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Author(s): Tribaldos, Theresa; Kortetmäki, Teea

Title: Just transition principles and criteria for food systems and beyond

Year: 2022

Version: Published version

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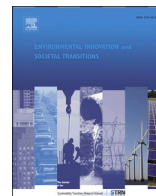
Please cite the original version:

Tribaldos, T., & Kortetmäki, T. (2022). Just transition principles and criteria for food systems and beyond. *Environmental Innovation and Societal Transitions*, 43, 244-256.

<https://doi.org/10.1016/j.eist.2022.04.005>

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Environmental Innovation and Societal Transitions

journal homepage: www.elsevier.com/locate/eist

Just transition principles and criteria for food systems and beyond

Theresa Tribaldos^{a,*}, Teea Kortetmäki^{b,c}^a Centre for Development and Environment, University of Bern, Mittelstrasse 43, 3012 Bern, Switzerland^b Department of Social Sciences and Philosophy, University of Jyväskylä, PO BOX 35, 40014 Jyväskylä, Finland^c School of Resource Wisdom, University of Jyväskylä, PO BOX 35, 40014 Jyväskylä, Finland

ARTICLE INFO

Keywords:

Low-carbon transitions
 Food systems
 Justice principles
 Just transition criteria
 Guiding decision-making and policy implementation

ABSTRACT

In this article, we propose a framework of principles and criteria for just transitions in food systems. Climate mitigation activities are urgently needed in food systems, but can have damaging social, environmental, economic, and health impacts. Consequently, food system transitions can cause significant side effects across and beyond food systems, aggravating existing inequalities and unsustainabilities, causing new ones, or hampering equal engagement in the transition itself. Thus, justice questions stand at the core of assessing decarbonization pathways and policies and must link to other sectors as well: Who bears the costs and who enjoys the benefits of the transitions? Can transitions be inclusive, leaving no one behind? We examine the establishment and purpose of general principles and food system-specific criteria for just transition, present the framework – standards for judging, evaluating, and deliberating justice in food system transitions – and reflect upon the uses of the framework and future developments.

1. Introduction

In the vast field of sustainability transition studies (Köhler et al., 2019), scholars have recently begun to focus on justice in transition processes (Jenkins et al., 2018; McCauley and Heffron, 2018; Morena et al., 2020; Newell and Mulvaney, 2013). While analyses have long focused on transition processes and characteristics (Köhler et al., 2019), less attention was paid to normatively evaluating the process of transition and to considering justice-related “side effects” of transitions. More recently, transition studies have begun to integrate insights from environmental justice approaches (e.g., Evans and Phelan, 2016; Newell and Mulvaney, 2013; Stevis and Felli, 2015). McCauley and Heffron (2018) emphasize the need to integrate energy, climate, and environmental justice considerations in just transitions to low-carbon societies and have called for defining sound justice principles as a guiding framework for just transition (ibid, p. 2). So far, such principles have been proposed by various organizations, but scientific perspectives on them remain scarce.

To date, the justice focus of sustainability transition studies has mainly been on energy transitions. While food system-wide transitions have recently gained increasing attention in sustainability transition studies (e.g., Clapp and Fuchs, 2009; Clapp et al., 2018; El Bilali, 2019; Hebinck et al., 2021a), justice-relevant considerations remain scarce (Kaljonen et al., 2021). This is evident, for example, in the marginal attention given to food security in sustainability transition studies (El Bilali, 2019). In this sense, Hebinck et al. (2021a) explicitly call for inclusion of food system justice and inequality considerations in transition studies, as well as relating food systems to other sectors. Previous research has also shown how case studies on alternative food networks and local initiatives can create understanding about justice issues in food system transitions, especially regarding power relations (Lamine et al., 2019).

* Corresponding author at: Mittelstrasse 43, 3012 Bern, Switzerland.

E-mail addresses: theresa.tribaldos@unibe.ch (T. Tribaldos), teea.kortetmaki@jyu.fi (T. Kortetmäki).

<https://doi.org/10.1016/j.eist.2022.04.005>

Received 1 November 2021; Received in revised form 31 March 2022; Accepted 5 April 2022

Available online 20 April 2022

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However, tackling climate change as a food system-wide challenge is still underdeveloped in this regard.

Food systems are among the biggest emitters of greenhouse gases – accounting for 21–37% of total greenhouse gas emissions – while simultaneously being harmed by climate change itself (Mbow et al., 2019). Food systems must therefore play a substantial role in mitigating and adapting to climate change, in addition to their importance in achieving other sustainability goals, such as biodiversity and ecosystem conservation and restoration. In this way, leading scientific bodies see food systems not only as sources of harm, but also as key entry points for implementing the Agenda 2030 and other transformative actions (GSDR, 2019, XXV; IPBES, 2019; Mbow et al., 2019). The direct and indirect links of food systems to all Sustainable Development Goals (SDGs) explicitly demand addressing equality and other social aspects in transitions (UNFCCC, 2020). This means that for just decarbonization transitions, careful attention must be paid to the dominant food systems, their characteristics, and their well-documented harms (Tribaldos and Rist, 2022; Willett et al., 2019). These include environmental impacts on waterbodies, air, soil, biodiversity, and genetic resources; social and cultural impacts on local communities; economic impacts on and through value chains, trade, and financing; and serious health impacts including malnutrition with over- and undernourishment, non-communicable diseases, and mental health impairments. These impacts are also deeply interlinked with injustices on different spatial and temporal scales.

Indeed, the meaning of principles and criteria for just transitions remains an under-studied but important avenue for research, both generally and specific to food systems. While initial model-based attempts have been made to simulate justice impacts of different food-system transition policies (Aubert et al., 2021; Huan-Niemi et al., 2020), and research questions for just food-system transitions have been scoped (Kaljonen et al., 2021), many key questions remain: How can one tell if a particular mitigation process, pathway, or policy is just? Why is it just, and for whom? How can competing claims for justice be reconciled? These questions are crucial to prevent new injustices from arising or the intensification of existing inequalities on the way to sustainable, low-carbon food systems.

