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Just Agri-Food Transitions: Assessing the Implications of Contrasting Decarbonisation Pathways for Small Businesses

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ABSTRACT

This article examines the position of small businesses within just transitions to net zero agri-food systems. Decarbonising global agri-food systems is fundamental to net zero goals. Decarbonisation processes have varying implications for different people and across different geographies, prompting concerns for equity and inclusion. In this context, there has been a growing concern for a 'just transition' to net zero. To date, small businesses have not been considered a concern for just transition, but examination of the agri-food system highlights their importance in achieving an inclusive and equitable transition. Drawing from a semi-systematic literature review, we provide a thematic analysis of agri-food transitions, synthesising a novel research agenda through combining agri-food just transition and small business decarbonisation scholarship. In our review, we (1) investigate existing understanding of the position of small businesses within agri-food transitions; (2) produce a framework to analyse implications for small firms under different transition pathways; and (3) outline the transition-induced justice considerations that arise. Highlighting key research gaps and moving beyond existing literature, we develop an archetypal transitions framework to conceptualise and better understand what a just transition for agri-food small businesses looks like in three different, but interrelated, pathways: (a) agri-food system localisation; (b) demand-led dietary transitions; and (c) intensive tech-led transitions. Analysing these pathways, we identify key points of opportunity and challenge for different types of business across the agri-food supply chain. Through case study examples, we uncover the interrelationships and trade-offs that net zero transitions create for small businesses. Providing broader implications for agri-food sustainability, our framework shapes future research avenues, allowing for rethinking of small business agri-food just transitions and reimagining more equitable agri-food systems, built upon solidarity.

1 | Introduction

This article examines the position of small businesses¹ in a just transition (JT) for agri-food decarbonisation. It asks: what are the justice implications for agri-food small businesses under different net zero transition pathways?

Decarbonising the global economy requires transformative change to industrial production (Upham et al. 2022) and energy

use (York and Bell 2019). These shifts are unevenly distributed, creating challenges or opportunities for different organisations, people and places (Agyeman et al. 2003; Banerjee and Schuitema 2022; Evans and Phelan 2016; Jenkins et al. 2018; Newell and Mulvaney 2013). For instance, fossil fuel-dependent communities often suffer economic losses and social marginalisation (Evans and Phelan 2016), whereas wealthier households and communities can capture benefits of investment in new energy technologies (While and Eadson 2019).

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The concept of JT has gained prominence in policy and research as a response to these inequities (Climate Justice Alliance 2019; Heffron 2021; Robins et al. 2019). JT is multidimensional, without a universal definition. The concept first appeared during the 1970s as a labour-oriented concept (Wang and Lo 2021) and has more recently been conceptualised through polyvalent justice frameworks (Eadson et al. 2025). These frameworks incorporate previous considerations for energy justice and environmental justice (McCauley and Heffron 2018). We adopt this framing in our own approach to JT. JT is considered in international policy, such as the Paris Agreement and the EU European Green Deal. The concept appeals to policymakers and activists, who see its potential to contribute to the promotion of inclusive and sustainable growth, responsible decarbonisation, equitable resilience and place-based development (Robins et al. 2019).

Small firms are vital for achieving net-zero futures. Taking the broader category of small and medium enterprise (SMEs)²—the standard statistical category used by governments and official statistics agencies—these firms account for around 300 million enterprises globally (Statista 2022). In the European Union, there are 25.8 million SMEs, accounting for approximately 63% of total company CO₂ emissions (European Commission 2024a, 2024b). However, small businesses are vulnerable to change, often ‘hard-to-reach’ and under-represented in policy (Hampton et al. 2023; Eadson et al. 2026). This is particularly relevant for agri-food businesses, which are key to decarbonisation but face unique challenges.

The agri-food sector is a major climate change contributor, responsible for one-third of global greenhouse gas (GHG) emissions (Crippa et al. 2021), with a growing environmental footprint (Lal 2021). Smallholder agriculture represents 80% of global agriculture (Khanal et al. 2021) and agri-food SMEs make up 99.4% of the EU agri-food ecosystem (European Commission 2022). Climate change also threatens agricultural performance (Malhi et al. 2021), necessitating potentially radical changes in agri-food supply chains (AFSCs) (Ward 2023). These transitions are likely to disproportionately impact small businesses. The sector already faces labour precarity and exploitation linked to race, class and migrant status (Coulson and Milbourne 2021; Gottlieb and Joshi 2010; Kaljonen et al. 2021). Small business owners themselves may experience precarity and exploitation based on the same divisions. Power imbalances between large and small actors in AFSCs further marginalise SMEs (Kaljonen et al. 2021; Kuhmonen and Siltaoja 2022; Rossi et al. 2019; Tschersich and Kok 2022), increasing their vulnerability (Bui et al. 2019; Gajdić et al. 2021; Manikas et al. 2019). SMEs often lack the capacity to transform, with barriers including limited access to finance, knowledge and networks (Kaljonen et al. 2021; Zambon et al. 2019). This risks marginalising agri-food SMEs in transition pathways. Yet, their position in JTs remains underexplored (Kuhmonen and Siltaoja 2022; Tribaldos and Kortetmäki 2022).

This article addresses the lack of attention to agri-food small businesses as a concern for JT, offering new insights into the challenges and possibilities of equitable and sustainable food futures. Using a semi-systematic review, we first synthesise existing knowledge on justice, SMEs and agri-food transitions. The review identifies gaps in the literature, including an overarching

framework for understanding SME JT across the AFSC and in different transition scenarios. We then propose our own framework to conceptualise agri-food small business JTs across different pathways. The core contributions of the paper are to (a) synthesise existing research through a JT framing, identify gaps in knowledge; and (b) develop our framework to scope out different potential challenges and opportunities for agri-food SME JT. The article highlights how different decarbonisation pathways produce distinctive JT challenges across supply chains and places.

The remainder of this article is structured as follows. First, we outline research design and methods (Section 2). Then we provide an analysis of the existing literature, developed from the themes identified in the articles selected for the review (Section 3). We take this review and the gaps identified to set out a framework for investigating the role of small businesses in agri-food JT (Section 4).

2 | Methodology

The aim of this study was to investigate the position of SMEs within a just agri-food transition. To do so, we began by reviewing the existing literature on SMEs and agri-food transitions, employing a semi-systematic (or integrative) literature review approach, which allows for in-depth qualitative exploration of interdisciplinary topics (Eadson et al. 2023). Semi-systematic reviews seek to produce qualitative narratives, with emphasis on critical review of the existing literature and conceptual synthesis, rather than producing quantitative results (Garvey et al. 2022). A semi-systematic review was identified as the most suitable approach, as the topic of this review is explorative and novel, concerned with qualitative understanding of thematic challenges within an area of study where directly corresponding evidence is diffused and limited.

The review aimed to identify literature at the confluence of three areas of interest: SME decarbonisation, sustainable agri-food systems and JT. A search strategy (Figure 1) was established, beginning with developing a set of key search terms, followed by an initial literature search on Scopus and Web of Science databases in June 2023. Our search criteria were strict, as we wanted to identify research articles explicitly focused on our topic. An example keyword search used during the initial research stage included the following: ‘Agri-food’ AND ‘SMEs’ AND ‘Just Transitions’. However, this initial search generated very few results: only seven articles, of which only two were deemed relevant. This confirmed a lack of existing research in this field.

