decision-making processes (Low & Davenport, 2007). These spaces prioritise respect, reciprocity, and

inclusivity, fostering a deliberative approach to addressing systemic challenges in food and environmental sustainability (Barnett, 2005). A key characteristic of ethical spaces is their reliance on mutual respect and inclusivity. According to Tronto (2020), ethical spaces maintain their legitimacy as long as they adhere to principles of reciprocity, fairness, and open deliberation. The moment power imbalances override these values, such as when decision-making becomes coercive, exclusive, or disproportionately influenced by dominant stakeholders, the ethical integrity of the space is compromised. The boundaries of ethical spaces are shaped by the principles that govern them. Lock (1996) argues that ethical spaces must establish clear boundaries to prevent them from being co-opted by dominant interests. This includes defining the extent to which participants can exert influence and ensuring mechanisms for accountability, else an ethical space may transition into a conventional power structure, thus ceasing to be an ethical space. For instance, in food governance, an ethical space ceases to exist when corporate interests dictate policies at the expense of community representation and environmental sustainability (Perugini & Gordon, 2017).

While ethical spaces and living labs share a common goal of fostering inclusivity and engagement, they differ in their approach to innovation and experimentation. Ethical spaces traditionally focus on dialogue and reconciliation, often resisting rapid technological or structural change, whereas living labs are built upon the principle of innovation through real-world experimentation (McPhee et al., 2021). This distinction makes living labs particularly effective in contexts where adaptive governance and dynamic problem-solving are required to address complex sustainability issues (Galli et al., 2024a, b).

Living labs rely on experimentation as a fundamental mechanism for sustainable transformation. Unlike conventional research approaches, which could take place in controlled environments, living labs conduct experiments within real-life settings, involving multiple stakeholders in iterative co-creation processes (Chapagain & Mikkelsen, 2023). This mode of experimentation offers solutions that are contextually relevant and able to adapt to the evolving needs of communities. Ethical spaces, by contrast, provide the conditions for this experimental ethos to be socially and politically legitimate, allowing for meaningful engagement without imposing predetermined frameworks or outcomes (Vicente-Vicente & Walthall, 2025). Although these concepts seem to be in contrast with each other, we highlight the commonalities. Other than experimentation, other areas where these two frameworks overall are the focus on stakeholder engagement and knowledge exchange.

Stakeholder engagement is central to both ethical spaces and living labs and while ethical spaces focus on power redistribution and dialogue, living labs employ participatory methods to integrate stakeholders directly into the innovation process (Labellarte et al., 2021). In food systems, this means involving farmers, consumers, policymakers, and researchers in the development of sustainable agricultural practices and food governance models (Giovannini & Forno, 2023). This engagement process enhances trust and legitimacy, ensuring that policies and innovations reflect the needs and aspirations of those most affected by food system transformations (Galli et al., 2024a, b). Furthermore, knowledge exchange within these frameworks ensures that diverse perspectives, including scientific, and experiential knowledge, are integrated to create holistic and context-specific solutions, reinforcing the inclusivity and adaptability of living labs (Barnett, 2005), in a similar manner to communities of practice (Cacciolatti & Lee, 2022).

The Relationship Between Food Sovereignty and Social Justice

Food sovereignty and social justice are deeply interconnected concepts that fundamentally challenge existing food governance structures. Food sovereignty. This is a broad and evolving concept that emphasises the rights of communities to control their own food systems. La Vía Campesina's 1997 definition frames food sovereignty as a nation's effort to attain self-reliance, fighting against the industrial and neoliberal paradigms of food production and through the prioritisation of the rights of smallholder farmers and local food systems to self-determination (Agarwal, 2014). Wittman et al. (2010) highlight the 2007 Nyéléni Declaration, where 500 representatives from 80 countries defined food sovereignty as the right of people to healthy and culturally appropriate food that is also produced through sustainable methods. Thus, determining their right to define their own agricultural and food systems (Wittman et al., 2010). A wider definition is given by Patel (2009), who describes food sovereignty as an expansive and inclusive framework, reflecting a diversity of interpretations that adapt over time. Food sovereignty prioritises the rights of communities to control food production and distribution, emphasising the importance of local knowledge, ecological practices, and democratic governance (Patel, 2009). However, among scholars there is agreement in seeing food sovereignty as a fundamental shift away from industrialised food systems toward democratic, localised control over food resources (Pimbert, 2009). When looking at the boundaries of food sovereignty, it differentiates from food security, emphasising that while food security ensures food availability and safety, food sovereignty ensures democratic control over food production and access (Clapp & Scrinis, 2017). Thus, the extant literature highlights the evolving nature of food sovereignty as an idea advocating for justice, sustainability, and local autonomy in food systems (Cacciolatti et al., 2024).

This linkage between communities of practice and ethical spaces is more than a metaphorical resonance. Communities of practice offer a theoretical scaffold to understand how situated learning and identity formation unfold within ethical spaces. In the context of living labs, ethical spaces can serve as epistemic communities in which actors engage not only in cognitive learning but also in moral and affective deliberation. CoPs inform the iterative learning cycles and power-sensitive dynamics of ethical spaces, particularly by enabling the circulation of situated knowledges and legitimising diverse ontologies. In this way, the ethical space is not just a setting for practice, but a learning infrastructure where the reproduction of dominant norms may be challenged, and alternative transition imaginaries co-created.

Social Justice

This is another concept that goes in tandem with food sovereignty in a food system context. Social justice in food systems and social sustainability refers to the equitable distribution of resources, opportunities, and decision-making power within the food system. Sumner (2011) describes social justice as central to the development of sustainable food systems, addressing the crises of the global corporate food regime and advocating for more inclusive, community-driven solutions. Hinrichs (2010) defines social justice in this context as the processes of social inclusion or exclusion that shape decision-making around sustainable food systems, highlighting the need for participatory governance (Hinrichs, 2010). When looking at the boundary between environmental sustainability and social justice, while the former focuses on ecological resilience, the latter aims to create fair and just food systems that alleviate food insecurity and empower marginalised groups (Longo, 2016). Some authors even describe local food system movements as a means of achieving justice by addressing environmental, social, and economic disparities in food production and distribution (Allen, 2010). Overall, the literature on sustainability agrees that enhanced food security and food sovereignty promote social equity. It also emphasises that sustainable food systems must ensure both access to nutritious food for everyone and fair treatment of food workers (Carney, 2012). Thus, social justice in food systems is about ensuring that all people, regardless of socio-economic status, have access to healthy food, fair working conditions, and the ability to shape the policies that govern their food environments, while dismantling structural inequalities that perpetuate food insecurity (Alkon & Agyeman, 2011). These concepts suggest potential for an alternative food system that moves beyond neoliberal market logics and ensures access to nutritious and culturally appropriate food for all. Therefore, sustainability cannot be achieved without addressing food sovereignty and justice, as ethical governance and equitable food systems are prerequisites for long-term resilience (Holt-Giménez, 2011).

