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Review

Grassroots Initiatives as Sustainability Transition Pioneers: Implications and Lessons for Urban Food Systems

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Abstract: This review explores the current evidence on the role and success factors of grassroots initiatives in sustainability transitions, with special attention given to social innovations and the transformation of urban food systems, a field that is still rather scantly dealt with in literature compared to technological innovations in other sectors such as energy. In addition to their contributions to get the necessary transformation towards sustainable futures off the ground, the preconditions for grassroots initiatives to thrive are presented—as well as limitations regarding their possibilities and the challenges they face. Increasingly, the importance of civil society and social movements in facilitating societal transformation is recognized by both researchers and policy makers. Within their radical niches, grassroots initiatives do not have to adhere to the logics of the wider systems in which they are embedded. This allows them to experiment with diverse solutions to sustainability challenges such as local food security and sovereignty. By means of democratic, inclusive and participatory processes, they create new pathways and pilot a change of course. Nevertheless, upscaling often comes at the loss of the transformative potential of grassroots initiatives.

Keywords: grassroots initiatives; local food security; radical niches; sustainability transitions; transformative social innovations; urban food systems

1. Introduction

With industrialization, a new era has ascended, the so-called "Anthropocene." Human activities are now the main driver of global environmental change, likely causing the Earth system to lose its stability. Three out of nine interlinked planetary boundaries have already been crossed, namely climate change, the rate of biodiversity loss and the nitrogen cycle. The consequences of crossing bio-physical thresholds are expected to be devastating also for large parts of humanity [1,2].

Due to the entanglement of established technologies with business models, value chains, organizational, institutional and political structures and regulations, dominant regimes (cf. the Multi-Level Perspective, MLP) are reluctant to transform [3–15]. Yet, incremental modification will not suffice to cope with the prevailing sustainability challenges [2,4,6,7,9,16,17]. Crises in multiple areas, such as climate change, the economic and the ecological crisis as well as geo-political tensions, can be viewed as symptoms of underlying, persistent unsustainability. Responses that seek to re-stabilize regimes only strengthen the lock-in to unsustainable structural, institutional and practical trajectories and deepen systemic problems [17–22]. The strong path dependencies and lock-ins in the current system [2,4,9,13,17,20–25] thus confirm the need for sustainability transitions, that is "long-term, multi-dimensional and fundamental

transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption" [16] (p. 956).

Worldwide, more and more people are living in cities. Urban patterns of consumption and production, social interaction and cultural practice, in conjunction with agricultural policy and economy, drive global flows of people, materials and information and determine how food systems looks like [2,26–29]. However, motivating consumers to change their behaviour by transmitting knowledge or influencing personal values and attitudes often fails since everyday practices are largely made up of routines and thus difficult to change. An alternative, promising strategy for more sustainable systems of provision might consist in spotting where and how in society grassroots initiatives emerge and to learn from their transformative social innovations [21,29–38]. Accordingly, both innovation and transition literature emphasize the experimentation with new solutions [39,40]. The spatial, context-specific dimensions of transitions only recently found entrance into this literature (see Section 3.3.4). Likewise, policy interest in community-based initiatives such as local food projects is growing [33,41,42]. Bulkeley et al. [43] perceive a shift in the nature of urban governance towards experimenting.

Novelties are particularly often invented and tested in local communities, initiatives and experiments. This fundamental mechanism of societal development generates effects on the level of concrete practice [34,38,44,45]. With their diverse, innovative, hands-on approaches and tangible manifestations of novel discourses, grassroots initiatives are often "ahead of the game" [46] (p. 8). Local food security and sovereignty are closely related to their focus on enhancing the quality of life of the communities in which they are embedded [2,28,37,45,47–50]. Yet, despite tackling unaddressed societal problems in a self-help way and creating multiple values for both cities and citizens, the potential of addressing civil society itself as "third force" driving sustainability transitions thus far remains underdeveloped [38,45,51–53]. Therefore, this article is interested in the current evidence regarding the potentials of bottom-up grassroots initiatives committed to the principles of sustainable development. After defining grassroots initiatives and innovations, their actual and potential contributions to sustainability transitions will be depicted. The second part of this article deals with the preconditions and success factors for grassroots initiatives to arise, spread and take effect before the last section unveils the challenges encountered by grassroots initiatives, as well as their limitations when it comes to sustainability transitions.

2. Materials and Methods

In order to identify the contributions of grassroots initiatives to sustainability transitions and to map recurring characteristics of grassroots initiatives (i.e., success factors) as well as limitations regarding their possibilities, a qualitative literature review was conducted between September and November 2017. Boolean search terms were formulated to filter out relevant publications focusing on grassroots initiatives in the context of sustainability transitions, expressed through the explicit use of respective terminology. Accordingly, keywords were "(grassroots initiative OR grassroots innovation OR bottom-up initiative OR civil-society organization OR social movement OR social innovation) AND sustainab* AND (transition OR transform* OR system innovation OR radical innovation OR system shift OR system change) AND urban AND food." The combination of these five (clusters of) search terms ensured a focus on both grassroots initiatives and fundamental change towards sustainability (i.e., sustainability transitions). By including the last two terms, the field of interest was effectively distinguished from the abundant literature in the research areas of civil society, sustainability and systemic change in general. Using different synonymous during the search was deemed necessary to nevertheless be able to take into account variants in the terminology used by the respective authors.

The search was carried out on the following databases:

- DigiBib (online catalogue of FH Münster—University of Applied Sciences; 17,328 results since the year 2000; with Routledge, Springer, Wiley-Blackwell, Sage Publications and several university presses as the publishers producing most hits);

- Google Scholar (16,600 results; 16,500 since 2000);
- ScienceDirect (6978 results; 5861 since 2000).

Relevant findings were sorted by relevance and selected by reviewing the abstracts and conclusions of the search results on the first ten pages (i.e., the first 100 hits). Divergent understandings and conceptualizations not engaging with the search terms were excluded, as well as irrelevant findings. This also means that contributions with similar research interests, yet different terminology, may have been excluded. The authors took into account both English and German journal articles from 2013 to 2017, preferring the latest ones. Some key references, also of earlier calendar years, have been added based on the authors' own expertise, as well as from the reference lists and publications rubrics of the following websites: Transition Research Network (CiteULike, Group "Transition Town"; http://www.citeulike.org/group/15407); The Arts Project (http://acceleratingtransitions.eu/publications/); and "grassroots innovations—researching sustainability from the bottom up" (https://grassrootsinnovations.org/category/publications) [54]. Since no relevant works could be identified from before 2000, the scientific conjunction of grassroots initiatives and sustainability transitions appears to be a relatively recent phenomenon, presumably linked to the realization of structural unsustainability persisting and calling for different solutions. The scientific papers portraying grassroots initiatives as such an alternate approach, illustrating and critically investigating the dimensions in which the initiatives contribute to sustainability transitions, were thoroughly read and reviewed. In addition to online sources, several books were included that bring together topic-relevant information.