To address this limited result, we broadened our keyword search strings, allowing a broader exploration of the JT topic, in the context of agriculture and food systems. In total, 26 different search strings were produced using alternative synonym terms, to generate a larger number of sources (e.g., ‘Agri-Food’ AND ‘Small Enterprises’ AND ‘Transitions’; ‘Small and Medium Enterprises’ AND ‘Agri-food’ AND ‘Justice’ OR ‘Inequalities’; ‘Agriculture’ AND ‘Just transition’ AND ‘Small business’; ‘Equitable Food’ AND ‘SME’ AND ‘Transition’) (see Appendix 1 for full set of key searches). A snowballing technique was also employed to identify further literature, through references used

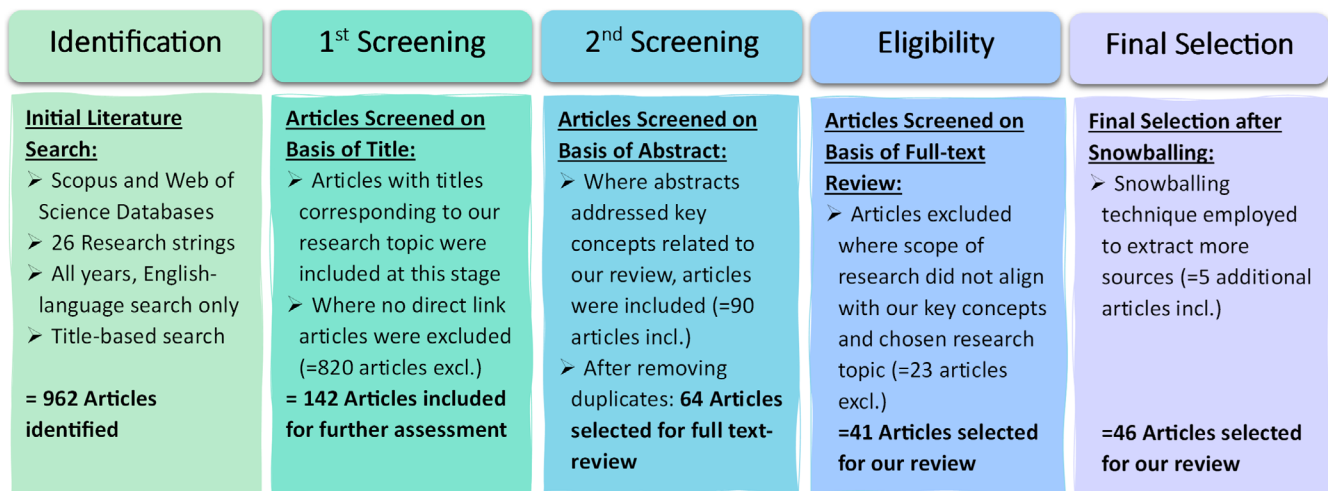


FIGURE 1 | Semi-systematic review search strategy.

TABLE 1 | Publications by year (2000–2023).

Publication year	Number of studies
2000–2018	5
2019	3
2020	5
2021	12
2022	11
2023	10
Total	46

in papers found from the searches. This allowed us to extract a greater variety of articles related to the research topic. Through these processes, we identified 46 journal articles for review (see Appendix 2). Figure 1 shows the research stages as well as the article screening and selection process.

An initial analysis of the chosen articles included the date of publication, geographic distribution and topic focus of studies. Search results show a growing body of literature on questions related to agri-food JT, especially since 2020 (Table 1).

Twenty-seven out of the 46 research articles had a geographic focus or used a case study approach. Most of these studies were focused on the Global North (17) and more specifically Europe (13). The rest of the case studies (10) were focused on the Global South, with five studies from Africa, four studies from Latin America and one study from Asia.

The overarching questions posed in the literature review were as follows: (1) ‘How is justice conceptualised in agri-food SME transitions?’; and (2) ‘What are the justice challenges for agri-food SME transitions?’. These questions guided the research process and aided in narrowing the search results. Key topic themes identified from our search included:

- Different framings of justice in agri-food transitions

- Existing injustices and transition challenges for SMEs in the agri-food sector
- Alternative initiatives aiming for agri-food SME JT

However, an overarching finding was that agri-food SME JT is not well covered in the existing literature. It is also worth noting that the term ‘SME’—widely used in policy, business and economics literature—is not widely adopted in the agri-food literature. Documents instead tend to refer to SMEs as small-holders, small producers/processors/retailers, small actors and small firms. In Section 3, we review the identified literature across these themes, organised in relation to our two research questions.

3 | Review Findings

3.1 | How Is Justice Conceptualised in SME Agri-Food Transitions?

There is no common definition of justice within the literature reviewed (de Boon et al. 2023; de Bruin et al. 2023). More commonly, rather than explicitly defining justice, broad terms such as fairness, equity/equitability and inclusion/inclusivity are used. Definitions of these terms also vary. Where agri-food transition studies do directly conceptualise justice, they most commonly use the ‘justice multiple’ (de Bruin et al. 2023), analysing different dimensions of justice. We use this framing to outline how different dimensions of justice are included within existing literature.

The *distribution* dimension of justice centres attention on who will benefit and who will suffer from proposed transitions (Whitfield et al. 2021). Accordingly, much of the literature seeks to assess whether the benefits and burdens are equitably distributed across actors involved (Huttunen et al. 2022; Puupponen et al. 2023). For Tschersich and Kok (2022), for example, distributive justice in agri-food transitions entails fair distribution of access to land, resources, income and ecosystem services, while ensuring the right-to-food for all.

Procedural justice involves the fair and equal participation of different stakeholders in decision-making (Kaljonen et al. 2021; Manikas et al. 2019). The literature on this theme centres on re-democratising decision-making processes (Maluf et al. 2022), empowering marginalised communities and ensuring the 'right of people to define their own agri-food systems' (Tschersich and Kok 2022, 360). For instance, the idea of food democracy (Jani et al. 2022) has been employed to call for re-democratising food systems (Tschersich and Kok 2022). Alternative Food Networks (AFNs) and Food Policy Councils are identified as examples of alternative spaces for just food transitions, potentially fostering active and equitable participation in just food governance (Gori and Castellini 2023; Huttunen et al. 2022; Tschersich et al. 2023). Huttunen et al. (2022) claim that these initiatives cultivate more socially and environmentally just and locally rooted food systems through equal participation.

The *recognition* dimension of justice aims for equal recognition and representation of all stakeholders. This includes recognising different groups of people, regardless of their social group, ethnicity, cultural and racial background, and gender, including the special recognition of Indigenous populations (Kaljonen et al. 2021; Maluf et al. 2022; Puupponen et al. 2023; Tribaldos and Kortetmäki 2022; Tschersich and Kok 2022; Valverde et al. 2022).

Some authors have also used additional dimensions of justice. Whitfield et al. (2021) introduce *historical* justice, aiming to explore how historical injustices are being reproduced within a transition framing. *Restorative* justice is also sometimes addressed, highlighting the need for fair compensation for communities that have suffered injustices (Kaljonen et al. 2021; Kuhmonen and Siltaoja 2022; Tschersich and Kok 2022). Kaljonen et al. (2021) contribute the idea of *contributive* justice. This dimension focuses on the need for equal opportunity and on the duty for fairer participation in labour and decision-making (Timmermann 2020). One dimension of justice not explicitly addressed in the literature reviewed is what McCauley et al. (2019) call *cosmopolitan* justice, which is interlinked with spatial scales and *spatial* justice, and entails elements of global fairness in conjunction with *intra- and inter-generational* justice. However, while not using the term, the literature does cover challenges such as protecting the right to food for distant communities and for future generations (Kaljonen et al. 2021; Tribaldos and Kortetmäki 2022).

Different meanings and dimensions of justice are applied to specific challenges. For instance, one notable theme within the literature was the idea of 'food justice'. Food justice emphasises the human right to access nutritious and healthy food and the right of people to define their own agri-food systems (Coulson and Milbourne 2021; Maluf et al. 2022), based on the understanding that food should be produced for people, not for markets and large corporations (Borsellino et al. 2020). Similarly, Kaljonen et al. (2021) approach JTs and the notion of justice through the lens of dietary transitions. Dietary transitions are perceived as an opportunity to bring agri-food systems back within planetary boundaries and to realise a more socially and environmentally just AFSC (see Section 4). Tribaldos and Kortetmäki (2022) propose a framework which takes into consideration a range of different potential sites of (in)justice, including labour justice, just

food-chain structures, livelihood opportunities, global fairness and intergenerational justice, ecological integrity and animal justice.