Two existing strands of food system research can contribute to improved understanding of just transitions in food systems. First, scholarship on the sustainability of food systems emphasizes the importance of changing unsustainable and unfair structures and outcomes of food systems (e.g. Duncan, 2021; Gliessman, 2016; Llanque et al., 2021; Marsden, 2014). Contributions coming from this direction have included sustainability assessment methodologies relying on indicators in different sustainability domains to guide change (Chaudhary et al., 2018; Hebinck et al., 2021b; Jacobi et al., 2020). Similarly, agroecology research has promoted trans-disciplinary engagement in related knowledge-production processes (Ernesto Méndez et al., 2013). Much of this literature explicitly addresses justice questions and emphasizes the need to overcome the deeply rooted injustices of food systems. At the same time, agroecology and food sovereignty are also social movements that demand more democratic decision-making and power redistribution in food systems and the right of peoples to determine their own food systems (Altieri and Toledo, 2011). Whitfield et al. (2021) have focused on assessing past injustices, present representation of actors, and future outcomes of these processes through a temporal justice lens.

The second strand of relevant contributions is food justice literature. It explicitly analyses inequality in access to fresh and healthy food, indecent working conditions, violations of workers' rights, and unequal opportunities to participate in food-related decision-making (e.g., Gottlieb and Joshi, 2010). Inequalities are often based on structural discrimination, where the affordability of food and income are only one side of the coin. Besides spatially distributed injustices, addressing questions of class, race, and gender is central to food justice literature (Glennie and Alkon, 2018).

Theoretically and conceptually oriented just transition research is generally characterized by two perspectives. The first is descriptive *conceptual mapping*, i.e. characterizing themes that are central to just transitions (Kaljonen et al., 2021; McCauley and Heffron, 2018; Williams and Doyon, 2019). The second is *methodological negativism* (Hull, 2015): a focus on the existing or potential injustices which need to be prevented, alleviated, or compensated to make the transition just (e.g., Evans and Phelan, 2016; Newell and Mulvaney, 2013; Sovacool et al., 2019). These perspectives are important but, in our view, should be expanded with approaches that provide positive guidelines and normative visions regarding desired directions of change, aiding clarification and discussion of what makes transitions just.

The development of principles and criteria for just transitions significantly advances such discussions and have been initiated by global organizations. The International Labour Organization's "Guidelines for a just transition towards environmentally sustainable economies and societies for all" (ILO, 2015) was the forerunner. The United Nations Framework Convention on Climate Change issued a technical paper on supporting the workforce and creating decent jobs through transitions (UNFCCC, 2020). A growing number of other non-governmental organizations and networks (e.g. Climate Justice Alliance, International Chamber of Commerce) have engaged with the topic and formulated their own just transition principles that differ in comprehensiveness, but minimally refer to the ILO's guidelines and the need to address existing inequalities.¹

While organizational approaches to just transition principles articulate the concerns of non-scientific communities, academic perspectives on the matter are needed to advance scientific discussions. As an exception, Atteridge and Strambo (2020) defined seven principles for just transitions towards low-carbon economies grounded in a literature review. They are: (1) actively encourage decarbonization; (2) avoid creation of carbon lock-in and more "losers" in these sectors; (3) support affected regions; (4) support workers, their families, and the wider community affected by closures or downscaling; (5) clean up environmental damage and ensure that related costs are not transferred from the private to the public sector; (6) address existing economic and social inequalities; (7)

¹ More comprehensive lists include topics such as self-determination, resource and power redistribution, regenerative economies, culture and tradition, and solidarity (for more information see the Climate Justice Alliance: <https://climatejusticealliance.org/just-transition/>). The UNFCCC paper also emphasizes the need to consider historical responsibilities for emission mitigation, to prevent discrimination, and to link just transition policies to social and economic development and the 2030 Agenda.

ensure an inclusive and transparent planning process. This contribution is welcome and appears useful especially for macroeconomic and employment-oriented transition planning. However, sector-specific transition challenges and policy evaluations would also require sector-specific criteria for promoting just transitions. In addition, [Atteridge and Strambo \(2020, p. 6\)](#) ground their principles in a literature review without philosophically scrutinizing the justifiability of different claims or explicitly considering what might be missing. For example, recognition-related justice as the right of people to participate in decision-making regardless of their social class, race, and gender, is only implicit in their list. Moreover, their framework is implementation-oriented: it lists activities that support just transitions, but it does not specify what makes a particular transition policy or pathway just or unjust. Nor does it address the question of normatively legitimate claims for justice, on the one hand, versus mere expressions of self-interest, on the other.

In this article, we address the following identified gaps: (1) the development of research-based just transition principles that clarify what makes a decarbonization transition just, and help to make sense of different competing claims for just transition; (2) criteria for just food-system transitions that are crucial for climate mitigation targets, yet underexamined in just transition studies; and (3) the demand for philosophical scrutiny of the justifiability of potential principles and criteria, and for research-based justice integration of commonly invisible concerns and vulnerabilities. We address these by constructing a framework of principles and criteria for just transition. Our resulting system-specific criteria address just food-system transitions, and our set of just transition principles is applicable to just transitions in various sectors and in cross-sectoral contexts. Because just transition specifically refers to justice in low-carbon transitions, both in academic and in public discussions, we adopt this framing in order to contribute to the existing research stream. Low-carbon transition is hence the contextualizing head of the framework, with various other sustainability issues taken into account. The next section explains our methodology. We then present the framework and discuss its application and further development.

2. Methodology

Our framework development combines a theory-guided approach, interdisciplinary iteration, and philosophical justification. We started by reviewing literature that addresses justice in and/or sustainability of food systems (comprising food justice, food sustainability, food sovereignty, agroecology, and food-system resilience literature), which we identified as relevant for either the transition process or goal of a sustainable, healthy, and low-carbon food system. The other part of our literature consultation comprised of reviewing keystone works that conceptualize established justice approaches ([Fraser, 2009](#); [Nussbaum, 2006](#); [Rawls, 1971](#)). Regarding justice issues, we started from the keystone publications in different research traditions and added new references until thematical saturation was achieved and new works did not raise new topics. This resulted in an unstructured list of 130 entries encompassing diverse topics of food justice and/or sustainability but very rarely including justice in transition processes, let alone low-carbon transitions specifically.