3. Results

3.1. Theoretical Framework

3.1.1. Grassroots Initiatives

Grassroots initiatives are groups of people trying to create solutions to challenges as they see them, adhering to criteria that diverge from mainstream institutions and practically expressing core social values [37,38,49,55,56]. Often, they challenge the status quo and promote new forms of organizing social and economic life as well as alternative systems of provision, such as local food systems [19,20,22,28,37,49,56]. Though not all grassroots initiatives self-identify as social movements, they involve collective action in civil society intended to transform a community to a sustainable state and may link to broader social movements [35,38,55]. Grabs et al. [57] define grassroots initiatives "as including any type of collaborative social undertaking that is organized at the local community level, has a high degree of participatory decision-making and flat hierarchies. In addition, initiatives generally engage the voluntary contribution of time and resources of the organizations' members to achieve a particular shared cause" (p. 100).

The grassroots groups can be motivated either by material and economic necessity or by social issues marginalized by the conventional state and market systems, promoting and coordinating activities attentive to these needs and issues [55,58]. Thereby, they are informed by ideas in community development, collective action, participatory design, action research, direct democracy and voluntary organization as much as by conventional innovation management [59]. According to Smith et al. [55], "[t]heir alternative approach is based on the premise that people at the grassroots level already have the ideas, knowledge, tools and capabilities required to create their own innovative solutions to climate change and sustainable development" (p. 1). All grassroots initiatives share the commitment to helping people to access the tools for building alternatives that improve the chances and quality of life of the local residents [55,60]. This also sets them apart from "mainstream business greening" [61] (p. 408). Contrary to the conventional, market-based innovations, "they are driven by ideological commitment rather than profit seeking; the protected space is created by values and culture as opposed to regulation or subsidies and they tend to involve communal ownership structures and to operate in the social economy,

often relying on voluntary labour, grants, or mutual exchange" [62] (p. 4). The development of new or alternative forms of material culture as principle means of change makes grassroots initiatives analytically distinct [55]. As radical niches of experimentation, they "can act as incubators of the social change that needs to respond to and minimize, future environmental change" [63] (pp. 3–4). A transition necessarily includes radical, socio-spatial innovations [64]. The important role of niches (i.e., protected spaces in which innovations with high potential to change the regime emerge) in system reconfiguration is widely acknowledged (see, for example, [9,15,34,41,42], as well as the depiction of the MLP, Section 3.3). The scale and ambition implied by current transition narratives means that civil society—and, hence, grassroots initiatives—needs to be involved [41,42,65]. Civil society can be defined as acting autonomous from the state, upon interests and motivations different from winning politicians or gaining economic benefit [66]. Conceivably, its most prominent role lies in altering values and beliefs towards more sustainable ones, contributing to socio-ecological and economic literacy—as well as "futures literacy"—and putting knowledge into action for sustainability [22,37,66]. Networks of neighbours, groups and activists generate novel bottom-up solutions for sustainable developments—the plural signalling the multidimensional, contested characteristics of purposeful social changes. Importantly, the community involved is in control of both the process and outcomes [22,37,38,50,55,59,67].

Thus, grassroots initiatives with potential to contribute to urban sustainability transitions may be defined as locally-based, radical niches that aim for transformative change of existing societal systems towards sustainability—in multiple dimensions and driven by multiple actors from civil society, situated in the city region.

3.1.2. Grassroots Innovations

Social innovations comprise a change of attitudes, behaviours and perceptions, as well as emergent forms of collaborative action [23,30,31,33,61]. Grassroots innovation as such an alternative, novel form of innovation seeks to integrate new or overlooked actors, issues, sites, networks, processes and purposes [32,33,46,56]. According to Smith et al. [55], "Throughout the history of social movements for both environmentalism and development, there has existed an associated undercurrent of practical grassroots innovation committed to values of social justice and environmentally sustainable developments" (p. 3). Food security and sovereignty, as well as justice and sustainability are all necessary, interlinked building blocks of urban food system transitions, yet also extremely complex social and political issues that depend upon underlying community values [49]. The cultivation of knowledge, skills, working practices and community development is both requirement for grassroots innovation and indicator of successful outcomes. Even if something does not work out, "the efforts nevertheless cultivate [. . .] capabilities and lessons [of] more enduring value" [55] (p. 193). However, distinctions can be difficult to pin down and grassroots innovations and conventional institutions increasingly intersect. For instance, grassroots initiatives can make use of technologies developed in industrial innovation systems and sold by global firms that, in turn, appropriate ideas and practices originally developed by grassroots innovators [55].

3.2. Contributions of Grassroots Initiatives to Sustainability Transitions

3.2.1. Grassroots Innovations for Sustainable Food Systems

Habits, feelings and thinking change through the practice itself [65]. Grassroots initiatives are spaces in which capabilities for citizenship and transferable know-how and practices are developed through the realities of creating an initiative [59]. Local transition initiatives, led by citizens, can provide empirical ground and proof of concept for new market forms and novel economic structures that react to a market need in a socially responsible, value-creating way. Connecting local actors and networks enhances the legitimacy of both process and outcome [22,36–38,51,66]. They build and promote novel forms of social organization and economy as well as alternative systems of provision, such as local food systems, to enable more sustainable forms of production and consumption. Thereby, grassroots initiatives challenge

the status quo [2,22,28,37,38,47–49,62,68,69]. Unimpeded by commercial and policy logics, disciplinary boundaries and other institutional pressures and restrictions, grassroots initiatives—in the global North and South alike, in both urban and rural settings and across all sectors—are free to innovate [20,59]. The interaction between producers and consumers as primary source of innovation can mobilize new resources to co-produce innovations for sustainability [25,48,51,69]. Accordingly, sustainability effects are attributed to the actions of individual agents and groups [70].