Ethical Governance

The increasing industrialisation and commodification of food systems have exacerbated social and environmental injustices, marginalising small-scale farmers while prioritising agribusiness interests (Gonzalez de Molina, 2013). This market-driven approach often contradicts the principles of food sovereignty, as global trade policies frequently undermine local food economies and limit community self-determination (Claeys, 2015).

In this regard, a major tension within food systems arises between food sovereignty and consumer sovereignty. While food sovereignty focuses on empowering producers and communities, consumer sovereignty is driven by market choices that prioritise price and convenience over sustainability and justice (Timmermann et al., 2018). The dominance of large supermarket chains and corporate food producers has led to a food system where affordability often takes precedence over environmental and ethical considerations. This creates a paradox where consumers may unknowingly contribute to exploitative labour conditions and ecological degradation by opting for cheaper food products (Clapp, 2016).

Addressing these tensions requires governance models that prioritise community-led decision-making and long-term environmental sustainability over short-term consumer preferences (Brons et al., 2022). However, this is easier said than done, especially in periods when world nations face increasing inflation. Participatory food policies that integrate diverse stakeholder voices, including small-scale farmers, indigenous communities, and food justice activists, offer a promising avenue for bridging the gap between food sovereignty and social justice (Carolan, 2018). Thus, governments and civil society organisations can help foster an inclusive food system that values sustainability and justice in equal measure by embedding ethical principles into policy frameworks (Raynolds, 2012).

Governance innovations also intersect with ethical marketing scholarship, particularly where consumer trust and authenticity are co-constructed through participatory processes (Vargo et al., 2008). In the context of food systems, where provenance, transparency, and fairness are increasingly market differentiators, the co-creation processes embedded in living labs can actively reshape branding narratives. Rather than positioning firms as the central architects of innovation, ethical living labs allow value propositions to emerge from community-grounded experimentation, transforming products into vehicles for shared values through authenticity (Napoli et al., 2016).

Ultimately, achieving a just and sovereign food system necessitates systemic transformation that challenges

existing power structures. Strengthening local food economies through cooperative models, agroecological practices, and fair trade policies can create a more resilient and equitable food system (Altieri & Toledo, 2011).

Furthermore, educational initiatives that raise awareness of the links between food consumption, labour rights, and environmental sustainability can help shift societal perceptions toward more ethical and just food choices. If they align food sovereignty with social justice, policymakers and activists can work toward a food system that not only nourishes people but also upholds human rights and ecological integrity. Yet, there is currently no one-size-fits-all formula and this implies the need to experiment and identify best practices to bring innovative solutions for a sustainable food system, while adapting ethical governance principles to local realities.

The Role of Experimentation in Fostering Innovation and Best Practice

Experimentation is fundamental to shift toward more sustainable practices in the food system, as it allows for the development of new governance models, technologies, and practices that foster systemic change. Experimentation can be defined as a systematic process of testing, observing, and evaluating variables to gain insights, refine theories, or develop solutions. Rousmaniere (1906) defines experimentation as an essential mechanism alongside observation for understanding phenomena, forming the foundation of scientific inquiry (Rousmaniere, 1906). Auer et al. (2020) highlight the role of continuous experimentation in iterative learning processes, particularly in technological and business environments. The definition has been also extended to sustainability and environmental research, where experimentation is used to test and validate nature-based solutions for climate resilience (Moosavi, 2022). Bocken et al. (2021) describe business model experimentation as a process that refines strategies through iterative trials, assessing economic and social feasibility. Across disciplines, experimentation serves as a core method for innovation, adaptation, and knowledge production, thus for the purpose of this study, we define experimentation as the 'systematic process of testing, observing, and evaluating variables to gain insights, refine theories, or develop creative solutions that drive innovation, adaptation, and systemic change across disciplines' thus experimentation is inherently interdisciplinary and it requires an element of creativity to bring all disciplines involved together and identify triggers of change.

Transition theory and innovation studies highlight how experimentation helps navigate complexity and uncertainty, enabling policymakers and stakeholders to test transformative solutions before full-scale implementation (Geels, 2002; Schot & Steinmueller, 2018).

Transition theory helps us explain how complex systems undergo long-term structural changes through interactions among technological, social, economic, and institutional factors. This theory focuses on processes and phases, such as (i) pre-development (stability with emerging pressures), (ii) take-off (disruptions trigger change), (iii) acceleration (widespread adoption of innovations), and (iv) stabilisation, i.e. new system consolidation. A key concept is the multi-level perspective (MLP), where transitions emerge from niche innovations challenging dominant regimes under external landscape pressures, thus changing a shit in the dominant logic. Several constituting elements shape transitions, including actors and agency (policymakers, businesses, civil society), governance and policies (laws and regulations that steer transitions), technological innovations (emerging technologies that disrupt existing systems), social and cultural shifts (changing values and behaviours), market and economic factors (financial incentives and economic structures), crisis and shocks (events accelerating change), as well as feedback loops, i.e. iterative adjustments based on real-world responses (Weitzman, 1993). In this theory, experimentation helps testing technological, policy, and social innovations in controlled settings before broader implementation (Santosa et al., 2014). Thus, transition theory offers a framework for understanding sustainability transformations, economic shifts, and societal adaptation. A summary of the relationship between the constituents of transition theory and experimentation is shown in Table 1.

In food systems, experimentation plays a crucial role in addressing systemic challenges such as climate change, food insecurity, and biodiversity loss (Illich & Lang, 1973). Experimentation allows for adaptive policymaking by enabling feedback loops where policies can be refined based on real-world outcomes. This is particularly evident in participatory governance models, where multiple stakeholders collaborate to assess the effectiveness of alternative food production and distribution strategies (Leach et al., 2012). Such iterative approaches help policymakers to design regulations that support smallholder farmers, encourage agroecological transitions, and mitigate environmental harm while ensuring equitable access to nutritious food.