Next, we reorganized this list by grouping similar topics around key food-system dimensions: food chains, environment, economy and livelihoods, nutrition and health, knowledge and technology, governance, and sociocultural values. This helped to simplify the list by merging entries addressing similar issues. Next, we conducted interdisciplinary discussions. The set of collected topics was introduced to researchers participating in a large collaborative research project on low-carbon food system transitions and coming from different disciplinary backgrounds (economics, social and political sciences, nutrition, agricultural sciences and biology, geography, and law). In total, we conducted three shorter and more generic feedback sessions with the whole research team and four smaller, more concentrated and discipline-focused group discussions with the project work packages, which included 2–5 researchers each. Researchers were asked for feedback regarding (a) whether something important was missing from the list; (b) whether some topics in the list did not seem relevant for just transitions; and (c) which formulations required clarification from the viewpoint of their disciplinary understanding. We thus jointly verified the relevant topics, clarified explanations, and further merged topics by deleting issues that were covered by others (for example, food price issues being captured by food security) in these iteration rounds.

The revised list had various types of entries: some addressed justice generally, others referred to very activity-specific norms. Accordingly, we defined a structural hierarchy for topics at different levels: the general principles of justice, just transition-related principles of justice, and food system-specific criteria for just transition. Alongside this process, principles and criteria were also philosophically tested to justify the framework from the viewpoint of moral philosophical research, enabling assessment of what makes a particular transition (process, pathway, or policy) just and why.

The analysed literature comprised many justice claims that may not be philosophically justified or may not reflect the actual intentions of claim-makers.² In this way, an empirical set of justice claims may contain incoherent statements, statements with consequences the statement-maker would be unwilling to accept if considered carefully, or statements that simply defend the interests of some interest groups rather than articulate a valid justice perspective.

To test the normative justifiability of different statements, research in moral philosophy utilizes a variety of methods (e.g., [Powers, 2018](#)). Such methods can be applied to test normative claims that arise either in political and moral philosophy or in other contexts.³

² Claim-makers may actually mean something slightly different than what their words are taken to mean (or their meaning may be precise in a given context, but not outside of it); or they may have considered their claims in particular circumstances, without reflecting the consequences of those claims in other circumstances, or without reflecting on the claims in light of other ideas they hold important.

³ Providing some subjective justification for a claim does not necessarily justify it more objectively: subjective justifications may be invalid, inapplicable, or logically unsound. Based on critical evaluation, a claim or some of its justificatory grounds may be revised or rejected. See [Powers \(2018\)](#) for an example of the evaluation of justifications in a food system context (global markets and fairness).

Philosophical research has produced a rich variety of tests for justice-related principles and criteria for analysing different scenarios or events, concerning different potential recipients of justice (especially, for example, disadvantaged groups) and considered vis-a-vis competing justice approaches (e.g., Sen, 1980).

The philosophical justification for an empirically derived candidate principle or criterion can occur in three ways. First, findings originating from philosophical literature may be attributed justification directly if they were originally justified using a philosophical method. Second, findings from non-philosophical literature can be attributed justification on hierarchical grounds if they are directly linked to some higher level, established (and tested) principles of justice and can be derived from such principles. This is the case regarding, for example, demands to fulfill the right to food or food security claims that derive from the principle of the equal right to vital goods. Third, if there is no clear link between the candidate principle or criterion and another pre-existing higher-level principle, the candidate can be tested using philosophical methods of justification.⁴ Moreover, one further condition for our purposes is relevance to just transition-related concerns. In our case, this philosophical iteration round led to the exclusion, revision, and rewording of certain candidate criteria.

In the final step, we tested our criteria against the findings from two workshops with food system stakeholders discussing just transition policies. The main purpose of this testing was to see whether the workshop findings could be located in our framework, i.e. to test whether our framework was applicable to mapping specific just transition-related claims, positions, and emphases. This application also served as the final check for saturation. If stakeholders had raised justice issues that were missing from our framework, it would have indicated insufficient saturation of our original grounding literature (new issues were not raised, however). Here, it should be noted that our framework construction was theory-guided and literature-grounded to create a philosophically and theoretically valid framework, but it was not the outcome of a transdisciplinary process. Nevertheless, mapping the perceptions of workshop participants served as a valuable test of the structure and conceptual solutions used to construct our framework.

Overall, this process (Fig. 1) resulted in 12 principles of just transition and 27 criteria of just transition in food systems.

3. The framework of principles and criteria for just transition in food systems

What serves to make a low-carbon transition in industrial systems, and specifically in (industrial) food systems, just overall? Our framework answers this question. The structure of the resulting framework contains three levels. A-level principles are basic, fundamental rules of justice established in philosophy research, and ground the framework in established theories of social justice. B-level principles are more practical rules of justice serving as an analytical lens to just transition questions across systems, from energy to mobility transitions, and cross-sectoral approaches. These A- and B-level principles serve as a justificatory foundation for the criteria, which are derived from the principles. Criteria, the third level, are food system-specific standards according to which given states of affairs and actions can be judged as just or unjust in particular just transition contexts. The whole framework is shown in Table 1. How criteria will be implemented in various contexts depends on political decision-making processes and community-level values. The framework represents mid-level theorizing in ethics: its contents can be derived from various high-level theories.⁵ Consequently, the framework enables plural understandings of justice (for pluralism in environmental justice, see Schlosberg 2009, p. 165–185; details are beyond the scope of this article) yet balances them with justice as equity. While people hold diverse views on justice, conceptualizing justice in transitions as incorporating *any* claim made in the name of justice would dissolve its transformative power and make it merely a descriptive notion.

A-level principles in the framework partly overlap. This is because the framework takes two justice-related perspectives to just transition. The first perspective comprises content-focused analytical lenses, based on the three-dimensional conceptualization of environmental justice common in just transition theorizing: distributive, recognition, and procedural justice. In the particular context of transition processes that imply significant societal changes, it is important to pay attention to the adaptive capacities of people in making climate policies socially just (Kortetmäki and Järvelä, 2021). This viewpoint is grounded in the capabilities approach and highlights that justice should promote equal opportunities of people to choose and act in diverse ways (Nussbaum, 2011; Sen, 1980). Consequently, we added capacities as the fourth element. However, to ensure the inclusion of often neglected recipients of justice – beyond state-territorial borders (Fraser, 2009) and beyond humans – Schlosberg (2007) calls for making marginalized groups or entities explicitly visible in the framework. Consequently, the other perspective underlying our A-level principles incorporates the “justice to whom?” viewpoint alongside global, intergenerational, and non-human recipients of justice (e.g., for food systems Kaljonen et al., 2021; and Schlosberg, 2007). Together, these two perspectives, which are rooted in justice theorizing, comprise the overall set of A-level principles.