Smith et al. [55] point out that "among the openings that grassroots innovation movements help cultivate are plural ideas about what constitutes sustainable developments" (p. 4). These include the different forms of urban agriculture that increase the availability and accessibility of food in cities and strengthen local economies, e.g., organic food cooperatives, farmers' markets, community-supported agriculture (CSA), garden sharing, seed swapping, agroecology, cycle networks as well as countless other ideas and practices [2,28,34,45,59,60,71–73]. All these innovations emerged from grassroots settings and communities of users whose priorities, values and visions diverged from those of mainstream industries and innovators [37,59]. Their proximity to local contexts, as well as their elasticity and flexibility that is due to operating on the fringes of complex bureaucratic settings, enable grassroots initiatives to foster transformative innovations tailored to local contexts through actions and participation in social and policy processes. The local understanding and knowledge of civil society can synergize new ideas, system dynamics and sustainability [2,24,34,38,51,66,72].

When repeated many times over, even small initiatives can add up to significant environmental improvements [71]. The hybrid grassroots innovations are often "open source" and scalable, thus can be picked up by others. In some cases, they evolved into substantial commercial activity. Even if they fail, they generate competences and lessons to learn for future efforts [59,72]. They can alter lifestyles and social practices that may foster sustainability transitions either through niche growth or the uptake of new practices by the regime. By seeking to construct a more satisfying culture, they go beyond countering the current system [41,42]. It is "important to recall grassroots origins of many contemporary sustainability solutions and to take seriously initiatives in that tradition today" [55] (p. 6). This entails investigating whether the development path of the respective grassroots innovation activity in history is still able to contribute to sustainability, whether it is suitable for large-scale adoption or implementation and in which context [55,74].

3.2.2. From Individual Initiatives to Regime Reconfiguration

As a necessary precondition for sustainability transitions to occur, the regime that currently dominates the societal system must either be transformed or replaced by a new regime that takes sustainability into account [24,64,67]. Local food initiatives generate "multiple-bottom line" outcomes [49] (p. 321). Most grassroots initiatives do not only develop technological innovations but also social and organizational ones, tailored to local settings, e.g., new forms of coordination, land provision, procurement and knowledge transfer that coevolve over time, leading to the collective construction of a vision of the desired type of systems and the role of different actors therein [21,34,72,75]. Compared with market criteria dominating conventional regimes, innovations for sustainability often perform poorly [61]. Measures for success need to account for both the externalization of social, environmental and economic costs and the subsidization of mainstream economic activities [49].

Trusted by communities due to the use of locally legitimate communication mechanisms, grassroots initiatives can mediate between citizens and local and state institutions, advocate for more radical and progressive ideas and empower actors to facilitate new courses of action, while also serving as mediums for individual political activity [66]. With their innovative approaches, they question the established systems and power structures therein, amplify irritations and may ultimately delegitimize the status quo [21,22,38,39,61,68,76]. When their advocates present realistic solutions to the instabilities, conflicts and tensions in mainstream regimes, radical niches can inform institutional reforms [20,33,57,77]. By diffusing critical knowledge and reflection, they can shift the agendas and terms of debate that are shaping future development possibilities, as well as the criteria used to

assess the appropriateness of products, services and systems. In so doing, the grassroots initiatives reconnect lived experiences to social and conceptual critique, demasking the structures that govern an issue such as sustainability and suggesting actions to overcome the dominance and to mobilize more transformational policy [20–22,61]. In due course, grassroots initiatives, with a specific starting point that corresponds to a single component of the socio-technical system, affect various components and thus local governance [75]. Thus, it is through bidirectional interactions that the initiatives may contribute to the transition of urban systems of provision [35]. Both niche activities, and the enrolment of further actors lead to a gradual reconfiguration of the regime through constructing shared visions, such as sustainable development and embedding them in local policies and public action [61]. The true value of these real-world experiments can be seen in the revelation of transition properties invisible or ignored by other approaches, e.g., practical realities and emergent tensions [20,35,70]. Consequently, Smith et al. [61] define the spread of critical insight and transformative politics as success indicator. The multidimensional, diverse ways in which all grassroots innovation movements create new pathway possibilities represent vital resources for societies [36,55]. Their activity stretches beneath and beyond upscaling and insertion of specific artefacts into conventional innovation processes [55]. In this way, the experimentation with new relationships can both illustrate and foster transitions. In many initiatives, changing relations equals changing institutions [78,79].

The new modes of community found in some initiatives include attempts of post-modernism and post-individualization that integrate individual freedom, self-realization and responsibility, for instance changing the relationships between producers and consumers [25,78,80–82]. The example of garden sharing, as practiced in "Transition Towns," involves changing social relationships at the interpersonal level while, through providing an alternative food source, it also links to the wider webs of socio-ecological relations associated with the food sector [78]. Grassroots initiatives, often built upon the logic of the commons, share innovations through open networks, rejecting enclosure and exclusivity [32,33,50,55,72]. Their pragmatic approach, focused on skill sharing and communal activities, can facilitate the dissemination of sustainable behaviour. Their flat hierarchies, peer-to-peer network structures and small group size help to cultivate social learning (i.e., learning through interactions). Both experiential learning by doing and the observational imitation of the behaviour modelled by others place change within wider social units and communities of practice [57]. The diverse forms of learning expand individuals' competences and capabilities to solve problems and to implement new behaviours. Successful mastery experiences reinforce the feeling that change is possible, thereby augmenting self-efficacy. Through fundamentally altering societal rules, norms and power relations, social learning may itself transform social networks, as well as wider societal and institutional structures [10,22,35,37,38,57,79,80,83,84]. The "change of societal norms and worldviews can be seen as a result of grassroots action per se and in effect one of the most powerful results due to its multiplier effect that may lead to behaviour change on a societal level" [57] (p. 109).

3.2.3. Social Sustainability Dimensions: Democratization, Social Inclusion and Participation

Civil society forms an indispensable actor in sustainability transitions. Grassroots initiatives in particular can enhance the effectiveness and inclusivity of transition processes, while simultaneously safeguarding and strengthening democracy [2,28,66,72,85]. "Usually in diverse, emergent and unruly ways, grassroots innovation movements open up important spaces, demonstrations, prototypes, ideas and methods for exploring open-ended, contingent futures" [55] (p. 196). Searching for, and weighing options are central elements of democracy [65,85]. The assemblage of alternatives grassroots initiatives generate is made up of:

- Contextual and technological knowledge (created through grassroots innovations), e.g., about community aspirations and social needs;
- Development of novel artefacts (i.e., objects and services);
- Methodologies (i.e., procedures for involving people in knowledge production, design and development), e.g., agroecological techniques;

- Access to infrastructures such as tools and development spaces, e.g., workshops, training centres and skill-swapping events;
- New actors and alliances (and thus identities and social relations);
- Novel concepts and ideas (i.e., new ways of thinking and approaching innovation activities and their purposes, including socially useful and commons-based peer-production); and
- Development of skills, including organizational, material and social capabilities [59] (p. 18).