Living labs serve as key facilitators of food system experimentation by offering structured environments for co-creation and iterative learning (Robaeyst et al., 2023). They integrate academic institutions, businesses, and community organisations to collaboratively test new food governance models. Living labs support sustainable agriculture practices, alternative food networks, and urban food initiatives through real-world applications, making them instrumental in scaling up localised solutions into broader policy frameworks. For instance, the Nordic Food Lab has been pioneering experimental food science that promotes sustainability while maintaining cultural and ethical food practices (Evans

Table 1 Relationship between Transition Theory constituent elements and experimentation

Constituting element	Role in experimentation
Actors and Agency	Key stakeholders (e.g. policymakers, businesses, civil society) initiate and support experiments to test new transition pathways
Governance and Policies	Policies create experimental environments through subsidies, regulations, and pilot programmes to encourage innovation
Technological Innovations	Experiments in emerging technologies (e.g. renewable energy, AI) test feasibility and scalability before widespread adoption
Social and Cultural Shifts	Social experiments explore behavioural shifts, consumer preferences, and cultural adaptation to new systems
Market and Economic Factors	Market-based trials assess the economic viability of transitions, including pricing models, incentives, and financial mechanisms
Crisis and Shocks as Triggers	Crisis-driven experiments accelerate innovation by necessitating rapid adaptation and resilience-building strategies
Feedback Loops	Experiments provide iterative learning, adjusting policies, technologies, and behaviours based on feedback loops and real-world results

& Mylan, 2019), and the Cavendish Living Lab in London[1] has been developing five different streams of activities spanning from waste management and the creation of bioplastics for sustainable fashion to urban farming and hydroponics, to co-create sustainable solution while engaging different London communities. These are just two examples of the very many living labs that are currently being run around the world.[2]

Despite their transformative potential, living labs and experimental governance face significant ethical and practical challenges. Ethical concerns in living labs include power asymmetries, inclusivity, and risks of unintended consequences, particularly when working with marginalised communities (Bulkeley et al., 2016). Experimentation in food systems must navigate these complexities to ensure that innovation does not disproportionately benefit corporate actors at the expense of small-scale food producers (Fitzgibbons & Mitchell, 2019). Furthermore, there is a risk that experimental initiatives could be co-opted by large agribusinesses, leading to the greenwashing of unsustainable practices rather than meaningful systemic change (Fougère & Solitander, 2020).

It is therefore critical to ensure broad participation and a distribution of equitable benefits to avoid ethical pitfalls in experimental food governance. Policies that facilitate knowledge exchange between research institutions, policymakers, and local food producers can enhance the democratic potential of food experimentation (Carolan, 2018). Also, regulatory frameworks that support open-access research and community-driven innovation can help prevent corporate monopolisation of experimental food practices (Hess & Ostrom, 2007). Therefore, the encouragement of multi-actor collaboration and long-term funding for experimental food initiatives is essential to develop food governance models that are both ethical and sustainable.

Experimentation enables society to test adaptive strategies, refine ethical considerations, and create pathways toward resilient and equitable food systems. Furthermore, experimentation is fundamental to sustainability transitions, allowing for the development of new governance models, technologies, and practices that foster systemic change. Transition theory and innovation studies highlight how experimentation helps navigate complexity and uncertainty (Geels, 2002; Schot & Steinmueller, 2018) and in food systems, stakeholders can foster innovation (as well as social innovation) and test transformative solutions before large-scale implementation thanks to experimentation (Illich & Lang, 1973). While we acknowledge other mechanisms of experimentation (e.g. private and public initiatives), Living Labs are the catalysts for knowledge transfer and social innovation, encompassing other ecosystem actors (e.g. private and public organisations and citizens) that interact with Living Labs.

Living labs are the main causal chain (the moderators of the experimentation–social innovation relationship). They function as critical moderators in the experimentation–social innovation nexus by embedding innovation practices within real-world, user-centred environments that enable iterative co-creation. Rather than viewing experimentation as isolated pilot projects, living labs position such experiments within a framework of sustained stakeholder engagement, ethical deliberation, and contextual responsiveness. This unique setup allows social innovations to evolve through technical validation but even more so through normative legitimacy and local relevance (Cacciolatti & Lee, 2025). Living labs foster quality of life by enabling citizens to actively participate in the development of socially oriented innovations, transforming experimentation into a vehicle for social

[1] www.cavendishlivinglab.com.

[2] https://food2030.eu.

inclusion and empowerment (Edwards-Schachter & Matti, 2012). Similarly, Leminen and Westerlund (2025) emphasise that living labs act as boundary-crossing infrastructures that support collaborative innovation ecosystems, thereby amplifying the impact of experimentation by aligning diverse stakeholder agendas around shared societal challenges.

Thus, in support of experimentation, living labs offer user-centred, co-creative environments where multiple stakeholders collaborate to test and refine sustainability solutions. They encourage real-world testing and adaptation, ensuring innovations that meet the needs of diverse actors (Gascó, 2017; Horner et al., 2021; Robaeyst et al., 2023) while decreasing the gap between centres of knowledge, e.g. universities and research institutes, and the corporate world.

Figure 1 presents the core conceptual framework of this paper, positioning living labs as moderators of the relationship between experimentation and social innovation. This framework integrates key elements from transition theory, ethical governance, and food system innovation to illustrate how living labs enable participatory experimentation, co-creation, and reflexive learning. Each component (i.e. actors and agency, governance and policy structures, technological and social innovations, feedback loops, and institutional embedding) plays a critical role in facilitating sustainability transitions rooted in justice.

The framework also conceptualises the importance of feedback loops. These are iterative processes that ensure that stakeholder input continually informs experimental outcomes, as it promotes adaptability and inclusivity. Actors such as farmers, policymakers, consumers, and researchers are not passive participants but co-creators of solutions. Governance, as depicted in the model, refers to the institutional structures and decision-making practices that emerge from and support living lab activities. Together, these elements demonstrate how living labs function as mechanisms of ethical governance and sustainable innovation embedded in the ethical space.

Integrating Living Labs with Food Sovereignty and Social Justice

This section synthesises key theoretical threads, i.e. ethical spaces, living labs, experimentation, and food sovereignty, into a coherent pathway that illustrates how living labs function as governance mechanisms within ethical transitions toward sustainability and justice. While the preceding sections addressed each domain independently, here we propose a dynamic integration that explains how ethical spaces shape the legitimacy and structure of living labs, which in turn catalyse innovation and contribute to socially just food systems.

The integration of living labs with food sovereignty and social justice requires a transformative approach to reimagining food systems through participatory and community-driven experimentation. These collaborative spaces enable local actors to co-develop and co-create sustainable food and agricultural practices that align with their socio-cultural and environmental needs while challenging dominant corporate models of food production and distribution. Living labs offer the opportunity to foster democratic governance, inclusive innovation, and adaptive policy frameworks, while offering a means to enhance food sovereignty and social justice through ethical, decision-making processes that respect the needs of the local population.