The following sections present our A- and B-level principles and criteria in detail (Table 1). Because of the different epistemological and interdisciplinary foundations underlying the criteria, we refrain from distinguishing the different theoretical and empirical underpinnings here. Our framework highlights justice aspects that are important in making *effective* decarbonization just; however, the

⁴ The conditions for justifiability as a claim of justice include: adherence to the idea of justice as fairness or equity; relatedness to some meaningful standard(s) of justice; and internal coherence (a claim of justice must not imply treating some groups unequally). The demand for equal treatment does not mean blindness to differences; individual variations and the context-specificity of entitlements, needs, and vulnerabilities are emphasized in feminist and environmental justice literature (e.g., Nussbaum 2006; Schlosberg 2007).

⁵ For mid-level theorizing, see principlism in bioethics (Beauchamp and Childress, 2019). We do not claim that all criteria could be derived from *any* theory of justice. For example, John Rawls’s theory of justice would not consider animal treatment as a question of *justice* but of general morality.

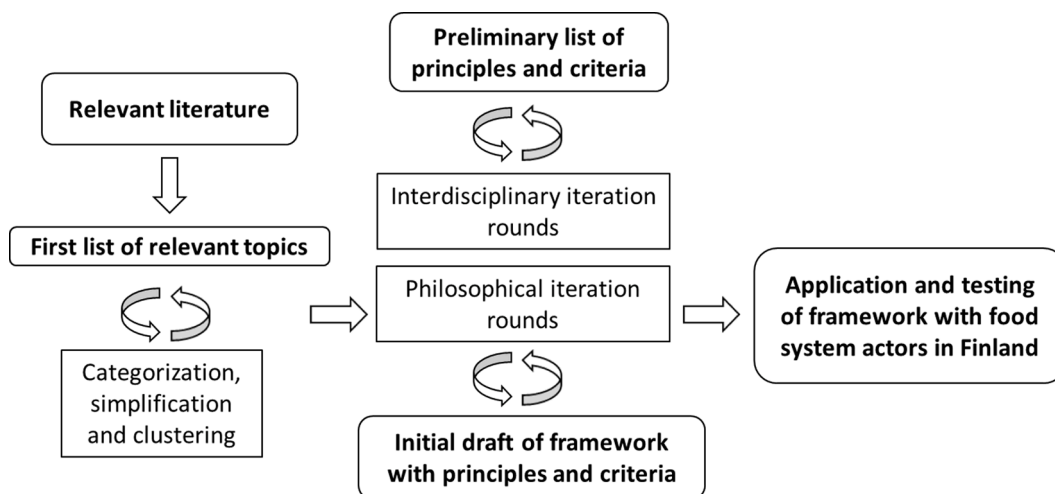


Fig. 1. Framework development process.

Table 1
Principles for just low-carbon transition and criteria for just transition in food systems.

Dimension of justice (A-level)	Principle (B-level)	Criterion for just transition: process- / policy-pathway evaluation level
Distributive justice	Right to vital goods (incl. right to food)	The access of the whole population to sufficient nutritious, adequate, and safe food at all times is protected.
	Labor justice (incl. farmers and fishers)	The resilience of food supply chains towards shocks is increased. The established or supported food jobs have fair payment and working conditions.
	Just food-chain structures	Farmer resilience towards shocks is retained or improved. Established food chain relations are reciprocally agreeable.
	Livelihood opportunities	The viability of farming is retained or improved. The access to suitable farmland is protected. Multiple opportunities for livelihoods in rural areas are retained or designing them is supported. Transition demands are designed in a way that different-sized food system actors are able to respond to them.
Cosmopolitan justice	Global fairness	Decarbonizing activities do not cause food insecurity elsewhere in the world. Decarbonizing activities respect the participatory control over and access to productive resources elsewhere in the world.
	Intergenerational justice	Decarbonizing activities do not undermine fair livelihood opportunities for distant actors. Transitions towards decarbonization do not undermine the opportunities of future generations to achieve well-being.
Ecology and non-human beings	Ecological integrity	Ecosystem health is improved. Biodiversity is protected or increased. Soil, water, and air health/quality is retained or improved. Natural (biotic and abiotic) resource use stays within planetary boundaries.
	Justice for animals	The inherent value of animals is respected, and they are treated respectfully.
Procedural justice	Just processes	Decision-making processes are sufficiently transparent, inclusive, and provide a fair opportunity for different voices to be heard. Decision-making does not create or intensify power disparities.
	Access to relevant information	Reliable information about the impacts of food systems and different diets on humans and nature is available to all in decision-making and climate action.
Recognition justice	Respectful pluralism and esteem recognition	Traditional, indigenous, and local knowledge is respected and given a voice. Diverse visions of producing, preparing, and eating food are respected. Climate actions in different food professions and by both genders are equally recognized and esteemed.
	Non-discrimination	People are not discriminated on ethnic-, gender-, age-related, or other grounds.
Capacities	Capacity building	Supported innovations are made available to interested actors, especially least-advantaged groups. Developing individuals' skills for transition activities is supported. Capacity building to engage people in collective action for transitions is supported.

importance of effective decarbonization for cosmopolitan, environmental, and climate justice means that the mitigation effectiveness of actions is not treated as merely one criterion among others in the framework; rather, it is treated as a vital precondition for using the framework for policy or transition pathway evaluation.

3.1. Distributive justice

The distribution of material and immaterial goods that every person wants or needs, regardless of her or his conception of a good life (Rawls, 1971, p. 62), constitutes a core building block of almost all perspectives on social justice. Thus, the distribution of benefits and burdens of transition impacts, including resources and risks, is among the core questions of any just transition (for food systems Kaljonen et al., 2021; and Williams and Doyon, 2019). Not all distributive inequalities imply injustice, however. Further distinction is thus needed to clarify which distributive impacts are matters of justice in transition contexts. This directs focus to the distributive impacts of the main food system outcomes: food and nutrition security, livelihoods, and the environment (dealt with in Section 3.3).