This diversity is an important quality of public engagement [45,59]. In trying to do something differently, in innovative, unusual ways, the exclusions—and thus politics—of incumbent systems become apparent. Grassroots initiatives create working innovations while developing critical knowledge about the injustices imposed by dominant regimes. Individuals can only rarely cultivate all these capabilities. Therefore, labour is divided in grassroots initiatives. People bring in different forms of expertise and experience—from negotiating skills to expert knowledge, e.g., of social dynamics in the neighbourhood—as well as resources, e.g., personal contacts [59,86]. Internally heterogeneous groups can draw on their collective wisdom to solve problems. Coalitions that cross boundaries may achieve significant political impact. While socio-demographic diversity presents a challenge for developing and maintaining collective identities and reaching shared understandings, it benefits those groups learning to coordinate the contributions of their different members. Grassroots organizations attentively build bridges, explicitly addressing diversity and emphasizing how different individual identities intersect with shared ones [58].

When social needs are neglected by the state or market, grassroots initiatives respond with self-organized alternatives. This self-help approach, grounded in the ideas of democracy and solidarity, contributes to a new social order of active citizens, counterbalancing dominant neoliberal policies. In less affluent neighbourhoods, the role of civil-society initiatives often lies in countering social and economic segregation [28,51,60,87,88]. Their social innovations are directed towards vulnerable societal groups [46]. By giving voice to those unheard and marginalized in a society, grassroots initiatives stimulate critical reflection on the current system [59]. They raise questions regarding distributive, procedural and cognitive justice [55].

In innovation politics, democracy signifies the "access by the least powerful people and communities to the capacities for challenging the directions of the innovations that affect them" [59] (p. 10). Grassroots initiatives can cultivate more democratic practices. Their innovations can empower citizens and support activities that might otherwise have been suppressed by dominant power distributions. Compared to conventional innovation management, grassroots initiatives are freer to explore broader sets of issues, groups, values, visions and criteria. These include neglected or marginalized concerns such as seeking more creative, meaningful work and environmentally sustainable practices like organic, more localized food production and consumption, all of them strengthening the solidarity with providers and communities [37,38,47,59,60,69,85]. By developing solutions collectively and fostering active community participation, grassroots initiatives counter the trend towards individualization and social isolation; building social capital and capacities to create inclusive societies instead. Increased participation, in turn, boosts efficiency, transparency, accountability and community ownership, among others [2,28,37,44,51,55,60,71,72,85,86,88,89]. Consequently, Smith & Stirling [59] view the persistent opening of innovation agendas, institutions and practices as the most powerful and important contribution of grassroots initiatives. In addition, grassroots innovation itself provides a forum for deliberating over ideas.

The various opportunities for expressing oneself provided by grassroots innovations can facilitate alternative forms of discussion and expression. Practical encounters give people who are less inclined to or capable of debate the chance to participate in "material deliberations" over the values and visions at stake, e.g., in the embodied, more accessible form of a local food initiative. This, in turn, helps to build greater familiarity and knowledge of the deeper, more abstract concepts and possibilities for local food sovereignty. Likewise, events that promote the everyday activity of seed swapping as part of conviviality and food culture became a form of resistance against European regulatory proposals, mobilizing local

citizens to protect the right to swap. Next to nurturing biodiversity in the garden and local food system, the different age groups and social classes participating in seed swaps are representatives of social diversity [28,47,49,50,59,60,72,90]. The open, at times uninvited nature of grassroots innovation, with people simply engaging directly and of their own will, significantly contrasts—and is complementary with—more formally structured forms of discursive public engagement. By involving more people in growing their own food, local food security is increased and the control over food production taken from agri-business into the hands of the people [59,86,91].

3.2.4. Strongly Sustainable Consumption

"Strong sustainability" indicates strategies fundamentally different from those prioritized by food industry, science and states (i.e., the regime) thus far, yet better satisfying people's needs. The sustainable products and services of grassroots initiatives often comply with these strategies that include sufficiency and "decommodification" [37,57,69]. According to Sarkar & Pansera [92], grassroots "ecopreneurs" are motivated by the local context with its problems, resource scarcity, embedded traditional values and knowledge. The environmental motivation of the innovators forms a central element of their value system—in the global North and South alike. Strong sustainable consumption encompasses both individual behaviour and collective practices and lifestyles. By redefining the purpose and underlying mechanisms of consumption, it contributes to fundamental changes in societal structures and drives sustainability transitions [22,57]. The synergy between personal and societal transformation, in turn, increases intrinsic motivation and empowers individuals to make a difference [37,64,88].

An important motivation for starting and joining an initiative is the wish to meaningfully connect to others [37,69,87]. Acknowledging social relations, responsibility for others—also non-human forms of life—and civic engagement as complementary sources of well-being may broaden the acceptance and realization of the concept of strong sustainability [39,68,69]. By going beyond "green" consumption choices within the conventional system to collectively creating new products and services and changing infrastructures, grassroots niches, such as CSA initiatives, can act as change agents. Next to building a self-governed sustainable supply structure, they provide social support for developing sustainable practices and lifestyles. Grassroots initiatives build capacity for the sustainable development of neighbourhoods and communities. At societal level, they experiment with social innovations and offer opportunities for the collective reframing of problems and solutions [20,30,31,33,39,57,60,69,85,93,94]. Furthermore, grassroots initiatives can foster and re-establish connections between people and nature and create ecological experiences and memories in urban citizens that are fundamental to the environmental dimension of sustainability [66,90]. Participation organically raises the awareness of sustainability issues and potential solutions—not only of the members but also of the wider community. This may result in behaviour change that possibly stretches beyond the original goals, generating trickle-down effects of innovative solutions at organizational level if other groups and institutions in the community adopt them [38,45,57,90,93].

All these processes form necessary preconditions for sustainability transitions. While taking various forms—from CSA to organic gardening cooperatives—all grassroots initiatives provide a collective social strategy for action and change. By equipping previously disempowered individuals with such a roadmap, they contribute to feelings of comprehensibility, meaningfulness and manageability and thus to a sense of coherence [37,57].