In this context, the normative dimensions of communities of practice (CoPs) provide a useful example to deepen the conceptual understanding of how living labs generate socially embedded innovation. In CoPs, shared values and norms shape collective learning and guide practice development over time (Wenger, 1998). Likewise, living labs not only facilitate co-creation and participatory governance but also cultivate communal norms around sustainability, inclusion, and justice. These shared ethical commitments function as tacit governance structures that regulate expectations and foster mutual accountability among participants (Amin & Roberts, 2008). Particularly in food systems, where

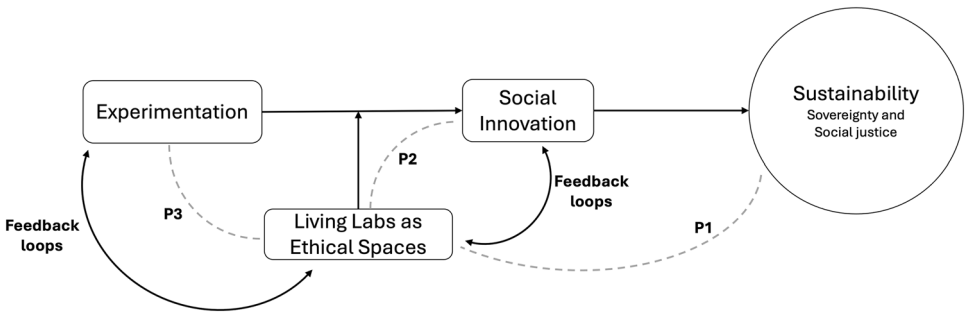

Fig. 1 Living Labs as Ethical Spaces and Moderators between Experimentation and Social Innovation. The testable propositions presented in this paper are represented in this figure with P1, P2, and P3 and their relationships with the constituting elements of the conceptual model are represented by a dashed line. Feedback loops are represented with bi-directional bent arrows

values around land, culture, and labour differ across contexts, the normative orientation of living labs can ensure that innovation remains grounded in local identity and purpose (Rantakokko et al., 2022). When they adapt the community-oriented features of CoPs, living labs become more than technical arenas for innovation, evolving into socially anchored, values-driven platforms capable of generating transformative change in line with food sovereignty goals and collective governance.

Living Labs as Ethical and Inclusive Governance Spaces

Ethical spaces, rooted in indigenous scholarship, create the moral and epistemic groundwork necessary for pluralistic engagement. In our model, ethical spaces are not only symbolic zones of dialogue. They also serve as normative infrastructures that legitimise diverse knowledge systems and establish conditions of mutual respect, inclusivity, and fairness. When applied to food systems, ethical spaces become mechanisms for challenging corporate dominance and fostering deliberative governance.

Living labs foster participatory decision-making, empowering local communities to engage in sustainable food production, transformation, and consumption. They promote knowledge co-creation, ensuring that sustainability practices align with local values and needs (Schäpke et al., 2018a, b). The collaboration among diverse stakeholders including farmers, researchers, policymakers, and consumers facilitates living labs in the creation of a structured space for iterative learning and innovation. Their focus on real-world experimentation enables more effective governance strategies that respond to the complexities of food systems while integrating ecological, economic, and social considerations (Puerari et al., 2018).

The democratisation of food innovation through living labs challenges dominant corporate food models and enhances local sovereignty (Barthel & Isendahl, 2013). The corporate control of food systems often marginalises smallholder farmers and limits access to alternative, locally driven solutions for food production and distribution (Clapp, 2016). Living labs can counter this by fostering grassroots experimentation, enabling local communities to test and refine innovative agricultural and distribution practices that align with their specific cultural and environmental contexts (Gugerell & Zuidema, 2017).

Furthermore, living labs in public administration research have shown potential in advancing collaborative innovation and co-creation in governance frameworks (Dekker et al., 2020). Living labs extend the moral logic of ethical spaces into practical governance through real-world experimentation. Their participatory design methods and emphasis on stakeholder co-creation translate normative values into governance processes. Thus, living labs are not just sites of innovation, they are ethical infrastructures that embed deliberative democracy within sustainability transitions. Unlike traditional ethical spaces, which prioritise intercultural dialogue, living labs facilitate iterative cycles of experimentation, reflection, and adjustment, giving institutional form to distributive and procedural justice.

The integration of living labs into food policy development facilitates cross-sectoral learning and enhance the responsiveness of public institutions to emerging food system challenges. This is particularly relevant in the context of climate change and global supply chain disruptions, where adaptive and participatory governance approaches can help build more resilient food networks (Voytenko Palgan et al., 2016).

Despite their potential, living labs face challenges related to power dynamics and inclusivity. Ensuring meaningful participation from historically marginalised groups, such as smallholder farmers and indigenous communities, requires careful design and governance of these experimental spaces. If not properly structured, living labs risk reinforcing existing power imbalances rather than fostering truly inclusive food system transformation (Smith et al., 2020). Yet, living labs represent a transformative approach to food system governance by bridging the gap between policy, practice, and community engagement, and their success depends on addressing governance challenges and ensuring that participation remains truly equitable and community-driven.

Furthermore, the implications for new product and service development within sustainable food systems are significant. Living labs can leverage regional agricultural, cultural, and food heritage, facilitating the creation of authentic, locally resonant innovations. New products and services not only contribute to sustainability but also strengthen local identities and community resilience, especially when recovering and promoting regional heritage. Such heritage-driven innovations align closely with principles of food sovereignty and social justice, providing opportunities for communities to revitalise traditional practices, diversify their economies, and gain greater control over their food futures.

Living Labs and the Democratisation of Food Innovation

Living labs promote the involvement of diverse stakeholders, including farmers, consumers, researchers, and policymakers, in co-developing food system innovations. These spaces enhance the democratic governance of food systems, empowering local actors to shape food policies and practices through multi-stakeholder engagement (Brons et al., 2022). Unlike traditional top-down policy approaches, living labs provide a participatory framework that encourages dialogue, knowledge-sharing, and grassroots experimentation,

allowing food innovation to emerge from the needs and aspirations of communities rather than corporate interests (Carayannis & Campbell, 2012).

The cumulative effect of ethical grounding and governance experimentation typical of living labs encourages the advancement of food sovereignty. Our framework suggests that food sovereignty is both an outcome of ethical governance and a guiding principle for structuring living labs. As local actors gain more control over food production, distribution, and policymaking through lab-mediated governance mechanisms, food sovereignty becomes institutionalised.

A key aspect of democratising food innovation is ensuring that the technological and governance advancements developed within living labs remain open, accessible, and community-driven. The corporate concentration of food research and innovation often results in exclusionary practices that marginalise smallholder farmers and local food producers (Clapp, 2016). By contrast, living labs offer a counternarrative, fostering an environment where local expertise is valued alongside scientific knowledge, leading to regionally tailored and socially responsible solutions (Puerari et al., 2018).