3.2 | How Are SMEs Considered Within Concern for Agri-Food JT?

Research on justice in agri-food SMEs has focused on (a) existing injustices in the agri-food sector; and (b) inequities arising from sustainability transitions. The predominant focus is on agricultural production, with less attention paid to SMEs operating in other parts of the agri-food system.

An underlying factor of injustice identified in the existing literature is the power asymmetry between large and small firms (Bui et al. 2019). Market-led economic development and the domination of AFSCs by large multinational corporations (Manikas et al. 2019), as well as a lack of trust and meaningful partnerships (Gaitán-Cremaschi et al. 2020; Härri et al. 2020; Tschersich and Kok 2022), hinder smallholders' access to markets, leading to unequal bargaining power (Manikas et al. 2019). For example, Beaton-Wells and Paul-Taylor (2017) explore power imbalances and unequal partnerships between large multinational supermarket chains and smaller suppliers in Australia. Likewise, Gajdić et al. (2021) shed light on power asymmetries between producers and retailers, finding unfair trading practices, unfair prices, lack of meaningful collaborations and increased costs.

Agri-food regulation and voluntary standards also create disproportionate challenges for smaller businesses. For instance, Coral and Mithöfer (2023) explore the challenges smallholders face in complying with increasingly stringent standards for sustainability in fair trade and organic production. Similarly, Martin et al. (2015) show how smallholders in the Malaysian palm oil industry are marginalised given that global sustainable palm oil standards, developed by large corporations and NGOs, are tailored to large-scale estates. Similar challenges also limit the capacity of small-scale producers to get perishable foods to retail outlets, due to the strict food safety/quality and price standards imposed (Fanzo and Miachon 2023). Such challenges will likely also apply for decarbonisation processes, as carbon reduction requirements and associated accounting/reporting become tighter.

Distributional justice is a prominent theme, highlighting asymmetries in global development (Borsellino et al. 2020), including uneven distribution of resources and land. Unequal distribution of land and unequal land rights affect the ability of smallholders and Indigenous populations to make decisions for their own agri-food systems and to take an active role in agri-food transformations (Larson et al. 2021; Maluf et al. 2022). A lack of resources and technical knowledge (Härri et al. 2020), information asymmetries (Manikas et al. 2019) and limited access to digital capital (Saruchera and Mpunzi 2023) are also highlighted as distributional challenges, in particular hindering the ability of small firms to take up innovation niches.

Procedural and recognition justice were also prominent in the literature and often intertwined. The exclusion of smallholders from decision-making processes, especially women and Indigenous

populations (Valverde et al. 2022), is shown to be a key source of injustice (Bui et al. 2019; Puupponen et al. 2023). Spatial inequities are also examined. Kuhmonen and Siltaoja (2022) provide insights into small-scale Finnish farmers' vulnerability and exclusion from sustainability transition pathways, due to limited production opportunities in peripheral areas, thus making it difficult to 'escape' from the existing food regime. Existing policies fail to address the different distributional, procedural and recognition challenges (Huttunen et al. 2022), which is in itself a form of procedural justice.

In parallel, labour injustice further aggravates small firms' marginalisation and exclusion from agri-food transitions. This takes the form of unfair/exploitative working conditions in conventional agri-food systems (Tribaldos and Kortetmäki 2022) and a lack of high-skilled labour availability (Gaitán-Cremaschi et al. 2020; Härri et al. 2020; Huttunen et al. 2022). At the same time, policy frameworks have failed to integrate the protection of labour rights of immigrant/foreign workers within transition agendas (Puupponen et al. 2023). This potentially makes smallholder producers—who often rely on immigrant labour—sites of injustice, while simultaneously being subjected to their own injustices.

In summary, the literature suggests that small-scale actors are often excluded and marginalised in transition pathways. However, the literature also proposes alternative approaches to support JT for agri-food SMEs, predominantly focusing on localisation initiatives.

3.3 | Alternative Approaches for Just Agri-Food SME Transitions

Apart from outlining broad justice challenges faced by SMEs, some examples in the literature also examine different initiatives that seek to produce more just processes and outcomes for SME agri-food transitions (Hebinck et al. 2021; Maluf et al. 2022; Valverde et al. 2022). These especially focus on initiatives and normative calls for localisation of food systems, which are covered in more detail in Section 4.3. Such initiatives include efforts to shorten food supply chains, repositioning small-scale producers at the centre of food provision systems (Borsellino et al. 2020; Connolly et al. 2022), networking and cooperative development between producers (Laforge et al. 2021), and seed sharing initiatives that seek to improve climate resilience for small producers (Davies et al. 2022; Tschersich et al. 2023). It is worth noting here that the literature is nuanced in setting out the potential benefits to small actors of these moves as well as some of the challenges, in particular regarding inclusion and exclusion from initiatives. Again, however, the focus has tended to be on agricultural producers rather than other actors within supply chains.

4 | Towards a Framework for Agri-Food SME JT Research

4.1 | Research Gaps

From the above literature review and analysis, we identify three key gaps and inconsistencies in existing research. First, no research has explicitly considered the question of JT and agri-food

SMEs (although some literature addresses aspects of this question). One overarching problem is that the existing literature has yet to provide conceptual and analytical frameworks for understanding the key points of tension, challenge and opportunity for agri-food SME JT.

Second, previous studies on just agri-food system transformations have solely focused on the production stage—mostly agricultural producers—leaving actors across the rest of the AFSC barely explored. Further, consideration of different pathways to decarbonisation is limited to either broad challenges faced by SMEs or issues relating to specific aspects of decarbonisation.

Third, the literature lacks a framework for exploring how different agri-food decarbonisation drivers and pathways might shape possibilities and challenges for JT. Combined, these three gaps point to a need for an integrated SME agri-food JT framework to provide analytical tools and new empirical directions for future research.

4.2 | A Framework to Examine Just Agri-Food Transitions for SMEs

As a first step to address the identified gaps in existing knowledge on the position of SMEs within 'just' agri-food transitions, we now propose an analytical framework to set out key issues and challenges for agri-food SME JT under different scenarios. The framework aims to (1) emphasise variability and heterogeneity within the SME population, including creating a more balanced view of implications across supply chains; and (2) examine how different decarbonisation pressures (or pathways) produce different challenges for SMEs. As such, our framework provides a typology based on two axes: (a) archetypal transition pathways; and (b) position within agri-food systems.

First, we identify three archetypal transition pathways. These archetypes were identified through our survey of agri-food transition literature and are designed to highlight different geographies, drivers and technological approaches to decarbonisation. These pathways are:

1. Localisation: Scalar shift of agri-food systems towards localised systems with the objective of reducing emissions through shortened supply chains and changing production methods.
2. Dietary transitions: Production- and demand-led shift in agri-food systems, based on shifting production practices and consumption habits to lower carbon foods, such as switching from meat and dairy to plant-based diets (PBDs).
3. Tech-led transitions: An intensive technology-led pathway, which seeks to achieve efficiencies through technological advancement, digitalisation, automation and greater industrialisation of food systems.

All three proposed pathways are identified in existing research as potential decarbonisation routes. However, in practice, decarbonisation will be complex and involve a range of different approaches and experiments, including elements

of all three pathways and perhaps others not yet identified. Nonetheless, we argue that analysing these interconnected stylised pathways can provide a tool to better understand the nexus between agri-food SMEs and JTs and open avenues for future research on this topic.