3.1.1. The Right to Food as a right to vital goods

The Right to Food is a fundamental human right. States are obliged “to respect, promote and protect and to take appropriate steps to achieve progressively the full realization of the right to adequate food” (FAO, 2004, p. 6 Art.17). A crucial component of realizing this right is food security. It “exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, stability of supply, access, and utilization.” (FAO, 2004, p. 5 Art. 15). Food security is included in the Right to Food as a technical component, describing the preconditions for the Right to Food, while the right itself is based on international human rights and addresses the obligations of states. Sustainability is a precondition of protecting and fulfilling the Right to Food and food security in the long term (De Schutter, 2014). It can only be guaranteed if the resources needed to produce, process, and distribute food are sustained. Many existing food systems perform poorly in fulfilling the Right to Food (e.g., Dieterle, 2015; FAO et al., 2020) although the question is a matter of fundamental entitlements in justice (Sen, 1988). While a low-carbon transition is vital to guarantee future food security (Mbow et al., 2019), corresponding climate policies could have impacts that violate food security (Kortetmäki, 2019) if not properly structured.

To assess the development towards the Right to Food in just transition, we included two criteria for this principle. The Right to Food is one of the central principles for food system transitions and especially crucial when considering the situation of vulnerable groups. Climate policies may hamper the food security of vulnerable groups and access to adequate food by, for example, influencing food prices (Gilson and Kenehan, 2019; Kaljonen et al., 2021). The Right to Food is therefore especially important for vulnerable groups.

To guarantee the Right to Food, it is crucial that food supply chains function better than at present and are less prone to interruption in times of crisis (Tendall et al., 2015). Current structures of many food supply chains especially impact the poor in times of disruptions, as they are less able to cope with price spikes. The two criteria are therefore:

- The access of the whole population to sufficient nutritious, adequate, and safe food at all times is protected.
- The resilience of food supply chains towards shocks is increased.

3.1.2. Labor justice (including farmers and fishers)

The principle of “labor justice” addresses the way in which employees are treated in food value chains and whether their working conditions can be considered decent. The working conditions of agricultural and food industry workers (often minorities, immigrants, or people of color) are frequently precarious and unjust (e.g. Gottlieb and Joshi, 2010). In some systems, conditions are highly gendered such that women are especially affected by unfair payment or working conditions (Allen and Sachs, 2012). High dependencies and consolidated power structures often accompany precarious working conditions, leaving little room for alternatives or increased bargaining power for those suffering from such conditions, which reinforces the call for food sovereignty (Patel, 2012). This is particularly relevant for farmers and also fishers in regions where fishing vitally contributes to local livelihoods and food security. This must be considered when designing new climate policies for low-carbon transitions. Low appreciation and payment for agricultural work and increasing price pressure on agricultural products affects rural livelihoods and makes farmers particularly vulnerable to climate and economic shocks. Accordingly, we defined the following criterion for this principle:

- The established or supported food jobs have fair payment and working conditions.

3.1.3. Just food chain structures

The principle of “just food chain structures” addresses the resilience of farmers (regarding agreeable work and business relations) and power asymmetries along food value chains. The principle of reciprocal agreeability of cooperation rules is established in canonical justice theorizing (e.g. Rawls and Kelly, 2001) and the reciprocal agreeability of agreements is central to fair exchange relations (Powers, 2018). The need for livelihood resilience at the farm level is important in just transitions to avoid additional injustices to those already negatively affected in current food systems (Ifejika Speranza et al., 2014; Jacobi et al., 2018). In this literature, resilience is defined as the ability to cope with shocks, learn from them, and recover through self-organization. Farmers must become more resilient to cope with just food system transitions and the relations within the food systems must be agreeable by all partners to introduce greater justice to highly dependent, often unfair relations. These considerations invoke two criteria under this principle:

- Farmer resilience towards shocks is retained or improved.
- Established food chain relations are reciprocally agreeable.

3.1.4. Livelihood opportunities

Livelihood opportunities in rural areas are crucial because they currently provide the basis for production of food in diverse agricultural systems. Further, rural livelihoods are important beyond their regions since they provide food for urban areas and are affected by urban food preferences (de Bruin et al., 2021). It is necessary to reduce poverty and inequality in rural areas to sustain and regenerate rural livelihoods (De Schutter, 2014), which makes the socioeconomic impacts of transitions on rural regions a central issue. Livelihood resilience is one key part of liveable rural livelihoods (Ifejika Speranza et al., 2014). Hence, farming needs to represent a viable opportunity for rural people, rural people need more options than only farming to become less agriculturally dependent, and actors in the food system need to have the capacities and knowledge to respond to transition demands. These capacities and knowledge should not depend on farm size, but rather should be open to any food system actor. This relates to diversity in livelihood opportunities, which also requires access to education and other basic services. The more employment opportunities people have from which to choose according to their skills, preferences, and social, political, or economic contexts, the more attractive they will find the places they live in (Scoones, 2009) and the less prone they will be to move due to employment impacts of climate policies. Regarding just food-system transitions, these observations yielded the definition of four criteria under livelihood opportunities:

- The viability of farming is retained or improved.
- The access to suitable farmland is protected.
- Multiple opportunities for livelihoods in rural areas are retained or designing them is supported.
- Transition demands are designed in a way that different-sized food system actors are able to respond to them.

3.2. Cosmopolitan justice

The principle of cosmopolitan justice is distinguished in our framework to make the transition impacts beyond the nation-state or federal borders explicitly visible. Justice considerations have generally begun to reach beyond their initially state-oriented framings (Fraser, 2009) and climate justice further highlights the importance of global considerations. Just-transition thinking initially focused on the impacts of environmental measures on local communities and workers therein (Morena et al., 2020), but the cosmopolitan viewpoint has been integrated as a result of the climate and environmental justice-based understanding of justice in transition processes (e.g., McCauley and Heffron, 2018). As the main tenet of cosmopolitanism is that all humans matter, we include both spatial and temporal expansion beyond nation-states under this principle. Cosmopolitan justice also calls for the consideration of the responsibilities of transnational corporations in the promotion of just transitions.