3.3. Preconditions for Grassroots Initiatives to Form and Spread

Understood in line with procedural sustainability, success equals the initiatives' ability to engage in processes beneficial to large-scale change, e.g., expressing learning and empowerment practices that contribute to sustainability transitions [20,57]. For opening up alternative pathways, the grassroots innovation activity needs to expand beyond the niche, influencing wider society [55]. According to Sarkar & Pansera [92], grassroots solutions often have the potential to be scaled up to the next

city, region or even country. Thereby, isolated grassroots initiatives transform into a movement for grassroots innovation [55].

The success factors for grassroots initiatives and their diffusion will be structured in line with the Multi-Level Perspective (MLP, see Figure 1) that differentiates between the micro-level of the grassroots initiative or group itself (cf. niche), the societal meso-level of the regime and the macro-level of the landscape [3–15]. Referring to Göpel [39], this analytical framework was extended to include a mini- or personal level of the individual, as well as a meta-level of narratives (see Figure 2).

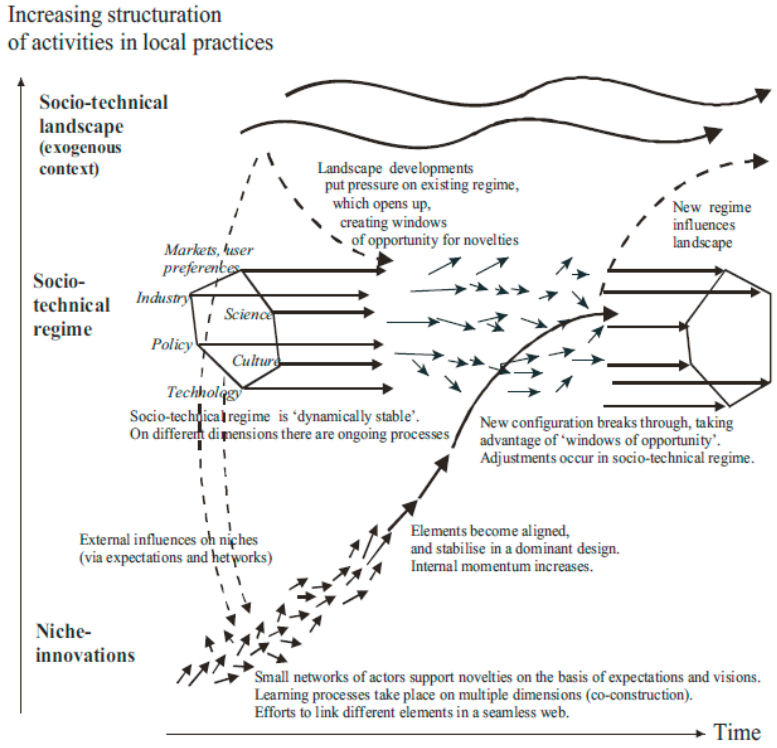

Figure 1. Multi-Level Perspective on transitions ([7] (28), adapted from [3] (1263)).

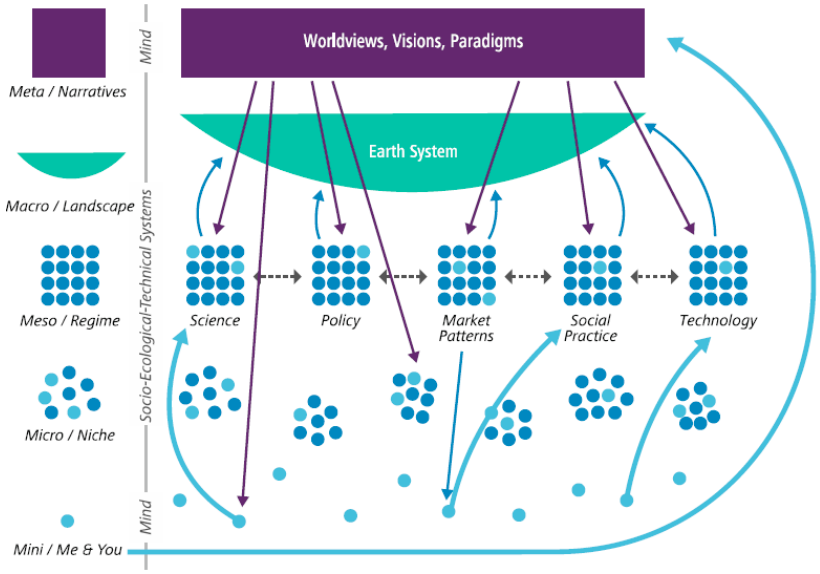

Figure 2. Mind-sets in the Multi-Level Perspective on transformations ([39] (47)) Sections 3.3.1–3.3.3.

3.3.1. Preconditions at Individual (Mini-)Level

For the most part, initiatives are initiated, and moved forward by individual change agents. The actors' understanding of the challenge at hand is integral for behaviour change. Awareness of, and knowledge about, environmental problems are cognitive requirements for the development of moral norms. Disseminating knowledge about deeper root causes and effective steps can incite social movements [57]. In this way, Foodsharing was created subsequent to the movie "Taste the Waste" that also stimulated a deeper societal discourse on preventing food waste on the meta-level. A key experience or narrative can induce a revaluation of the necessity of change—as may internal value systems or worldviews, particularly if they contradict with those prevailing in the individual's environment [37,53,57]. The prospect of a better life quality can serve as alternative motivation—as can feeling responsible for contemporary unsustainability and the need to change it, as well as empathy with those most vulnerable, e.g., people in developing countries and future generations. When individuals know how to act effectively, feelings of cognitive dissonance and a sense of urgency help to steer them towards collective action [37,57,95]. According to Haxeltine et al. [78], the initiatives become viable projects in terms of attracting and retaining participants when they can provide a context in which autonomous forms of motivation can be sustained over time. Besides the freedom to act—in line with personal values and identity—relatedness and competence, i.e., the perception of effectiveness in carrying out actions to achieve one's goals, should be fostered. Self-efficacy as a psychological resource and most important aspect of personal agency describes the trust in or belief of being able to control one's own functioning and environmental events and to pursue the intended change. By breaking down complex problems into small steps and everyday solutions, positive outcome expectations may be generated [37,57,84,85,93].