Second, we expand from the emphasis in existing literature on agricultural production to consider the position of SMEs within different parts of the agri-food system, including manufacturing, processing, logistics, retail and consumption services (such as cafes and restaurants). This in turn allows for a more comprehensive framework for understanding SMEs and just agri-food transitions. Challenges and possibilities for justice in different pathways are used to cut across analysis in all pathways and different parts of the agri-food system.

Figure 2 provides a visual representation of the framework, whereas a summary of the key points of opportunity and challenge is provided in Appendix 3. We now outline each pathway and its JT implications in turn.

4.3 | Localisation Pathway

4.3.1 | Characteristics

One response to the need to promote a more sustainable and climate neutral AFSC has been the development of local food movements (Goodman et al. 2012; Kessari et al. 2020). Agri-food system localisation is often examined through the wider AFN model (Tregear 2011), within which alternative small-scale localised food systems are key components (Goodman et al. 2012). Proponents argue that AFNs offer a sustainable and potentially transformative alternative to the conventional AFSC (Murdoch et al. 2000; Wald and Hill 2016; Zoll et al. 2021).

Key objectives of AFNs are to 're-localise', 're-connect', 're-spatialise' and 're-socialise' AFSCs (Renting et al. 2003; Watts et al. 2005). In AFNs, relations between producers and consumers are reconfigured (Renting et al. 2003), with few or no intermediaries operating between the producer and consumer. AFNs focus on greater proximity between producers and consumers, in terms of both spatial and social relations (Fourat et al. 2020). Characteristic elements of AFNs include slow food movements

(Chiffolleau and Dourian 2020), farmers' markets and collective farmers' shops, community-supported agriculture (CSA) and community gardens, and box schemes (Tregear 2011). AFNs are perceived to provide opportunities for the reduction of GHG emissions through adoption of regenerative farming practices, reduced food miles and less food processing (Böhm et al. 2022; Jarosz 2008).

4.3.2 | Justice Implications for SMEs

Local food systems (LFS) have the potential to foster more equitable and democratic outcomes for small farmers by placing producers at the centre of the food system (Lutz and Schachinger 2013; Paciarotti and Torregiani 2021). By reconnecting diverse actors within AFSCs, LFS aim to reconfigure power dynamics and strengthen relationships among local producers, suppliers, distributors, retailers and consumers (Berti and Mulligan 2016; Paciarotti and Torregiani 2021; Todorovic et al. 2018). For instance, food manufacturing SMEs that use locally sourced inputs and agri-food retail SMEs that sell local products can enhance collaboration with local suppliers, supporting local economic resilience (Berti and Mulligan 2016; Low et al. 2021).

Community-based organisations, food community enterprises and food cooperatives are key actors in the localisation pathway, potentially promoting community cohesion and building meaningful partnerships (Berti and Mulligan 2016; Hingley et al. 2011). An example is the farmer-led initiative Groundswell, which provides a forum for farmers, growers and stakeholders to share knowledge on regenerative agriculture (Groundswell Agriculture, n.d.). Additionally, local food hubs and alternative food market initiatives—such as nested markets and slow food markets—serve as intermediaries that support small family-run farms and enterprises (Berti and Mulligan 2016; Hatipoglu and Inelmen 2021).

One example is the case of SpeiseLokal, an Austrian local food hub, developed using CSA principles (Lutz and Schachinger 2013). SpeiseLokal sells only locally grown seasonal produce from local farmers in the Lower Austria region. It seeks to ensure that farmers receive two-thirds of the selling price, which is substantially higher than in more mainstream retail-producer agreements. According to Lutz and Schachinger (2013), SpeiseLokal helped small producers to gain greater access to markets and increase their income, while also fostering meaningful dialogue and shared learning between the actors involved. They also found that farmers gained greater participation in decision-making processes and greater control over their produce, while particularly empowering female organic farming producers (promoting procedural and recognition dimensions of justice). Other examples of LFS include local and regional initiatives such as the Devon Agri-Tech Alliance in the UK and FoodValley in the Netherlands, which facilitate knowledge exchange and collaboration among farmers, research organisations, agri-tech developers and other agricultural businesses and stakeholders (Devon County Council, n.d.; FoodValley, n.d.).

However, agri-food system localisation also presents justice challenges (Lamine et al. 2019), including specific implications for agri-food SMEs. Localisation does not automatically ensure sustainable

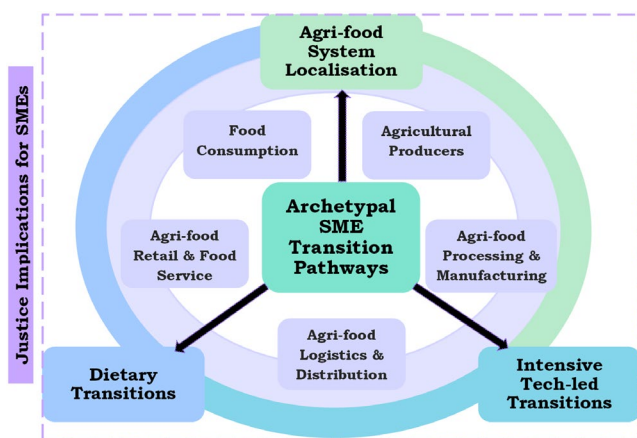


FIGURE 2 | Archetypal transitions pathway framework.

and fair agri-food systems. As in broader geographic literature, there is a danger of falling into the 'local trap' when considering the local as a site of justice (Born and Purcell 2006). Short food supply chains radically shorten the AFSC, which could lead to loss of business for various actors in the agri-food sector—for instance, longer-distance logistics or retail—while also creating local opportunities for food distribution (Paciarotti and Torregiani 2021). In this model, the pressure of managing agri-food operations is potentially placed upon farmers, who become responsible not only for producing food, but also for managing agri-food products from farm to fork. It can be difficult for small family businesses to produce large food quantities, whilst also maintaining consistent and sustainable production (Jose and Shanmugam 2020).

In their case study of Malaga (Spain), Rucabado-Palomar and Cuéllar-Padilla (2020) draw out some of the barriers small family farms face when trying to market their produce. These include lack of necessary resources, limited logistical infrastructure and time pressure. It was also noted that many producers found collaboration with other farmers and joint decision-making in cooperatives difficult, as these relationships need to be built upon long-term trust and nurtured by meaningful communication (ibid.). Conflicting interests, power imbalances and competition among farmers created challenges for collaboration. Distribution and procedural dimensions of justice were undermined in this instance, raising questions about the LFS vision for equitable food systems.

Other literature reinforces Rucabado-Palomar and Cuéllar-Padilla's (2020) findings. Oglethorpe and Heron (2013) noted that farmers' markets can be exclusive, focusing on niche produce and limit access for smaller independent sellers. In their UK study, seller permits were allocated based on subjective criteria, whereas membership fees and the required certifications created participation obstacles for small producers. More broadly, low-income and vulnerable agri-food SMEs and communities can be excluded from AFNs (Fourat et al. 2020; Hatipoglu and Inelmen 2021; Lamine et al. 2019; Michel-Villarreal et al. 2019).

One challenge for AFNs is to ensure food security alongside environmental sustainability. This implies the need to increase local productivity, requiring changes to farming practices. Yet, the limited adaptive capacity of small farms and food manufacturing businesses creates challenges for meeting increased demand for the production of more sustainable food. Proposed shifts in production patterns also require skills development, while concerns have been raised about the labour-intensive nature of activities, and in some cases even involve unethical working conditions (Cerrada-Serra et al. 2018; Fourat et al. 2020). For example, researching AFNs in Ohio (USA), Bruce and Castellano (2017) found that labour intensity provides a key barrier for small-scale farmers to engage in AFNs. Alternative/ecological production requires specialised skills and is often highly labour-intensive due to the limited mechanisation of small-scale operations. This jeopardises the economic viability of smaller agri-food actors.