3.2.1. Global fairness

With intensifying globalization of food systems and agricultural value chains, it becomes increasingly difficult to trace the impacts of food production. This is particularly important in food-system transitions when a focus on people's own national borders is no longer sufficient. A growing body of literature looks into interactions of distant food systems and their impacts on local social-ecological systems. Sustainability, and especially justice, require addressing and correcting the negative impacts of such interactions. Tele-coupling research, for example, investigates the interconnection and impacts of food systems through trade, value chains, resource flows, and actor and power networks (Hull and Liu, 2018). Inequalities and injustices are at the core of such interactions, which demands analysing them with a cosmopolitan justice lens to detect and address distant injustice impacts through interactions (Boillat et al., 2020). Scholarship on sustainable trade engages with questions of justice and sustainability around trade agreements and regulations and whether or not these contribute to sustainable food system development (Bürgi Bonanomi, 2015). More recently, discussions about sustainable production processes of agricultural products entered into the debate on what is legal and possible in international trade (Bürgi Bonanomi and Tribaldos, 2020). To cover these issues, three criteria represent the global fairness principle:

- Decarbonizing activities do not cause food insecurity elsewhere in the world.
- Decarbonizing activities respect the participatory control over and access to productive resources elsewhere in the world.
- Decarbonizing activities do not undermine fair livelihood opportunities for spatially distant actors.

3.2.2. Intergenerational justice

The principle of intergenerational justice is at the core of the most commonly used definition of sustainable development namely, “[development that] meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987, article 27). Numerous studies have used this definition and discussed how it should be interpreted. As a core principle for just transitions, it is still a valid foundation relating current activities in food (and other) systems to future generations. The criterion for intergenerational justice in just food-system transition is thus:

- Transitions towards decarbonization do not undermine the opportunities of future generations to achieve well-being.

3.3. Ecology and non-human beings

Promoting low-carbon transitions in food systems is crucial for climate change mitigation but does not necessarily tackle other negative environmental impacts of production and consumption systems. This is, however, necessary to avoid undermining the environmental preconditions necessary for dignified human life (Schlosberg, 2007) now or in the future. Biodiversity loss and

ecosystem health degradation can, in turn, violate the opportunities of non-human flourishing and species existence. Thus, the rationale for addressing the non-climatic negative impacts of food systems alongside low-carbon transitions is twofold. The first part relates to environmental justice: nature's contributions to people, ecosystem services, and adequate environmental conditions must be conserved for current and future human well-being (IPBES, 2019). The second part is intrinsic and relates to ecological justice (justice to nature): namely, that nature has value and importance on its own, also beyond its utility in meeting human needs (Sagoff, 1992). Both perspectives base their assumptions on a holistic understanding of health that encompasses both human health and ecosystem health. This holistic understanding of health can build the basis for stable and sustainable process functioning. In the case of food systems, this means having all the necessary components to maintain food production now and in the future without undermining the prospects of non-humans to achieve well-being and health or integrity.

3.3.1. Ecological integrity

Environmental justice deals primarily with questions of who benefits from environmental goods and quality, and who has a say in related decision-making processes (Schlosberg, 2007). The emphasis of environmental justice is thus usually on justice for humans regarding environmental benefits/burdens, while ecological justice addresses justice for nature itself (Baxter, 2004). The conservation of nature's contributions to people and biodiversity for sustaining food production processes, and justice to nature are both justified claims. Further, they ultimately depend on the same outcome: sustained ecological integrity of the non-human world around us. Based on Parrish et al., (852) we define ecological integrity as “the ability of an ecological system to support and maintain ...species composition, diversity, and functional organization comparable to those of natural habitats within a region.” Due to its openness, ecological integrity calls for more specified contents at the criteria level. Ecosystem health and biodiversity are constitutive of ecological integrity. In addition, ecological integrity-related criteria must capture other key aspects that may be affected by transitions.⁶ We defined these such that they encompass the widely existing environmental issues in food systems: fish population collapses, soil degradation, nutrient flow disruptions, harmful chemicals (especially pesticides), and safe drinking water. Consequently, the four criteria for this principle read:

- Ecosystem health is improved.
- Biodiversity is protected or increased.
- Soil, water, and air health/quality is retained or improved.
- Natural (biotic and abiotic) resource use stays within the planetary boundaries.⁷

3.3.2. Justice for animals

While attention to non-human animals (hereafter animals) remains scarce in food justice literature (Glennie and Alkon, 2018), the rich animal justice literature has addressed the topic from a multitude of angles (e.g., Cochrane, 2018; Healey and Pepper, 2021). The absence of animals in food justice and just-transition literature risks that animals remain invisible or even become instrumentalised when attempting to increase resource efficiency or mitigate GHG emissions (Bos et al., 2018; Kaljonen et al., 2021). Animals may become depicted as a quantifiable mass and a source of emissions, rather than as living beings with agency, dignity, and species-specific needs.⁸ While calls for transition to more plant-based diets may reduce the consumption of animal-based foods, the number of animals raised for food might even be increased if only emissions are considered, for example when replacing beef with chicken. In food-system transitions, making animals explicitly visible is thus particularly important. The corresponding criterion for this principle is:

- The inherent value of animals is respected, and they are treated respectfully.

3.4. Procedural justice

Procedural justice – that is, equal opportunities of all people to participate in decision-making that may concern them – is another core building block of the seminal theories of justice (e.g. Fraser, 2009; Nussbaum, 2006, 2011; Rawls, 1971). In just transition and food justice literature, particular attention has been paid to obstacles to de facto participatory equality, which may differ from de jure participatory equality in decision-making. Power asymmetries, capacity disparities, and failed engagement processes must be

⁶ The coverage and formulation of the present criteria were reviewed in an extra interdisciplinary reflection session with environmental science researchers. Even these criteria need reflection about their operationalization: the ways in which changes and states of affairs are measured significantly influence what is made visible or left invisible in monitoring transitions (cf. Parrish et al. 2003 on biodiversity conservation and ecological integrity).