Also, the integration of digital tools and emerging technologies in food innovation labs has facilitated real-time data collection from citizen science initiatives and collaborative decision-making processes that enhance transparency and accountability in food system governance (Voytenko Palgan et al., 2016). These advancements enable consumers to actively participate in shaping sustainable food policies, reinforcing a food democracy where decision-making authority is distributed rather than centralised within agribusiness corporations (Smith et al., 2020).

Despite their transformative potential, potential challenges to democratising food innovation through living labs comprise issues such as unequal power dynamics, resource disparities, and institutional resistance, which can limit the extent to which marginalised voices are genuinely included in the innovation process (Bulkeley et al., 2016). To address these issues, project initiators should make deliberate efforts to design living lab initiatives that prioritise equity, inclusivity, and fair representation in food governance structures (Fitzgibbons & Mitchell, 2019). Ultimately, living labs represent a promising approach to democratising food innovation by embedding co-creation, inclusivity, and adaptive governance into food system transitions, and Table 2 shows the currently highest cited studies on this topic.

Ethical Tensions in Living Labs When Extending Experimentation Through Knowledge Exchange

Despite their potential, living labs are not free from ethical challenges. Power asymmetries can influence decision-making, and there is a risk of co-optation by powerful corporate actors (Bulkeley et al., 2016). Large-scale agribusinesses may attempt to dominate or steer the direction of experimentation, reducing opportunities for grassroots innovation and community-led approaches (Fougère & Solitander, 2020). Furthermore, the unequal distribution of resources between stakeholders can create imbalances in who benefits from living lab initiatives, potentially marginalising smaller producers and community-based organisations (Fitzgibbons & Mitchell, 2019).

Another major ethical concern in living labs is ensuring broad participation and equitable benefit distribution. Historically, marginalised communities, e.g. indigenous groups, smallholder farmers, and low-income urban dwellers, have been excluded from decision-making in food systems (Carolan, 2018). If living labs do not incorporate inclusive frameworks, they risk perpetuating these exclusions rather than addressing them. Ensuring participatory governance requires specific mechanisms to empower disadvantaged stakeholders, such as open-access platforms, transparent funding structures, and community-led decision-making (Schäpke et al., 2018a, b).

In support of this, Spagnuolo (2022) argues that ethical food systems cannot rely solely on consumer choices but require structural policy interventions to address systemic inequities. Ethical experimentation in food systems must integrate robust policy mechanisms to prevent market-driven distortions. Furthermore, emerging food technologies and alternative provisioning models highlight the need for a revised presumption paradigm (Toffler, 1980) that redefines value creation in food systems (Brons et al., 2022). Without proper safeguards, new technologies may exacerbate inequalities by favouring those with greater financial and technical resources while further marginalising vulnerable groups (Hess & Ostrom, 2007).

Furthermore, ethical tensions arise in the trade-offs between knowledge sharing and proprietary research interests. While open knowledge exchange fosters innovation and collective learning, corporate stakeholders may try to protect intellectual property rights, limiting the accessibility of new discoveries and solutions (Smith et al., 2020). Thus, it becomes important to develop ethical guidelines that balance openness with fair compensation for contributors so to ensure that experimentation remains a shared resource rather than a commodified asset (Puerari et al., 2018). Thus, the success of living labs in enhancing sustainability and food sovereignty depends not only on technological advancements but also on the ethical frameworks that shape their implementation and outcomes. Table 3 summarises the main concepts, the key challenge within the food system, and the key contributions to food systems' sustainability.

Table 2 Highly cited studies on Living Labs testing hypotheses related to (i) experimentation, (ii) food sovereignty, (iii) social justice, and (iv) sustainability

Authors	Hypothesis tested	Results	Dependent variable	Independent variables	Moderator	Context	Unit of analysis	Sample size
Geels (2002)	Multi-level perspective explains technological transitions	Historical case studies support multi-level analysis	Technological transition success	Policy support, market structures, technological innovation	Regulatory frameworks	Historical technological transitions	Technological sectors	Multiple historical case studies
Schot and Steinmueller (2018)	Three frames for innovation policy can shape sustainability transitions	Innovation policy strongly influences sustainability trajectories	Sustainability transition effectiveness	Policy framing, institutional capacity, societal engagement	Institutional structures	National innovation policies	National policy frameworks	Comparative policy analysis
Illich and Lang (1973)	Experimentation in governance enhances system resilience	Adaptive governance fosters resilient transitions	Governance adaptability	Experimentation scale, stakeholder diversity, feedback mechanisms	Stakeholder collaboration	Sustainability governance	Governance models	Theoretical discussion
Bergvall-Kareborn and Stahlbrost (2009)	Living labs facilitate collaborative innovation	Living labs improve urban sustainability practices	Innovation adoption in urban food networks	Stakeholder participation, knowledge co-creation, policy integration	Public–private partnerships	Urban food networks	Food innovation hubs	12 Urban living labs
Bulkeley et al. (2016)	Power asymmetries influence ethical outcomes in experimental governance	Power imbalances limit inclusivity in governance experiments	Ethical inclusivity in governance	Corporate influence, community involvement, decision-making processes	Social power dynamics	Governance experiments	Experimental governance models	15 Experimental food governance initiatives
Fitzgibbons and Mitchell (2019)	Marginalised communities face greater exclusion in system experimentation	Social justice requires structural policy interventions	Participation in justice movements	Institutional constraints, policy structures, socio-economic disparities	Legislative support	Marginalised communities	Community initiatives	100 Cities justice programmes
Brons et al. (2022)	Emerging technologies redefine prosumption in food systems	Prosumption shifts market-driven food governance	Market-driven food governance	Technology integration, consumer agency, policy intervention	Market dynamics	Emerging food technologies	Technology-driven food enterprises	Market analysis across five regions

Table 3 Main concept definitions, key challenges associated with the food system, and their contribution to equitable food systems