Findings on AFNs chime with other literature on efforts to support local agri-food SMEs, such as Geographical Indications

(GIs) (e.g., the EU's Protected Designation of Origin). Owen et al. (2020) observed that GIs in Wales integrated agroecological principles into their product specifications. For agri-food SMEs, GIs create opportunities by enabling higher value-added returns and safeguarding artisanal heritage against industrial competition. However, SMEs face challenges including the fragmented delivery of sustainability goals, asymmetrical power relations that favour large stakeholders and the risk of resource depletion if localised production is not managed through inclusive and reflexive governance (Owen et al. 2020).

In summary, localisation presents an important imaginary for consideration of future just and sustainable food systems. However, alongside the potential for democratic engagement and improved business models for some food producers, it creates justice challenges for other producers and across other parts of AFSC. A key point of debate is whether localisation promotes social justice (Lamine et al. 2019), or whether it is another source of inequality, promoting 'elitist localism' (DuPuis and Goodman 2005), further aggravating exclusion and marginalisation for some agri-food SMEs (Kortetmäki 2019; Lonkila and Kaljonen 2021; Kaljonen et al. 2021).

Illustrative Case 1: Localised Public Procurement in Brazil

Public food procurement can catalyse localisation pathways and has been used in different geographic contexts. One example is the Brazilian National School Feeding Program (PNAE). Although the programme is a national initiative, it is delivered locally by municipal administrations (Lamine et al. 2024). The PNAE aims to support access to healthy, sustainable and culturally appropriate food for all state school students. Municipalities are required to devote at least 30% of federal funds to products from family agriculture, and farmers are paid up to 30% more for organic and agroecological food products (Grisa et al. 2011). Therefore, the programme creates economic opportunities for small agri-food businesses and serves as an illustration of a localisation pathway for JT. However, the PNAE also shows how spatial inequalities impact JT possibilities. For example, the state of Paraná successfully sourced over 50% of its food from 22,000 family farmers, whereas the Federal District (the region surrounding Brasilia) only reached 17% and involved only 100 farmers (Lamine et al. 2024). Other challenges of localisation included complex analytical requirements, logistical barriers and political vulnerability.

4.4 | Dietary Transitions Pathway

4.4.1 | Characteristics

A second proposed pathway to agri-food decarbonisation involves dietary transitions away from ecologically unsustainable dietary habits, requiring shifts in production and consumption patterns (Aschemann-Witzel et al. 2023; Berners-Lee et al. 2018; Kaljonen et al. 2021).

Examples include transition towards PBDs (Hemler and Hu 2019), as well as the development of alternative (alt-) proteins and meat substitutes (Dueñas-Ocampo et al. 2023; Newton and Blaustein-Rejto 2021). PBDs also imply increased consumption of fresh fruit and vegetables, legumes, whole grains and seeds. PBDs provide a 'win-win' case, promoting both human and planetary health (Espinosa-Marrón et al. 2022; Hemler and Hu 2019; Poore and Nemecek 2018; Rasmussen et al. 2021). Nevertheless, dietary transitions are complex and require behaviour change in both consumers and producers (Aschemann-Witzel et al. 2023).

4.4.2 | Justice Implications for SMEs

To explore the opportunities and justice implications of a dietary-led transition for agri-food SMEs, we focus specifically on PBDs and plant-based meat alternatives (PBMA) as one example within this pathway. We highlight new market opportunities for agriculture and food manufacturing SMEs, but also uncover a range of justice challenges, including recognition of farmer identities and cultures.

A plant-based transition creates new market opportunities, with potential for new SME market entrants and related employment opportunities across the AFSC (Morais-da-Silva et al. 2022). Increasing demand for plant-based food products creates space for new crop-growing, food manufacturing and food service ventures. Some evidence suggests that the rise of plant-based food products supports the socio-economic welfare of some crop producers by providing new income streams. For example, Newton and Blaustein-Rejto (2021) identify market opportunities for farmers who are willing to adapt their production and grow crops to be used as ingredients for plant-based products: the increasing demand for PBMA has led to increased demand for soya beans, peas and other leguminous pulses.

Dietary transition also creates opportunities for food manufacturing businesses through production of alt-proteins, meat substitutes and cultured meats. Drawing on evidence from their study in the German PBMA market, Schwarz et al. (2024) argue that small-scale PBMA firms and start-ups are central to the protein transition. The European Innovation Council has launched a EUR 50 million funding to support SMEs and start-ups in the alternative protein production sector (Bonetti et al. 2024; European Innovation Council 2024).

There are some examples of SMEs successfully transitioning to plant-based foods. These include livestock and dairy farmers switching to crop production and animal-free agriculture, driven not only by the current climate emergency and the need to reduce environmental footprint but also by ethical and moral motives linked to animal breeding (Bearne 2022). In Scotland (UK), the Farmers for Stock Free Farming initiative aims to support farmers to make this shift, including case studies of farmers switching to cereal production or diversifying to incorporate regenerative agriculture alongside environmental restoration projects. Alongside the environmental benefits of such changes, there is evidence of psychological harms to workers in the meat and dairy industry resulting from their roles (directly or indirectly) in animal slaughter (Flores et al. 2025). As such, shifting away from animal-based

production has the potential to support a JT for workers. In these cases, the transition to plant-based production was primarily led by farmers and entrepreneurs, highlighting the importance of empowering SMEs to take a lead in dietary transitions (procedural justice).

However, a dietary-led transition (Lonkila and Kaljonen 2021; Sexton et al. 2019) also raises justice considerations for agri-food SMEs. For example, it is argued that the position of livestock and dairy farmers has been overlooked in existing research (Craft and Pitt 2024; Hurst and Pant 2024; Kaljonen et al. 2021), despite the potential impact on the activities of small-scale livestock producers (Vinnari and Vinnari 2014). In their study exploring Brazil's potential transition from conventional to plant-based meat, Morais-da-Silva et al. (2022) note that smaller scale farmers are the ones who will suffer the most from the side effects of the plant-based transition (distributive justice). Lack of resources and low-skilled labour limit capabilities of livestock farmers to switch from animal to crop production. Further, grazing lands owned by livestock farmers might not be suitable for agricultural production due to inappropriate soil quality (Mottet et al. 2017; Newton and Blaustein-Rejto 2021). As a result, without appropriate support, disruption and economic losses are likely to occur (Huan-Niemi et al. 2020; Newton and Blaustein-Rejto 2021).

It is also important to highlight the geographical implications of a plant-based transition. Rasmussen et al. (2021) highlight a divide between low-/middle- and high-income countries. They argue that for low- and middle-income countries, the transition is much more difficult as livestock production is a key economic activity for small-scale family farmers, whereas smallholders provide the vast majority of animal and dairy products (World Economic Forum 2019). The protein transition, therefore, increases uncertainty for the smaller-scale farmers, who are dependent on livestock keeping.

Another key concern raised centres on identity and culture (Bryant and van der Weele 2021). Small farmers—like other forms of small business—manage multiple and often contradicting values and drivers in sustainability action (McCarthy et al. 2023). For instance, even though farmers show moral concerns over animal welfare and environmental sustainability in the meat industry (ibid.), there is often a strong identity and emotional attachment towards animal agriculture rooted in historic family and community traditions. Such concerns relate to recognition justice in the need to recognise and address how different identities and cultures can be bound with economic activities, in this case animal farming. They also add to the risk of backlash from smaller producers experiencing both economic and identity loss (see Illustrative Case 2).

Further, existing power imbalances in the AFSC potentially create an additional burden for agri-food SMEs. Despite opportunities for SME innovation and enterprise, some aspects of the plant-based transition—such as alt-proteins—are dominated by larger manufacturing firms, possessing the resources to lead innovation and influence markets (Kaljonen et al. 2021). Small-scale farmers often have little influence in regulating the AFSC or taking the lead on the protein transition, as they are excluded from actively participating

in decision-making processes (Busch et al. 2023; procedural justice).