3.3.2. Preconditions at Initiative (Micro-)Level

On group level, the capacity for mobilizing resources largely determines success. The structure and legal status of the organization directly facilitates outreach in different networks and indirectly opens access to other resources. Strong organizational structures are particularly important if the initiative seeks to redesign ownership. Trust between the members initially can be reinforced through trust in the institutional design. Good relationships with the government, funders, media etc. are vital for small grassroots groups. Other essential resources include funding sources, infrastructures and the time of the volunteers and leaders. The group size, as well as the skills and educational level of its members, specifically the leadership capabilities of the founders and facilitators, are critical for the initiative's development, including positive internal relationships and effective processes [9,57,77,96]. A variety of resources is important since spaces must be actively opened and occupied through negotiation, persuasion and validation, for instance with means of prototyping, campaigns, research and documentation, community development and mobilization, education and awareness raising [55,77]. Mobilization gets easier the more members from different parts of society participate. A common goal that everyone identifies with creates a sense of community and social ties [57]. Generating feelings of belonging also empowers participants [63,66]. Because of the fluctuation of the members, leadership and group-level experiences, collective self-efficacy and expectation management must be balanced, and the membership values and movement goals iteratively aligned to maintain the core members' loyalty. The most successful groups purposefully remain flexible and engage in collective learning, regularly questioning the group's motives and strategies [37,57,96].

As a certain degree of formalization and conformity is needed for transformative impact, the initiatives become increasingly professional and external oriented over time. Still, it is important to hold up the internal functions, e.g., freedom to design and carry out projects, to experiment with and develop new abilities and to casually interact, discuss and share experiences. Alongside internal governance structures, active participation and collective decision-making, a flexible internal organization facilitates collective agency [20,78,79,97]. The development of grassroots initiatives likely follows a sequence of positive periods as well as more critical ones, success correlating with

learning cycles of coherence and fragmentation, depending on resource availability and membership activity. Diffusion, mirrored in initiative growth and development, is linked to joint local-global learning [20,63,77]. Networking, as opposed to fragmentation, occurs when actors and initiatives with disparate transformative ambitions or narratives of change arrive at complementary strategies and actions—or vice versa [9,66].

3.3.3. Preconditions at Societal (Meso- and Macro-)Level

Predominant directions deemed problematic can motivate alternative ones. Dynamic contextual conditions on the macro-level either provide windows of opportunity for the development of grassroots alternatives or constrain them. They arise when institutions become sensitive to an issue that mobilizes grassroots innovators or undergo reforms rooted in broader—national or international—processes such as democratization [12,14,15,33,55]. Through networking with the wider society or regime, information and reflection are spread, and niche building is significantly enhanced. Partnerships legitimize and institutionalize alternative processes and embed them in standardized ones [21,28,34,36,38,63,96,97]. Relations are key to obtain political support. With means of impression management and external communication, grassroots initiatives can even initiate change outside their traditional influence [33,57]. Similar to intermediaries sharing lessons, experiences and insights from different grassroots initiatives and facilitating the transfer of innovations into other settings, networks help to communicate and coordinate grassroots innovations [20,28,34,55,79,96]. Social media assist in spreading the ideas. Together with physical gatherings, effects can be far-reaching, connecting local, tacit knowledge with a scale of activity that questions industrial trends towards concentration, enclosure and exclusion [59,84]. Wider social movements provide solidarity, energy, people, skills, strategies, resources and facilities. Aware of local activities, they may, in turn, serve as bridges between initiatives in different places and across different times, drawing upon their knowledge and innovations to become drivers of sustainability transitions [55,66]. Together with social learning across multiple experiments, heterogeneous networking leads to growing momentum of the niches that, eventually, can compete with established regimes [16,19,20,38,77].

The Strategic Niche Management (SNM) approach identifies the conditions required for niches to successfully diffuse their ideas and practices into wider society [9,10,36,62,98,99]. Niches emerge from, are informed by and inform local projects and experiments. Their development is supported when strong, tangible, specific visions and expectations get widely shared. Niche growth depends on robust performance and compatibility with existing regimes. This again points to the importance of learning and experimentation [9,10,20,33,62,96]. Sustained over time, the resulting stable institutional field ("proto regime") may start to influence prevailing regimes or become a viable competing configuration [62]. Niche ideas diffuse through scaling (i.e., growth in size, activity or impact), replication of projects in new settings (growing number of participants and scale of innovative activity) and translation (embedding) of elements of the niche ideas into mainstream contexts in order to address regime crises [35,60,62]. Replication is the most common diffusion path whereas translation is the least common one. The rate of diffusion is highest in the case of all three paths being taken [62].

3.3.4. Role of Place

All grassroots initiatives ultimately need to be rooted locally. The activists operate in grassroots spaces such as villages, farms, neighbourhoods, street corners, community centres and social spaces, e.g., community relations, cultures and resources [36,55,93]. Places offer milieu (i.e., affective attachment) that enables responsibility, resilience and relatedness. Geographical settings and situated processes determine not only where the initiatives take root but also how successful they are [36,63,100]. Beyond the geographical or spatial context, the political, institutional, cultural and social contexts must be considered as well [67,93]. The context can be linked to the compulsion to act [55]. It is easier for local communities to share experiences since they are more likely to face similar problems. The location directly influences the degree to which a transition initiative represents the diversity in

its community. The weak local attachments and the low representation of diversity and inclusivity among urban initiatives contradict with the fact that cities are generally more socially diverse than rural areas [45,63]. According to Kny et al. [84], social transformation departs from cities, in particular from sustainability-oriented groups, and goes hand in hand with generation change. In urban areas, sustainable practices reach the mainstream more frequently and earlier—especially in "young, student" cities. However, the role of place attachment and embeddedness in the scaling and diffusion of initiatives so far remains vague [15,35,45,63,74,100]. What is more, Ehnert et al. [67] argue that the grassroots actors also actively reshape the structural contexts in which they are embedded, for instance engaging in political activism in order to challenge, redefine and reorganize governance settings.

3.4. Difficulties and Limitations of Grassroots Initiatives

3.4.1. Internal Challenges and Niche-Regime Interactions

Grassroots innovations encounter manifold dilemmas: They offer locally-specific, small-scale, project-based solutions. Yet, they seek structural change and therefore should be widely available and appropriate to—yet transforming—the mainstream [12,35,101]. As the members of grassroots initiatives come from within the regime, they are informed by the same paradigms, i.e., central reference frameworks that inform narratives of a social system's purpose [22,37,39]. Questions of in- and exclusion, conviviality and (in)justice are pertinent in grassroots initiatives [23,55,77]. As posed by Smith et al. [55], these questions "are just as pertinent in grassroots innovation spaces as they are in conventional innovation institutions. Grassroots spaces are also prone to exclusions arising through expertise, knowing how and knowing what, skills, tacit knowledge, practices and cultures that variously constrain and enable different social groups to become involved. Initiatives have to be designed and cultivated carefully, through ongoing community development processes that address structural inequalities and exclusions in terms of education, gender, class, ethnicity, age, disability and so forth" (p. 195).