Concept	Definition	Key challenges	Contribution to ethical food systems	Example of application
Food Sovereignty	The right of people to define their own food systems, prioritising local control, ecological sustainability, and fair distribution	• Corporate dominance	Empowers communities to shape their food futures and promotes agroecology	La Via Campesina movement advocating for farmers' rights globally
		• Lack of policy support		
		• Marginalisation of small-scale farmers		
Social Justice (Food Systems)	Ensuring fair access to nutritious food, equitable labour conditions, and democratic food governance	• Food deserts	Addresses systemic inequities and enhances access to healthy food	Food justice organisations promoting equitable access to food in urban areas
		• Labour exploitation		
		• Power imbalances in food decision-making		
Sustainability (Food Systems)	Balancing environmental protection, economic viability, and social well-being in food production and distribution	• Over-reliance on industrial agriculture	Encourages environmentally friendly practices and long-term resilience	Agroecological farming networks supporting regenerative agriculture
		• Climate change		
		• Biodiversity loss		
Experimentation in Food Governance	A process of testing and refining governance models, technological solutions, and policy interventions in real-world contexts	• Resistance to change	Supports adaptive policymaking and knowledge exchange	Pilot projects for sustainable urban food policies
		• Regulatory barriers		
		• Uneven stakeholder engagement		
Living Labs as Ethical Spaces	Participatory platforms fostering innovation, inclusivity, and co-creation in food system governance	• Scalability	Enhances inclusivity and innovation in sustainable food transitions	Multi-stakeholder collaborations in food innovation hubs
		• Institutional buy-in		
		• Potential corporate co-optation		

Living Labs and the Reconfiguration of Innovation and Marketing Logics

In traditional firm-centric models, innovation is often proprietary, market-led, and top-down, with branding and consumer trust managed as downstream marketing challenges. Living labs, by contrast, reconfigure innovation as an open-ended, participatory process rooted in context-specific ethics. This shift transforms marketing from a messaging function to a co-creative, governance-oriented practice. It repositions firms from originators of innovation to facilitators of ethical value creation. This decentralisation complicates established marketing strategies but offers potential for more socially embedded and resilient forms of consumer engagement.

Furthermore, consumer perceptions of authenticity are increasingly linked to the provenance of innovation (and often social innovation). When communities co-develop solutions that reflect local needs, values, and traditions, the resulting products or services often carry a higher perception of ethical legitimacy and cultural resonance. This has direct implications for branding strategies that seek to communicate transparency, justice, and community engagement as market assets. Thus, the ethical implications embedded in the food system configuration play a key role in granting market prosperity while supporting food systems' sustainability.

Ethical Implications of Living Labs in Food System Sustainability

Living labs demonstrated the potential to be transformative spaces where sustainability, food sovereignty, and social justice intersect. However, their ethical dimensions remain a subject of critical inquiry. While these experimental environments promote inclusivity and participatory governance, they also introduce challenges related to power dynamics, accessibility, and equitable benefit distribution. Transition theory emphasises the need for a multi-level perspective approach to understand the processes that generate change and ensuring that living labs contribute meaningfully to ethical food system transformations requires an in-depth examination of their impact at individual, organisational, and societal levels, as well as a reconsideration of the role of businesses and policymakers in fostering justice-oriented sustainability transitions.

Within an MLP framework, niche innovations typically exert pressure on the system through technological novelty or performance improvements. However, ethical governance reframes this influence as value-driven. Living labs, when structured as ethical spaces, operate as normative niches that not only experiment with artefacts but with justice-oriented governance forms. They embed alternative logics, such as equity, transparency, or reciprocity, into innovation design and stakeholder interaction. These normative logics can reshape the selection environment by making social acceptability and ethical alignment key criteria for regime evolution. Thus, ethical governance becomes a mechanism for reconfiguring transition pathways not only through scaling of solutions but also through diffusion of values across system levels.

The ethical values embedded within living labs extend beyond their experimental purpose. At the individual level, living labs can empower participants by fostering a sense of agency and ethical awareness, allowing small-scale farmers, consumers, and researchers to actively shape food innovation and sustainability (Schäpke et al., 2018a, b). They engage a diverse range of actors in their co-creative processes, and these spaces challenge hierarchical governance models, facilitating instead knowledge exchange that values experiential and traditional knowledge alongside scientific expertise (Pereira et al., 2015). Yet, participation alone does not guarantee equitable outcomes. If not carefully designed, living labs risk reinforcing existing inequalities by privileging actors with greater economic or institutional resources, rather than amplifying the voices of those most affected by food system injustices (Fitzgibbons & Mitchell, 2019).

At the organisational level, living labs present an opportunity for businesses and institutions to adopt more inclusive and transparent sustainability strategies. Experimentation allows companies to test alternative food production models, ethical sourcing practices, and regenerative agricultural techniques, for example, before they are implemented at scale (Bulkeley et al., 2016). However, corporate involvement in living labs raises questions about the extent to which businesses prioritise long-term sustainability over short-term profitability. When private sector actors dominate decision-making within these spaces, there is a risk that participatory governance becomes performative rather than substantive, limiting the ability of living labs to function as genuine vehicles for systemic transformation (Clapp & Scrinis, 2017).

At the societal level, living labs hold the potential to embed ethical considerations into innovation, governance, and policymaking. They challenge the dominant food governance structures that prioritise corporate profit over social and ecological well-being. They also create pathways for alternative systems based on collective decision-making and community ownership (Schot & Steinmueller, 2018). However, these alternative governance structures require institutional support to be effective and without regulatory frameworks that prioritise ethical experimentation (Brunori et al., 2013) and protect against corporate co-optation, living labs could fail to translate their findings into long-term policy change (Carolan, 2018). This would limit their transformative potential. Rethinking the role of businesses in

food system innovation is important to ensuring that living labs align with principles of social justice. Fair-trade practices, circular food economies, and regenerative agriculture models are examples of business strategies that align with justice-oriented sustainability transitions, provided they prioritise inclusivity and ethical supply chains (Clapp, 2016).

Policymakers play a crucial role in institutionalising ethical and justice-oriented living lab models. Regulatory frameworks should be developed to mandate inclusivity, transparency, and accountability in food system experimentation. Public–private partnerships can be leveraged to facilitate collaboration between governments, businesses, research institutions, and local communities, ensuring that sustainable food innovation is not driven solely by market forces (Carolan, 2018). Living labs offer a citizen-centric approach to innovation (Bergvall-Kareborn & Stahlbrost, 2009). Additionally, funding mechanisms should prioritise community-led initiatives, offering financial and institutional support to grassroots organisations that are best positioned to lead socially just sustainability transitions. Open-access knowledge-sharing policies should be implemented to prevent the monopolisation of experimental outcomes, ensuring that findings remain publicly accessible and benefit a diverse range of stakeholders (Brons et al., 2022).

Ethical considerations in food system experimentation are not merely theoretical but have profound implications for the future of sustainability. If governed responsibly, living labs can serve as vehicles for meaningful and just sustainability transitions. However, their effectiveness depends on the extent to which governance, business engagement, and policy frameworks align with principles of social justice and food sovereignty. Therefore, ethical implications emerge at multiple levels, individual, organisational, and societal, shaping how experimentation, policy, and business strategies evolve within sustainable food systems.