Illustrative Case 2: SME backlash to plant-based transition policies in Europe

Calls to reduce meat and dairy consumption in high-income countries have intensified as part of climate and public health strategies. These debates have intersected with growing mobilisation by smaller livestock farmers across Europe, revealing JT challenges if producer livelihoods, identities and knowledge are insufficiently considered (Läpple et al. 2025; O'Brien 2023).

In the United Kingdom, local authority (e.g., in Gloucestershire and Devon) campaigns encouraging consumers to substitute dairy products with plant-based alternatives have prompted backlash from small dairy farmers and artisanal processors. Some farmers and commentators argued that such messaging implicitly delegitimised small-scale livestock farming while failing to distinguish it from industrial production, threatening already narrow margins and long-term investments tied to land, herds and processing infrastructure (Buchanan 2025; Davis 2024; Garcia 2024).

In the Netherlands, government plans to meet nitrogen-reduction targets required substantial cuts in livestock numbers, especially among smaller cattle, pig and poultry farms. However, these triggered protests from farmers whose concerns included a perception that the policy imposed a transition without adequate participation or viable alternatives. Although voluntary buy-out schemes were introduced, critics of the schemes argued that these primarily facilitated farm exit rather than supporting diversified or lower-intensity farming for SMEs, fuelling perceptions of cultural and economic harm (Dennison 2024; Finger et al. 2024).

This case shows how dietary transitions can risk accelerating SME closures and/or 'green backlash' with concomitant procedural and recognition justice concerns, also jeopardising public support for decarbonisation. A JT would require co-designed pathways that support adaptation rather than displacement.

4.5 | Tech-Led Transitions Pathway

4.5.1 | Characteristics

The third archetypal pathway entails an intensive tech-led transition towards sustainable agri-food systems through the adoption of new technologies and innovation to significantly reduce the ecological footprint of AFSCs.

A tech-led pathway involves technology-driven intensification of agri-food production to optimise and decarbonise food systems, also sometimes referred to as Agriculture 4.0 (Zambon et al. 2019). Examples of tech-led innovations include the adoption of hydroponics and vertical farming (Miranda et al. 2019), precision agriculture (Annosi et al. 2019; Monteiro et al. 2021), robotics (Lezoche et al. 2020), farm drones, smart sensors and AI (Annosi et al. 2019; Zhai et al. 2020). Similar changes for other stages in the supply chain include smart factories (da

Silveira et al. 2021) with the implementation of digital technologies (i.e., Internet of Things (IoT), Big data, Blockchain technologies) and AI (Abbate et al. 2023; Yadav et al. 2022), as well as the implementation of enhanced traceability and tracking systems (Corallo et al. 2020; Dehghani et al. 2022).

4.5.2 | Justice Implications for SMEs

Tech-led transitions have varying implications for small businesses. To aid clarity, in this section we focus on the case of controlled environment agriculture (CEA). CEA refers to a high-tech form of crop/plant production, which usually takes place in (peri)urban areas (Vatistas et al. 2022). CEA includes a range of crop cultivation practices, including vertical and indoor farming (Engler and Krarti 2021), as well as the implementation of soil-free growing systems, such as hydroponics (Benke and Tomkins 2017). CEA practices aim to create and maintain optimal growing conditions for crops, protecting plants from outdoor threats (Vatistas et al. 2022).

One example of CEA, vertical indoor farming (VF), is predominantly practised at a smaller scale, providing potential opportunities for local growers (Gumisiriza et al. 2022; Petrovics and Giezen 2022). Commercial VF operations are increasing (Al-Kodmany 2018; Chatterjee et al. 2020), providing opportunities for start-ups to invest in the sector (Takagaki et al. 2020). VF can promote new business development, supporting job creation in urban food production (Despommier 2010; Kalantari et al. 2018; Nicholls et al. 2020) and create opportunities for new business models. For example, Martin and Bustamante (2021) argue that VF, and similar operations like mini plant factories with artificial lighting, creates a new market for 'growing-service-systems' (GSS) enterprises. These firms recalibrate the conventional AFSC by providing plant-growing services in small modular kits within local businesses and commercial units (ibid.; Takagaki et al. 2020). These innovations can also support urban agri-food retail SMEs through integration into local grocery stores, supermarkets, restaurants and coffee shops.

VF can also help to reduce land accessibility challenges for smallholders, a key source of injustice in the agricultural sector. Producers can utilise vertical structures in shipping containers, warehouses, multi-storey buildings and rooftop greenhouses located in urban centres (Chatterjee et al. 2020) with no need for access to farmland. As such, there is an argument that VF and similar rooftop gardening/greenhouse initiatives provide a more equitable form of agriculture, given that they reduce key barriers for smaller-scale growers and businesses to enter the sector (Appolloni et al. 2021; Specht et al. 2015; Thomaier et al. 2014).

Engaging small-scale growers and SMEs in VF has been subject to policy attention internationally, for instance through the European Union and the United Nations Development Programme (UNDP). Several grants have been made available through the European Union, including the SUAVE EuroCluster project (2022–2025), which aimed to provide targeted support for European SMEs to engage in urban agriculture and VF (European Cluster Collaboration Platform, n.d.).

UNDP has provided financial aid for VF, based on the assumption that innovative business models for SMEs can foster local community development and support sustainable livelihoods in economically challenged places, or those facing the impacts of low-carbon transition, such as energy-intensive industries (distribution justice). UNDP highlight the case of a former metal-working family business in Belarus, which switched to VF, in turn safeguarding their own livelihood while enabling a more sustainable local food system, supporting other local businesses, creating jobs and promoting economic growth for the local community (UNDP 2024).

However, evidence on how an equitable transition to high-tech systems will be designed and implemented is limited (Klerkx and Rose 2020). In the case of VF, we can point to several justice considerations for SMEs. High start-up costs—such as acquiring the necessary equipment and accessing appropriate business space in urban districts (Benke and Tomkins 2017; Chatterjee et al. 2020)—disadvantage small-scale growers, especially those from economically marginalised populations (Glaros et al. 2024; Van Delden et al. 2021). In their case study exploring urban CEA initiatives in New York, Goodman and Minner (2019) also highlight challenges faced by SMEs to meet skills requirements and increased operational costs (see also Kabir et al. 2023). Changing skills requirements and less labour-intensive methods mean that CEA SMEs likely have different labour requirements than traditional agricultural activities; coupled with the fact that these activities might occur in different places to traditional activities (e.g., in urban rather than rural areas), this raises questions about a JT for existing labour. From the SME perspective as employers, it is important to note that transitioning businesses can adequately support existing workers, and for new businesses to provide opportunities—where possible—to those affected by job loss in other agricultural businesses.

Most of the literature related to the transition to high-tech CEA has focused on the producer side, leaving other actors unexplored. Yet, several justice challenges might arise for SMEs in the midstream of the agri-food sector (such as food processing, manufacturing, logistics and wholesale firms). VF and similar methods shorten supply chains, because agri-food production can take place in urban areas, thus requiring fewer food miles (Al-Kodmany 2018). As with the localisation pathway, VF could lead to loss of business for logistic SMEs due to the reduced need for long-haul transportation of fresh produce and agricultural products (distribution justice).

Another geographic implication of VF is the potential disruption to rural areas and businesses (Benke and Tomkins 2017). Agri-food SMEs provide a major component of the rural economy worldwide (Freshwater et al. 2019; Gálvez Nogales and Casari 2023; U.S. Small Business Administration 2023). VF therefore raises justice considerations for traditional family farmers and agri-SMEs. If scaled up sufficiently, urbanisation and industrialisation of agri-food operations could have deeply felt consequences for small-scale growers in rural areas, including loss of livelihood and/or displacement.