Many critical turning points can be ascribed to the quest for a fitting "institutional home" that embeds the initiatives within their context and provides access to resources, legitimacy and a sense of belonging [11,36,78]. Social actors can stimulate, slow down or block a transition. This makes it important to map their action perspective [14,95,102]. According to Elzen et al. [11], hybrid actors as well as "hybrid forums," a specific type of innovation networks operating in this area, are critical for anchoring (i.e., linking niches to regimes) that starts in the overlapping area between niche and regime. The dispersed agency that characterizes the current social order and especially transformative social innovation phenomena, contradicts with the importance of embedded, networked agents in transition "journeys" [11,15,67,78]. Establishing strong links with the wider community—a central element of grassroots innovations—is difficult if the initiative does not mirror the community's diversity [63]. Both internal dynamics and the multifarious interactions with others will determine how a grassroots initiative positions itself between remaining an "outsider" and becoming a respected voice in policy debates by engaging with dominant institutions [15,66]. While the governance context can be constraining to local sustainability actions, Ehnert et al. [67] suggest conceptualizing the linkages between structural contexts and the grassroots agents as two-way relationships.

Trying to enact societal change by counteracting the mainstream is causing stress. For sustaining the members' intrinsic motivation, the effort of the initiatives has to be acknowledged [37,38,46,101]. While often driven by a long-term vision, the grassroots actors' rationality is bounded by their immediate environment and resource constraints [70,79]. Like other volunteer groups, grassroots initiatives often struggle with maintaining participation over time. The reliance on volunteers limits their ability to promote innovations in the local community [63]. Not all grassroots initiatives are relevant for enhancing sustainability or suited for spreading within society on a larger scale [44]. Many initiatives fail. The widespread risk aversion among policy-makers means that they are reluctant to support these ventures [71]. Likewise, the short-term, project-based funding constrains the grassroots

initiatives' efforts to promote sustainability [67]. The extent to which the contributions are taken up depends on the nature of the alliances [55]. Since grassroots initiatives often develop as "undercurrents" in society, they generally remain invisible to policymakers, business leaders and professional non-governmental organizations, their potential only just beginning to be recognized [34,55,63].

3.4.2. Scaling Grassroots Innovations

Diffusion patterns are complex, lie beyond the control of any single actor and, in response to in- and external conditions, can show peaks, troughs, recoveries, crashes and plateaus [62,76]. Grassroots innovators provide sustainable ideas, not blueprints. The local roots of grassroots initiatives can make scaling and diffusion difficult [71]. Successful replication of experiments and translation of innovative practices into policies and regulation or into new markets likely comes at the expense of control over the grassroots innovation [63,67,88]. Marketability risks losing deeper, more radical aspects of the innovations [88,101]. With it also comes the danger of rebound effects [84]. Likewise, isolation, bonding, enclosure and marketing of visible objects, products or prototypes may lose sight of the intangible, more complex values motivating small-scale effort such as local development [55]. When institutions engage with grassroots innovations, e.g., through introducing intellectual property, standardization for upscaling and commodification for attracting investment and marketing, they risk decontextualizing them. Institutionalized approaches from mainstream innovation management imply commercial innovations, identities and values [55]. Tensions occur when faced with the dilemma of either growing and adapting or safeguarding the separate space and challenging dominant institutions to transform. Dominant institutions' attempt of capture counteracts the contesting, innovative potential of civil-society initiatives that themselves may likely get transformed in the course of such interactions [66,86,103]. While important for scaling up their influence by making them accessible to wider populations, the adoption of grassroots innovations for market-based diffusion often reconfigures them. In this process, some of the original transformative values and visions get lost, as shows the example of the food industry that views organic produce as value proposition free from synthetic inputs. Yet, in the vision of the organic pioneers, the organic movement cultivated a different food system [59,84]. A recent study [80] comes to the conclusion that, in addition to tackling major environmental problems, a complete conversion to organic agriculture would guarantee the food supply even for a growing world population if less meat was consumed, less food wasted, and less food-competing concentrate fed in animal husbandry. Thus, the consumption side necessarily will have to be included in any transition to sustainable food systems [25,69,80,104,105].

A related risk lies in the co-option of grassroots initiatives by neoliberal agendas as "source" and "input" for otherwise unchanged innovation processes and development pathways to support neoliberal narratives about decentralization, serving as a tool to legitimize and excuse the retreat of the state. Relying on civil society for providing basic services risks deepening social inequalities within and between communities [22,66]. This makes it important to resist the contraction of framings that overlooks the social basis and relationships that originally cultivated the grassroots innovation [55].

3.4.3. Preconditions for Sustainability Transitions

Systemic change results from multi-level interactions between landscape, regimes and niches [5,15,46,103]. Grassroots initiatives are only one of many actors influencing societal sustainability awareness, visions and norms [14,35,37,40,45,57,76,82]. Even though they cannot drive sustainable development alone, grassroots innovators can provide diverse seeds for change when the conditions in the wider society and economy are right [71]. Particularly activist-led projects with looser central control and innovations with regime-crossing breadth, addressing society as a whole, can be translated into diverse contexts [62]. During any transfer of innovations to other contexts, the grassroots groups should be in control of the process that requires learning and adaption to local conditions [55,67]. For implementation in the mainstream, preconditions and processes like the success factors of grassroots initiatives delineated above need to be present in society more broadly. Successful transitions

encompass individual household decisions, for instance to buy from farmers' markets or to support local CSA and access to information and alternative product offers as much as transformative movements built upon the activities of collective change agents that redefine the consumption framework [22,34,37,45,57,69]. Bringing radical visions to life takes time and requires considerable irritation and a critical mass of alternatives building up tension and exerting pressure on the regime [39]. Support from and alignment with powerful social actors in politics, the state and society are needed to realize broader, structurally aware framing [28,33,34,38,55,60,69,86,91,95,103].

While niches play crucial role in developing and demonstrating alternatives, most of them—even if resisting to or challenging dominant regimes—so far have not significantly changed the system [34,106]. As they become relevant actors in transitions, the initiatives risk adopting the organizational forms and procedures from which they distanced themselves in the beginning [56]. The overall robustness of the alternative organizational form is vital when confronted with pressure to conform. It is grounded in social framings that motivate people and guide activity, in material and social spaces for experimentation, in strategies for occupying spaces and securing resources and in the ability to build momentum that can transform political and economic relations [55]. Transforming social, economic and political power, in turn, is essential for both sustainable development and democracy. The initiatives' true potential is realized through synthesizing sustainability and social economy approaches and objectives [38,49,68]. For influencing wider societal structures, they must transcend dominant pathways and build upon their movement qualities. It is by assigning significance to different agendas that social movements exert pressure to change institutions towards supporting transformational innovation in society [12,33,55,59,68].