⁷ Planetary boundaries are criticized for the difficulty of application to different scales where single actions or sectors never cross the safe operating space (e.g. Häyhä, T. et al 2016). Normative research can, nevertheless, state the importance of not crossing these boundaries while it is the task of future (empirical and normative) research to define *where* the thresholds reside and especially determine how they should be applied on sub-system scales.

⁸ We acknowledge that there is an ongoing conceptual-philosophical discussion about the agency of animals; here, however, we follow the established stance within justice literature, grounded in the broader understanding of agency where agency does not require self-reflective intentionality (e.g. Nussbaum 2006, Ch. 6).

addressed (Williams and Doyon, 2019), and participants who (should) have a say must actually be listened to (Loo, 2019). Because informal procedural injustices are often linked to epistemic injustices (Dieleman, 2015), both aspects are incorporated under this general principle.

3.4.1. Just decision-making processes

Procedural justice as the right to participate in political and social decision-making processes is, together with distribution and recognition, a fundamental dimension of justice, and inevitably linked to distribution and recognition (Young, 1990). Fair participation in decision-making in food systems has come up in food justice literature (Glennie and Alkon, 2018) and food sovereignty literature. It concerns people's right to actively participate in determining their own food systems (Dieterle, 2015). This principle acquires special importance in light of the lack of transparency found in many agricultural commodity chains, hindering greater sustainability (Gardner et al., 2019), and increasing power imbalances in food systems (Clapp and Purugganan, 2020). Decision-making processes must be transparent, inclusive, and accommodate a wide range of voices and opinions. Procedural justice thus encompasses several aspects. Accordingly, we include two criteria in this principle:

- Decision-making processes are sufficiently transparent, inclusive, and provide a fair opportunity for different voices to be heard.
- Decision-making does not create or intensify power disparities.

3.4.2. Access to relevant information

In addition to a functioning process as such, knowledge and information are crucial components to effectively guarantee participation in decision-making processes, especially when food system actors are called upon to contribute to transformative activities (Pereira et al., 2020). People who want to actively participate in food system decision-making need to know what the details are, who is involved, what possible consequences the decisions involve, and so forth. Only when food system actors know these aspects can they make informed decisions. This knowledge must also include climate- and justice-relevant information. Criteria for procedural justice therefore include:

- Reliable information about the impacts of food systems and different diets on humans and nature is available to all in decision-making and climate action.

3.5. Recognition justice

Recognition was incorporated as the third element of justice by feminist theorizing that emphasized how institutional value hierarchies deprive people with certain (ethnic, racial, cultural, gender, etc.) features from the equal opportunity to participate in society as peers with others (Fraser, 2009). Recognition has become a key concern in environmental justice (e.g., Fraser, 2000; Schlosberg, 2007; Young, 1990). Sustainability transitions raise inevitable tensions between needs for environmental effectiveness and for recognition of plural values and rights (Ciplet and Harrison, 2019, p. 9–11). The recognition aspect is highlighted in food-system transitions because eating is also inherently sociocultural. Just transitions influence how and what humans eat and inevitably raise numerous related questions about values (Kaljonen et al., 2021) and “culturally appropriate” eating within food security.

3.5.1. Respectful pluralism and esteem recognition

Food production, preparation, and consumption practices carry numerous values and visions of eating well. Food injustices are misrecognitive when they create institutionalized systematic value hierarchies influencing people's status as members of society, or simply disregard the impact of food-system activities on certain food traditions (Gottlieb and Joshi, 2010; Mares and Peña, 2011; Whyte, 2015). Existing food injustices and their interconnectedness with procedural injustices (Loo, 2019) invoke a clear risk that low-carbonization processes are misrecognitive towards different food values and cultural traditions. Just transition requires that adequate regard be shown to different knowledges and visions of eating. We include three criteria under this principle:

- Traditional, indigenous, and local knowledge are respected and given a voice.
- Diverse visions of producing, preparing, and eating food are respected.
- Climate actions in different food professions and by both genders are equally recognized and esteemed.

3.5.2. Non-discrimination

Food justice discourse is strongly linked to issues of racial injustice, including insufficient salaries and poor working conditions, and neglect of food workers' rights – especially the rights of black and immigrant food workers (Alkon and Agyeman, 2011; Gottlieb and Joshi, 2010). By contrast, gender has received less attention (Glennie and Alkon, 2018; Sachs and Patel-Campillo, 2014). The differentiated impacts of climate policies are a key concern for racial and gender equality. This includes, among other things, policy impacts on access to food among different ethnic groups and impacts on gendered labor markets. Racial injustices related to unequal access to nutritious food (Alkon and Agyeman, 2011; Dieterle, 2015) may worsen with policies that influence food prices and food

availability. Food labor markets are often highly gendered: women enter the processing, serving, and catering occupations while farm management is dominated by men in industrial countries.⁹ Inequality also exists in care work, where food provision is primarily done by women (Sachs and Patel-Campillo, 2014). Making this work visible and recognizing its value for the society (esteem recognition) is important for justice since these professionals are now also demanded to promote low-carbon transitions in their work. The corresponding criterion related to discrimination is:

- People are not discriminated on ethnic-, gender-, age-related or other grounds.

3.6. Capacities

Justice theories usually consider capacities either as utilities falling under the distributive and procedural dimensions of justice, or as an alternative standard of justice known as the capabilities approach (e.g. Nussbaum, 2011; Sen, 1980). This approach focuses on people's capabilities in the sense of their actual opportunities to be and do different things needed to lead a dignified human life. In environmental justice, capabilities have also been suggested as the fourth component of multidimensional justice (Schlosberg, 2007). While other B-level principles of justice also refer to some capacity-like elements and entitlements,¹⁰ our framework iteration rounds provided insight into the importance of particular transition-related transformative capacities. They are not to be equated with the capabilities approach, but rather refer to adaptive capacities that are central to engaging in climate action. Their development is among the key ways to reduce social vulnerability to climate policy-related inequalities (Kortetmäki and Järvelä, 2021). It is important to consider these capacities separately: they are neither a matter of transition impacts nor of the fairness of decision-making processes, but rather determine how well different actors are equipped to respond to the demands inherent in transitions.