Illustrative Case 3: Underground Farming in London (UK)

Growing Underground was a CEA enterprise located in disused World War II air-raid shelters in south London (UK). Founded in 2015, the venture produced microgreens and baby-leaf salad crops using hydroponic systems, LED lighting and digitally monitored environmental controls (University of Cambridge 2021). Its business model emphasised hyper-local production, supplying London retailers and food service markets within hours of harvest, aiming to reduce food miles and food waste (World Economic Forum 2021). The firm utilised digital systems, integrating real-time information on temperature, humidity, water use, CO₂ and energy consumption to optimise crop growth (University of Cambridge 2021; Walsh 2021). This investment was enabled by several million pounds in external investment and grant funding.

The case highlights JT challenges for small agri-food businesses in tech-led decarbonisation pathways. For instance, production was fully dependent on artificial lighting and energy-intensive environmental controls, exposing the business to high and volatile operating costs (World Economic Forum 2021). Substantial upfront capital investment and reliance on premium markets further limited accessibility and replicability of the model for smaller or less well-capitalised enterprises. The model remained commercially fragile, and the company ceased trading by 2023.

Growing Underground also shows how a tech-led decarbonisation pathway can privilege particular forms of knowledge, skills and business models—such as data analytics, digital optimisation and engineering-led innovation. The enterprise relied heavily on scientific partnerships, digital modelling and specialist expertise developed in collaboration with elite research institutions. If taken as a standard for a tech-led pathway, this approach risks undervaluing experiential, artisanal or low-tech forms of agricultural knowledge more commonly associated with microproducers and traditional food businesses.

5 | Conclusion

This article has examined small businesses as important actors within a global agri-food JT. Our findings emphasise how different overlapping decarbonisation pathways shape JT implications for agri-food SMEs across supply chains, each also with geographic differentiation. These findings point to the importance of interrogating different sets of systemic changes, from localisation to industrialisation, to produce a nuanced picture of JT challenges.

Our initial review of existing research in the field identified several research gaps, including a lack of integrated understanding of agri-food SME JT, lack of conceptual and analytical frameworks for understanding JT for agri-food SMEs, and a lack of consideration for how SMEs might be differently affected by transitions, most notably through insufficient attention paid to SMEs in non-agricultural settings.

The article therefore provides a contribution to knowledge by explicitly considering the role of SMEs within agri-food JTs, providing new insights into understanding agri-food JT and the specific position of SMEs within that. To address the gap in integrative approaches for understanding agri-food SME JT, we applied a justice approach to JT, then generated a framework for interrogating the justice implications of different potential decarbonisation pathways. In doing so, we expanded focus from agricultural producers to a wider range of agri-food SMEs, including manufacturers, distributors and retailers. The framework emphasised the importance of understanding SMEs as a heterogeneous population, which includes different positions in the AFSC, a curious blind spot within existing research. This has implications for how we understand JT as a systemic challenge across systems of provision, including geographic implications of different forms of supply chain reconfiguration: for instance, how a dietary shift to non-meat proteins also reconfigures how and where food is produced and the related supply chains (including inputs, production, logistics and retail). Although this might appear a basic point, it is important to address the existing gap in focus and move towards a more holistic view of agri-food SMEs, in order to develop appropriate policy for agri-food SME JT.

Drawing from our findings, we see three further implications for research and scholarship on agri-food JTs, and agri-food SME JTs more specifically. These are urban–rural disruptions; power, conflict and recognising relational differences; and cultural perspectives on inclusion/exclusion.

First, each pathway generated different potential geographic implications relating to JTs. A common theme was how different pathways disrupt urban–rural delineations. The localisation pathway blurs rural–urban distinctions by ‘bringing the rural in’ to urban arenas through direct sales and distribution of locally produced food. Although this potentially threatens existing urban distribution and retail SMEs, it also shifts burdens to rural producers to directly serve urban populations. Increased peri-urban small-scale food production brings likely land-use conflicts and sustainability challenges. The dietary transition might be viewed in some quarters as an imposed shift by ‘urban elites’ against historic urban identities. SME farmers hold a particular cultural position as perceived representatives of rural life, which can heighten this viewpoint. The tech-led transition more squarely champions the future of urban food production in economic terms, again with concomitant impacts for rural SMEs and communities. These implications are not uni-directional but do pose further questions about the role of small-scale rural agriculture in a decarbonised future. In turn, this raises challenges for rural community resilience and well-being. This matters for understanding the wider consequences of agri-food SME transitions and draws attention to the need for an agri-food JT to provide support not only to rural businesses themselves but also the communities they support. Such findings further emphasise the need to consider spatial justice in any analysis of JT.

Second, we highlight power imbalances and relational differences in SME agri-food transitions. As climate change impacts intensify in an era of increased logistical shocks, the agri-food

system is already becoming stressed. This creates conditions for further conflict and tension, already considered an important dimension of understanding possibilities for ‘just sustainability’ (Agyeman et al. 2003). Without adequate mitigation, accelerated decarbonisation pathways add to these stresses. Our review has highlighted power imbalances and conflict as central to understanding agri-food SME JT. Power imbalances are inherent in our understanding of how smaller firms are positioned within the transition, but these imbalances vary in different contexts and depending on specific sets of relations. For instance, we have variously highlighted social, economic and spatial relations with land ownership, state organisations, multinational companies, customers and communities, each of which involves different negotiations and power relations. SMEs themselves are highly heterogeneous, consisting of vastly differing internal and external relations. This further emphasises the importance of a relational understanding of SME JT (see also Eadson et al. 2026), in particular to ensure precise examination of decarbonisation implications in different contexts. This is important to ensure sufficiently nuanced and individualised support mechanisms for achieving agri-food SME JT.

Third, dynamics of exclusion and inclusion came to the fore throughout. This relates to both economic and cultural dimensions. The localisation pathway highlights risks to economically and socially marginalised communities, in the face of local collective mobilisation for those with greater levels of cultural, social and economic capital. This includes challenges for SMEs as employers: they also have a role to ensure continuation of good, meaningful work in agricultural labour. If the transition requires a shift in SME activities, then there is also a need to provide mechanisms to support workers through that change. Cultural exclusion is also foregrounded in accounts of those challenged by implicit or explicit pushes for shifts towards plant-based food systems; similarly, the privileging of specific codified forms of knowledge in tech-led transitions provides the basis for the exclusion of other practices and ways of knowing. These dynamics, imbued with power imbalances, create conditions for SME discontent and mobilisation for green backlash. As such, there is an important task to address the cultural and identity-based risks of agri-food transition pathways, acknowledging the specific cultural standing of SMEs within agri-food systems, not only to ensure a JT, but also to ensure that the low carbon transition can maintain sufficient support to continue. An important part of supporting rural SME resilience is through support for non-state support networks, such as grassroots membership-based unions. Existing examples include the Landworkers’ Alliance in the United Kingdom, the Confédération Paysanne in France and other member organisations of La Via Campesina, a global movement for food sovereignty and peasant rights.

In summary, this article examined the challenges and possibilities for SMEs to participate in a ‘just’ agri-food transition, which to this point has been under-researched. Given the predominance and importance of SMEs in AFSCs, employment and community well-being, a deeper understanding of this issue is important to achieving a thriving, equitable decarbonised future. Our research agenda seeks to support the creation of an equitable agri-food transition built upon solidarity for smaller agri-food businesses within sustainable and food secure communities.

Data Availability Statement

All data used for this review article are publicly available in online search engines (i.e., Scopus, Web of Science and Google Scholar). DOIs and online links to access the data used for this article are provided in the Manuscript submitted, in the 'References' Section of the document.

Endnotes

¹Small firms are those with fewer than 50 employees; we include 'micro' businesses within this definition (those with fewer than 10 employees).