Living labs serve as ethical spaces that foster experimentation and innovation for the benefit of society. The integrate diverse stakeholders into participatory governance processes, so that these spaces can create opportunities for co-creation, knowledge exchange, and collaborative problem-solving (Voinea, 2018). They create pathways for grassroots knowledge to inform policy and industry practices, ensuring that experimental sustainability solutions are not only technically feasible but also socially just and culturally relevant.

Moreover, living labs contribute to social innovation by reconfiguring relationships between different actors in food systems. Rather than viewing consumers and producers as passive participants in food governance, they empower them as co-creators of knowledge and solutions. This participatory approach fosters ethical literacy among stakeholders, encouraging critical reflection on sustainability challenges and reinforcing ethical values such as justice, inclusivity, and ecological responsibility.

Implications for Policymakers, Food System Actors, and Supply Chains

Living labs present significant opportunities for reshaping food systems through social innovation and participatory experimentation. Their implications extend across multiple stakeholders, including policymakers, food system actors, supply chains, consumers, and producers. Living labs can function as catalysts for fairer business practices and a more sustainable future as they can embed ethical considerations and democratic decision-making into food system governance.

For policymakers, living labs offer a tangible framework for developing inclusive and adaptive food policies. Traditional top-down regulatory approaches often fail to accommodate the complexities of diverse food systems. By contrast, living labs facilitate iterative learning and real-world testing of sustainability policies making sure that governance structures are responsive to local needs. Policies that promote the integration of living labs into food innovation strategies can drive systemic change by institutionalising participatory governance models. This can take place through supporting community-led food initiatives and ensuring that ethical concerns are embedded in policy design.

Also food system actors, including businesses, cooperatives, and non-governmental organisations, can benefit from living labs by actively engaging in collaborative experimentation. Many businesses are under increasing pressure to align with sustainability goals while maintaining profitability. Living labs enable businesses to test innovative food production and distribution methods that balance ecological responsibility with economic viability. Companies that integrate collaborations with living labs into their sustainability strategies and can develop transparent supply chains, ethical sourcing practices, and contribute to regenerative agricultural models that enhance their social and environmental impact. In turn, this fosters consumer trust and strengthens corporate social responsibility efforts.

For supply chain actors, including farmers, distributors, and retailers, living labs provide opportunities to co-create sustainable products, processes, logistics and fair trade mechanisms. These spaces allow producers to experiment with new agricultural techniques that enhance food sovereignty while giving priority to local knowledge and participatory decision-making. Farmers, in particular, benefit from access to shared knowledge networks, technical support, as well as policy advocacy that arise from living lab collaborations. Distributors and retailers, in the meanwhile, can explore alternative market structures that reduce dependency

on industrial agribusiness while promoting decentralised and resilient food supply systems.

Since consumers and producers play a crucial role in shaping sustainable food systems, living labs can empower both groups to become active participants in innovation. Consumers increasingly demand healthier as well as ethical and environmentally friendly food choices, and living labs create mechanisms for integrating consumer feedback into food innovation processes. Producers, on the other hand, benefit from participatory experimentation that strengthens their autonomy and enables them to implement socially responsible farming and business practices. The co-creation of knowledge and direct engagement between consumers and producers within living labs fosters ethical food cultures, strengthening local food economies and reinforcing values of justice, sustainability, and resilience. Their success, however, depends on the willingness of policymakers, businesses, and communities to embrace participatory experimentation and long-term sustainability commitments.

Implications for Food Marketing, Branding in Sustainable Consumer Behaviour, and Product Development in Value Chains

The adoption of living labs in sustainable food systems has significant implications for food marketing practice, particularly in the areas of branding, product co-creation, and ethical consumer engagement. These labs offer not just participatory platforms but also rich consumer insights that can be embedded across food product lifecycles, from sourcing and packaging to storytelling and distribution.

Living labs involve consumers directly in the co-creation of food products, and this participatory engagement can be strategically leveraged to build food brands that emphasise transparency, traceability, and authenticity. Food marketing strategies can highlight this consumer involvement to communicate sustainability commitments more credibly, thereby fostering deeper trust and emotional resonance. For example, community-supported agriculture (CSA) initiatives in Southern Arizona have integrated consumer input to design organic vegetable baskets, resulting in locally branded food products that reflect shared values of ecological responsibility and heritage (Mars, 2015).

Brand identity in food marketing is increasingly shaped by the narratives and values emerging from these collaborative spaces and sustainability. Authentic storytelling, highlighting the recovery of regional culinary traditions, heirloom crops, or artisanal methods, provides a compelling differentiation strategy. Heirloom tomato varieties, for instance, revived by urban agriculture collectives, become powerful brand anchors that signal cultural authenticity, ecological stewardship, and grassroots engagement.

Marketers in the food sector have the opportunity to position such products as both ethical and locally meaningful. This dual appeal resonates especially with consumers who prioritise provenance, social justice, and sustainability in their purchasing decisions. Effective food marketing should therefore spotlight the participatory processes underpinning the product, the transparency of supply chains, and the local embeddedness of production. By aligning food brands with principles of food sovereignty and social equity, companies can cultivate consumer loyalty while reinforcing community ties.

In terms of food product co-creation, living labs enable producers to collaborate directly with end-users and stakeholders, including farmers, chefs, indigenous food practitioners, and consumers, to develop offerings tailored to local culinary cultures and sustainability needs. In Europe, food innovation labs have partnered with farmers, small-scale processors, food SMEs, breeders and other stakeholders in the regional context to co-create fermented agrobiodiversity use in food chains, blending traditional knowledge with modern ecological considerations (Massari et al., 2023). These co-developed products reflect regional identity and contribute to brand authenticity while addressing health, environmental, and ethical concerns.

The co-creation of food innovations within ethical living labs reshapes consumer perceptions of trust, authenticity, and legitimacy. These perceptions increasingly depend not only on product attributes but on the ethical character of the innovation process itself, e.g. how inclusive, transparent, and responsive it is to diverse stakeholder values. When deliberation, reciprocity, and social learning are embedded into innovation, living labs reposition branding as a co-creative practice rather than a top-down narrative strategy. This shift aligns with ethical marketing perspectives, where authenticity is produced relationally rather than engineered through messaging.