3.6.1. Capacity building

Just transitions in food systems require the development and nurturing of actors' adaptive capacities to respond to related demands in food production and consumption. Attention is needed to even out the capacity-related disparities of different social groups. This principle becomes particularly important in relation to under-resourced food system actors – often those already disadvantaged due to existing food injustices (e.g. Gottlieb and Joshi, 2010), such as small family farms suffering from low profitability and lacking political power and participatory resources (Wiggins et al., 2010). Capacity building is also particularly important in regions and communities where current opportunities for diverse livelihoods or education are limited, creating obstacles to engage in just transition. We include three criteria under this principle:

- Supported innovations are made available to interested actors, especially least-advantaged groups.
- Developing individuals' skills for transition activities is supported.
- Capacity building to engage people in collective action for transitions is supported.

4. Discussion

The framework presented in this article is applicable at multiple levels and at intersections with other transition sectors, responding to a need highlighted in previous work on future demands for transition research (Hebinck et al., 2021a). The principles can guide evaluating just transitions in any sector, from energy to mobility transitions. At the same time, specific criteria link the framework to food systems based on the overall question: How can we assess whether low-carbon transitions in food systems are just and why? This distinguishes the framework from earlier more generic and less system-attuned works (Atteridge and Strambo, 2020). Building our framework on theory-based dimensions of justice enabled inclusion of philosophical viewpoints while simultaneously reflecting empirical claims made by food system actors in various settings, helping to clarify them, and grounding their justification in philosophical reasoning. Particular emphasis was placed on integrating sustainability and transition literature under a common justice framework – a need which has been largely neglected in transition research to date and which provides important avenues for future research (Köhler et al., 2019). We tackled the challenge of bringing together diverse topics, from different levels and with different intentions, by ordering them hierarchically under general justice principles, just transition principles, and criteria for just transitions in food systems.

Besides the usefulness of the framework for transition studies, we foresee several other potential applications. First, the framework helps to organize discussions and make sense of different claims that arise in them. Opposing claims inevitably come up in the complex, conflict-laden processes of food system transitions, in which there is much to win and to lose for different actors in the system. In view of existing injustices in current food systems, considering justice aspects is a moral imperative. Our framework helps assess whether particular claims for justice are generally justifiable, or whether they instead imply creation of new injustices. The framework also helps to highlight trade-offs that arise based on different actors' claims. Second, the framework can guide decision-making and policy implementation by offering a comprehensive justice view on transitions in food systems. One threat to justice is the sectoral nature of public administration. This sectoral orientation gives rise to designing climate policies with harms that go unaddressed because they

⁹ https://ec.europa.eu/info/news/females-field-more-women-managing-farms-across-europe-2021-mar-08_en

¹⁰ Distributive justice is also about the distribution of certain opportunities; procedural justice requires equal participatory opportunities; and recognition relates to opportunities to enact various cultural and identity-related practices without fear of discrimination.

occur in other sectors. Our framework is designed to link food systems to other sectors and could, for example, provide the foundation for cross-sectoral co-production visioning and planning workshops. Third, the framework helps make visible the different aspects of food system transitions. This point is important for public decision-making, but also supports private and civil society actors who engage in transition processes.

The prospects of applying the framework in participatory transition planning (Schwarz et al., 2021) would be worth examining, in particular, as participatory climate and environmental governance has been highlighted as important for justice (Kaljonen et al., 2021; Schlosberg, 2007). At the same time, it could increase tensions and challenge the effectiveness of policy processes and resulting policies (e.g. Ciplet and Harrison, 2019; Newig and Fritsch, 2009). Use of participatory tools in deliberative workshops for climate governance can, at the very least, help link participants' claims to the conditions needed for social justice (Kortetmäki and Järvelä, 2021). Nevertheless, further experimentation and study are needed to understand how this could actually promote effective and just transition governance. Moreover, as the regulation of certain transition impacts is largely in the hands of the public sector due to its regulatory and redistributive powers, it would be worthwhile to create tailored versions of the framework for non-public actors as well.

One additional challenge, not explicitly integrated in our framework, concerns the minimum standards of justice against which to assess conflicting claims for justice and resolve trade-offs in policy planning and implementation. Our preliminary suggestion in this respect is that the precedence of certain vital conditions for dignified human existence must be acknowledged when assessing conflicting claims. Other aspects of justice are meaningless unless core conditions for the dignified existence of humans as biological creatures are safeguarded. "Right to vital goods" and "Ecological integrity" are those B-level principles that concern the ultimate material-ecological foundations of human and non-human existence. Violation of these principles in any situation of conflict resolution cannot be justified. Additional guidelines for resolving conflicts could be provided by incorporating the minimum standards for justice in the transitions context to answer what a just transition must fix, at minimum, to be deemed just. This is a topic for future research.

Using the framework as an evaluation tool for assessing ongoing transitions makes its operationalization crucial. The next step would be the development of indicators to operationalize the criteria for specific contexts. We explicitly refrained from defining indicators that would differ depending on context, availability of existing data, or resources and willingness to invest in new inquiries. One option for developing suitable, democratically legitimate indicators could be to facilitate transdisciplinary processes in which actors co-produce common understandings of feasible transition pathways and corresponding indicators for them.

5. Conclusion

Just low-carbon transitions require further conceptualization to understand what counts as just, or as enabling justice, in the course of corresponding change. In the present work, we established a framework of principles and criteria for assessing just transitions, in which corresponding criteria draw particular attention to just transitions in food systems, whereas corresponding principles may be applied to other transition sectors as well as to cross-sectoral transition assessments. We ground our framework in justice theory and food system and sustainability literature to ensure its policy relevance and value for analysis and assessment of different, often competing, claims for justice in low-carbon transitions. While the framework is suitable for application in many different contexts, more research is needed to identify a set of indicators appropriate for assessing progress in practice. Together, these would foster the implementation of the concept of just transitions in actual policymaking in both public and private sectors.

Funding

This work was supported by the Strategic Research Council of the Academy of Finland [funding decision 327371].

Declaration of Competing Interest

No conflicts of interest to disclose.

Acknowledgments

We thank two anonymous reviewers for their helpful comments that significantly supported us in improving our article. In addition, we would like to thank all our colleagues from the Just Food project for the inspiring discussions in consortium and other project meetings, which built the ground for our iteration rounds.

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