²SMEs are businesses with fewer than 250 employees. Because existing literature and policy tends to use the SME categorisation as a catch-all term for small businesses, we have generally followed this within our analysis; however, our central focus is on small and micro businesses (and medium-sized business accounts for less than 1% of SMEs).

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Appendix 1

Search Terms

Search terms

1. 'Agri-food' AND 'SMEs' AND 'Just Transitions'
2. 'Agri-Food' AND 'Small Enterprises' AND 'Transitions'
3. 'Small and Medium Enterprises' AND 'Agri-food' AND 'Justice' OR 'Inequalities'
4. 'Agri-food' AND 'SME' AND 'Transition' AND 'Justice'
5. agri* AND food* AND 'SME' AND 'Transition' AND 'Justice'
6. 'Agri-Food' AND 'SME' AND 'Transformation' AND 'Justice'
7. agri* AND 'Inequalities' AND 'Food' AND 'SME' AND 'Transition'
8. agri* AND 'Small Business' AND 'Equitable' AND 'Food' AND 'Transition'
9. 'Equitable' AND 'Transition' AND 'SME' AND 'Agri-Food'
10. 'Agriculture' AND 'Transition' AND 'Justice' AND 'Small business'
11. 'Agri-Food' AND 'Manufacturing' AND 'SME' AND 'Transition' AND 'Justice'
12. sustainab* AND 'Justice' AND 'SME' AND 'Agri-food'
13. 'Agri-Food Production' AND 'SME' AND 'Transition' AND 'Justice'
14. 'Food Retail' AND 'SME' AND 'Transition' AND 'Justice'
15. 'Agri' AND 'Food' AND 'Small Businesses' AND 'Just Transitions'
16. 'Equitable Food' AND 'SME' AND 'Transition'
17. 'Justice' AND 'Net zero' AND 'SME' AND 'Agri-food'
18. 'Agriculture' AND 'Just transition' AND 'Small business'
19. 'Agriculture' AND 'Equitable transition' AND 'SME'
20. 'Agriculture' AND 'Just transition' AND 'SME'
21. 'Small-medium Enterprise' AND 'Just transition' AND 'Agriculture'
22. 'Just Transitions' AND 'Agri-food'
23. 'Agri-food' AND 'Decarbonisation'
24. 'Agri-food' AND 'Low-carbon' AND 'Transitions'
25. 'Agri-food' AND 'Net-zero' AND 'Transitions'
26. 'Agri-food' AND 'Sustainability Transitions'

Appendix 2

Articles Identified for Full Review

- 1 de Bruin, A., de Boer, I. J., Faber, N. R., de Jong, G., Termeer, K. J., & de Olde, E. M. (2023). Easier said than defined? Conceptualising justice in food system transitions. *Agriculture and Human Values*, 41, 345–362. <https://doi.org/10.1007/s10460-023-10482-y>.
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Appendix 3

Agri-Food SMEs—Implications Table

Pathways/ AFSC SMEs	Localisation		Demand-led		Tech-led	
Overarching implications	+Re-territorialisation/re-localisation of the agri-food systems; redefining the AFSC and creating shared value +Emergence of new value chains and business models	–Risk of the ‘local trap’: exclusion, inequality and power disparities –Deconstruction of the AFSC and loss of business, as the value chain is shortened	+Opportunities for new agri-food businesses; new R&D and innovation towards more sustainable agri-food production and consumption patterns	–No single dietary transition that will be sustainable for all –Disruption to agri-food SMEs, as it is difficult to shift from one production system to the other	+Emergence of new technology and innovation facilitates optimisation and efficiency in production stages; more sustainable industrial processes +Opportunities for new business development	–Loss of business due to limited adaptive capacity of SMEs, due to financial and resource barriers to uptake new innovation
Agricultural production SMEs	+Farm diversification +Emergence of ‘local food hubs’ +More equitable and democratic outcomes for farmers +Support local economy and ensure the welfare of farmers and farming communities	–Pressure on farmers to control operations and profit, from farm to fork –Marginalisation due to limited adaptive capacity of small family farms and lack of technical know-how and resources	+The transition to more sustainable diets will foster the reconnection between producers and consumers in the search for healthier, safer and more nutritious foods	–Difficult for producers to shift from one agri-food system to the other, due to both internal (i.e., limited resources/technical know-how) and external (i.e., ecological conditions) constraints	+Opportunities for business development +Emergence of new agricultural technologies can help to reduce overexploitation of resources, increase efficiency and maximise yield productivity	–Smallholder farmers struggle to adopt new technologies, as these are neither affordable nor compatible with rural agri-SMEs, especially in the context of the Global South
Manufacturing and processing SMEs	+Emergence of alternative business models and innovative start-ups +Re-connection and closer relationships with farmers; locally sourced supplies +Closer relationships and collaborative engagement with consumers	–However, the emergence of SFCSs often leads to loss of business, that is, fewer intermediaries involved, as the value chain is shortened –Employment concerns, as the transition will require skills development and transferability	+Emergence of new business models and opportunities for new food manufacturing ventures	–Loss of business for various manufacturing and processing SMEs, as the urgency for shifting towards more sustainable diets will require the replacement of foods, with novel nutritional products –Pressure on SMEs to shift the industrial modes of production	+Optimisation and increased efficiency in industrial/manufacturing processes; Industry 4.0 and Agri-food 4.0 +Eco-innovation and emergence of new business models +Green knowledge sharing	Barriers for small manufacturers to implement new tech and innovation, as I4.0 and digital technologies require high R&D and implementation costs, technical expertise, adequate management, regulation, governance and infrastructure
Logistics and distribution SMEs	+Re-connection and closer collaboration with producers; power relations re-established	–Disruption for food distributors, as operations will take place at a small scale only –Resource inefficiencies; SFSCs do not imply reduced food miles	+Emergence of new forms of food logistics, to design a more sustainable food distribution	–Pressure on SMEs to change their operations—need for investment in order to restructure food logistics and distribution; accumulation by larger firms or even loss of business	+New tech allows for digitalisation and automation of logistics and distribution; enhanced operations efficiency	–SMEs that struggle to adopt the proposed technologies, due to internal barriers and limited adaptive capacity

Pathways/ AFSC SMEs	Localisation		Demand-led		Tech-led	
Retail SMEs	+Re-connection between famers/ producers and consumers, through the emergence of 'nested' and slow food markets and food co-operatives +Local artisan brands embedded in local retail outlets and markets	–Farmers' markets are often niche and exclusive, limiting access for smaller independent producers –Seasonality constraints –Sales restricted to local margins	+Reimagining grocery shopping emergence of alternative food retail shops; emergence of slow food markets and more sustainable retail outlets +Small food retail shops will initiate health-promoting interventions	–Infrastructure limitations and resource constraints to implement more sustainable food options –'Green', organic and more sustainable food options are often expensive; thus, creating barriers for smaller retail shops to offer for sale, while at the same time might lead to reduced profits and limited ability of consumers to afford	+Opportunities for new business development +Digitalisation of food provision and modernisation of retail and dining experience through the implementation of ICTs	–Lack of financial resources and technical expertise create barriers for food retailers to uptake the proposed digitalisation strategies
Consumption/ food service SMEs (cafes, restaurants, etc.)	+Support for the local economy and re-connection with producers, as hospitality businesses use locally sourced supplies +Added value to the businesses, as locally sourced products are fresher and of better quality	–Difficult to meet demand, due to limited variety available for customers; seasonality constraints	+Appearance of more sustainable places to eat and drink, offering healthier and more sustainable options available to customers; that is, new business opportunities	–Limited clientele—constrained to coffee shop/ restaurant menu variety –Similar to retail, healthier and more sustainable foods are often more expensive; this poses a key constraint both for businesses and for consumers		