At the same time, living labs challenge traditional firm-centric models of innovation and marketing. Instead of acting as sole originators, firms become facilitators within decentralised innovation networks. This redistribution of control introduces new strategic dilemmas: corporate actors may face scepticism regarding their legitimacy, especially when power asymmetries are visible. The risk of co-optation is real—participatory spaces can be instrumentalised to serve reputational ends if not governed transparently. Thus, ethical living labs require safeguards that preserve community leadership and ensure that justice-oriented goals are not subordinated to market imperatives. For firms, this demands a commitment not only to social outcomes, but to process integrity and shared accountability.

Finally, living labs support the development of differentiated food products that are grounded in local knowledge and ethical production practices. Companies can meet consumer

expectations for sustainability and social impact by integrating stakeholder feedback into each stage of product development. This approach expands upon the 'buy local' ethos, as seen in regional branding strategies for Scottish beef and other protected designations (Revoredo-Giha et al., 2011). Food brands that embed living lab processes into their innovation pipelines can position themselves not just as providers of goods, but as facilitators of community-driven food transitions, thus turning marketing into a collaborative, ethical space of value co-creation. Table 4 summarises the key takeaways from our study.

Conclusion

This paper has explored the role of living labs as ethical spaces that foster social innovation, participatory governance, and sustainability transitions in food systems. We adopted a Transition theory perspective and integrated insights from food sovereignty, social justice, and the experimentation literature, to highlight how living labs contribute to reshaping food governance, empowering diverse actors, and embedding ethical considerations into food system transformation. The discussion has shed light on the importance of experimentation in creating more just, inclusive, and environmentally responsible food networks.

The conceptual framework we proposed can guide future empirical work by informing the development of case-based research designs or comparative studies of living labs in diverse geographic and policy contexts. For instance, researchers could investigate how different governance structures influence the degree of stakeholder inclusion or measure the impact of iterative feedback loops on community uptake of food innovations. Mixed-methods approaches, which combine qualitative ethnography, participatory action research, and survey-based evaluation, are particularly suitable to explore how ethical principles are enacted within living lab settings. Furthermore, this framework can be used to generate testable propositions, e.g. whether Living labs with stronger stakeholder feedback mechanisms are more likely to produce socially inclusive innovation outcomes. Such propositions bridge conceptual clarity and empirical applicability and reinforce the framework's value for both scholarly and policy-oriented research.

Future research might focus on empirical evaluations of living labs in diverse contexts, examining their long-term impact on sustainability and equity. Comparative case studies across different regions could provide deeper insights into how living labs operate under varying socio-political conditions. Also, interdisciplinary research is needed to assess how policy interventions and private sector engagement influence the ethical dimensions of experimentation in food systems. Building on the conceptual framework,

Table 4 Summary of key takeaways from our study

Research question	Framework constructs	Key learning
What underlying mechanism enables living labs serving as ethical spaces for sustainability transitions in food?	Living labs as ethical spaces	Living labs can be embedded within ethical spaces to provide include and normatively grounded environments for experimentation
How do living labs contribute to food sovereignty and social justice?	Conceptualisation of living labs as ethical spaces	Living labs, through participatory and co-creative methods, foster social innovation that empowers local actors and promotes equitable food systems
How do living labs link experimentation and social innovation?	Normative elements of communities of practice embedded in living labs	Living labs moderate the experimentation-social innovation relationship by enabling real-world, participatory testing
What implications do living labs have for food sovereignty, social justice and marketing ethics?	Co-creation for sustainable consumption and normative power that defines the boundaries of what is culturally and ethically appropriate in the food system	Ethically embedded living labs support responsible food marketing practices, co-creation, and regional identity, strengthening consumer trust and brand authenticity aligned with local values

we propose three refined propositions that target specific mechanisms illustrated in Fig. 1. These propositions aim to guide future empirical testing of the ethical dimensions of living labs in food system transitions and allow future research to examine the causal mechanisms linking participatory infrastructure, ethical governance, and social innovation, extending our framework beyond food systems, across broader sustainability transitions.

Proposition 1 *Living labs embedded within ethical spaces will result in greater inclusivity in governance processes, evidenced by broader representation, more equitable decision-making, and stronger community voice, compared to labs without such normative grounding.*

Proposition 2 *Living labs with iterative feedback mechanisms that incorporate marginalised stakeholder input will produce more justice-oriented outcomes, such as equitable resource access and culturally appropriate innovations, than those with limited or one-time engagement structures.*

Proposition 3 *when stakeholder engagement within living labs is explicitly framed around ethical principles (e.g. transparency, reciprocity), the food innovations co-created through experimentation will be perceived by consumers as more trustworthy, authentic, and aligned with sustainable values.*

More broadly, this study raises important ethical questions about the use of experimentation as a driver for systemic change. While living labs offer an innovative model for participatory transformation, ensuring that they remain inclusive and resistant to corporate dominance is critical. If properly supported, living labs can serve as powerful instruments for transitioning toward sustainable food systems that prioritise social justice, business resilience, and ecological integrity. "Appendix" maps out the research propositions to the elements of the conceptual framework.

Appendix: Mapping of the Research Propositions to the Elements of the Conceptual Framework

Proposition	Framework components	Testable relationship	Expected outcomes
(1) Living labs embedded within ethical spaces will result in greater inclusivity in governance processes, evidenced by broader representation, more equitable decision-making, and stronger community voice, compared to labs without such normative grounding	Living labs as ethical spaces for participatory governance structures	Ethical normative framing leads to inclusive stakeholder engagement and governance	Broader stakeholder representation; greater deliberative input, and enhanced governance legitimacy
(2) Living labs with iterative feedback mechanisms that incorporate marginalised stakeholder input will produce more justice-oriented outcomes, such as equitable resource access and culturally appropriate innovations, than those with limited or one-time engagement structures	Feedback loops and actor interactions leading to justice-oriented design	Depth and structure of feedback lead to social justice outcomes in food systems	Equitable resource access; culturally tailored innovations; improved justice indicators

Proposition	Framework components	Testable relationship	Expected outcomes
(3) When stakeholder engagement within living labs is explicitly framed around ethical principles (e.g. transparency, reciprocity), the food innovations co-created through experimentation will be perceived by consumers as more trustworthy, authentic, and aligned with sustainable values	Stakeholder engagement and experimentation supporting ethical co-creation (as a form of social innovation)	Ethical framing of co-creation leads to enhanced consumer trust and perception of authenticity	Increased consumer trust; perceived authenticity and ethical brand positioning

Declarations

Conflict of interest The authors declare that they have no financial, personal, or other relationships that could have influenced the outcome of this research. The authors declare there is no known conflict of interest.

Ethical Approval Research involving human participants and/or animals: no procedures involving human participants were conducted.

Informed Consent Written informed consent was obtained from all individual participants included in this study, in accordance with the ethical standards and guidelines stipulated by the approving IRB.

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