4. Discussion

Sustainability challenges call for new, sustainable and context-specific solutions that require learning and experimentation of multiple stakeholders on suitable scales [2,24,28,37,40,43,44,107]. Transitions are embedded in broader institutional contexts, the environments that select, shape and guide development courses over time [12,34,35,53,55,67,84,86,103,108]. However, the spatiality of transitions and grassroots innovations to date has received little attention in literature [16,35,41,74,100]. Yet, an explicit geographical perspective is necessary to comprehend the possibilities and particularities of the contexts in which transition pathways enfold, allowing for a reflexive understanding of the conditions under which findings from one place may be transferred to another, as well as of the factors enabling or impeding these processes. This, in turn, would increase the practical relevance of transition research [41]. Wolfram [36] points out that cities are critical sites for grassroots niches to form. Grassroots initiatives constitute "peninsulas" rather than "islands" completely separated from the mainstream [82]. Yet, in view of the many challenges they face, they may be termed socio-spatial "heterotopias" [82,109]. At the same time, the initiatives constitute "geo-political terroirs of resistance" [82] (p. 112) in which global struggles are fought at micro-level. By explicitly engaging with both old, "lost" traditions and futuristic experiments, they moreover break with traditional time, thereby displaying temporal heterogeneity [2,82,109]. Their transformative potential depends on the local institutional cultures and practices as much as on trans-local relations [29,34,67]. A common obstacle grassroots initiatives encounter is the absence of resources such as financing, active members and time [39,57,64,70,77–79]. Barriers to change include lock-ins to unsustainable regulations, market conditions and behavioural motivations, both at regime and landscape level [2,17,53,83,84]. Understanding the motives and strategies of actors on the ground is critical for making transitions socially robust and sustainable [37,70,88]. Since the heart of an initiative is the community, building relationships, networks, capacity and social capital is essential for broadening the basis for sustainability transitions. They can equally be regarded as resources [2,34,44,60,79].

Grassroots initiatives are not just sites of social innovation that contribute to system change but "in situ, comprehensive transitions of the community itself that cut across multiple systems of provision" [35] (p. 23). Smith et al. [55] call for promoting and supporting grassroots initiatives because

of their openness to experimentation for social change, concluding that, while they may "not have the map for more sustainable futures, they are exploring critical points of departure" (p. 198). For the transitions themselves to be sustainable (that is, driven by intrinsic motivation), internal and external transition must go hand in hand (see, for example, [37,39,82]). An important contribution of grassroots initiatives therefore lies in the extension, enrichment and eventual transformation of personal reflection and public discourse.

Since the steering of innovations is inherently emergent, futures must be cultured collectively [21,59]. For building desirable, more sustainable forms of production and consumption, wider society should be engaged in discussing alternative futures and building consensus on preferred ones [2,49,110]. Grassroots initiatives act as vital local laboratories, piloting and demonstrating in real-world settings how citizens and communities can live more sustainably [38,107]. Whereas research, by pointing out the plurality of sustainable developments and creating spaces for the politics of alternatives, helps to understand how grassroots initiatives represent sources of reflexivity in society, it remains the task of policy to decide whose solutions are "best" for whom in which combination under given circumstances and to make the initiatives' experiences fertile for designing sustainability transitions [20,21,24,33,44,55,84,91]. Yet, policy advice must transform itself to accept a broader range of rationales for intervention [16,67,88].

Current understandings of and policies for innovation, developed in commercial market settings, may be inadequate for grassroots initiatives. Policy makers need to take risks—with effective mechanisms for learning in place [71]. Infrastructure must be made more available to grassroots groups and skills are required to articulate aspirations and needs, to facilitate community building, to manage conflicts and to enable the co-design of new kinds of infrastructure together with local citizens [2,28,50,59,90,108]. A signpost in this direction is the advent of "real-life laboratories" that provide spaces facilitating experimentation and learning based on participation and user involvement [107]. Urban living labs are supposed to function as creative arenas for real experiments for a bottom-up transition "by design" [94] (p. 133)—with grassroots initiatives generating and sharing inspiration, innovations and knowledge for the transformation [9,33,43,88,111].

Promoting sustainability transitions in city regions holds potential for strengthening the ties between the initiatives and building capacity for governing local sustainability [2,67]. In this context, Martellozzo et al. [73] call for discourses and policies also aimed at smaller urban areas that, for instance, may offer the physical space required for urban agriculture. To increase both the speed and likelihood of sustainability transitions, "glocal governance" [18] is needed alongside public debate and envisioning, i.e., conditions under which unsustainable regimes are discouraged, emerging sustainability transitions accelerated and alternatives that share core characteristics such as self-organizational structures while taking specific local forms scaled up in manifold contexts. Grassroots community action as informal way through which "glocal sustainability alternatives" emerge can be considered a critical building block of social resilience [2,18,33,108].

5. Conclusions

In this article, the potentials of grassroots initiatives for pioneering sustainability transitions were set out. Throughout the creation of diverse innovations for sustainable production and consumption systems that expand the options and scope for action, these small-structured communities of practice pay close attention to democratization, social inclusion and participation (i.e., social sustainability dimensions). By focusing on the root causes and system change instead of treating symptoms, raising awareness of the current unsustainability and developing and demonstrating viable alternatives, the bottom-up initiatives, originating in civil society, open up new pathways for both sustainable production and consumption. Their contribution especially lies in creating spaces where new skills and actionable knowledge are co-developed in and for the real world. In these niches, different values and forms of learning and living together that make strong sustainable futures imaginable and hence real alternatives, can be tested and lived. Getting active, in turn, can generate the positive experiences of self-efficacy and empowerment that are needed for both embarking on the transition

journey and maintaining the intrinsic motivation of the members, thus ensuring the initiatives' own success. Focusing on regional- (urban-)level transitions allows for studying processes of anchoring and linking through which niche actors interact with the regime and may initiate radical changes. By supporting and promoting grassroots initiatives as important (re)source of creativity and innovation and integral part of urban food system transformation to achieve urban food and nutrition security, a city as a whole can maximize its chances to pioneer the plural sustainability transitions.

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