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Original research article

Just business? Rethinking the role of small and medium enterprise climate action through a just transition lens

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ABSTRACT

Small and medium-sized enterprises (SMEs) are critical to achieving climate action goals but are neglected in policy and academic debates. Current SME climate and energy policies are failing to address the complexity and vulnerability of SMEs in the transition to a low carbon economy, often treating these organisations as a homogeneous group, with dominant narratives that appeal to economic or moral imperatives to decarbonise, without recognising their diverse social roles or needs. This article develops a new analytical framework that integrates relational and situated perspectives with the lens of just transition, foregrounding SMEs as social actors with varied motivations and characteristics, embedded within a multitude of social and material relations. The framework can help to highlight how policies, governance and market arrangements can marginalise some SMEs, and identify how vulnerabilities and inequities might be addressed. We apply the framework to a large qualitative dataset consisting of 167 interviews spanning five sectors and five city-regions in the UK. Our findings illuminate the varied and nuanced role of SMEs within just transitions, across three sets of relations: sectoral, dimensional (space and time) and organisational. A large and diverse group which are conventionally overlooked in climate discourse, SMEs' vulnerabilities warrant renewed attention, while their power to help shape a fair and rapid transition remains under-utilised. The concluding section sets out practical implications for SME climate and energy policy. This includes addressing heterogeneity more systematically, designing targeted support for vulnerable firms, and harnessing SMEs as active climate citizens to deliver transformative change.

1. Introduction

The phrase, "it's just business" is often used to suggest that commercial considerations can be used to justify actions that would be regarded as questionable or unethical in other contexts. However, in the case of climate change, this assumption has been challenged by evidence of smaller businesses taking their energy use and carbon emissions more seriously, particularly where climate impacts are being felt by their employees or in their local communities [1]. "Just business" could also be used to describe the way that SMEs have been disregarded in business

climate policy discourses. This marginalisation has taken at least three forms. First, through underplaying the potential role of SMEs in facilitating the transition to a low carbon future and associated entrepreneurial opportunities. Second, in disregarding key vulnerabilities of smaller firms to emerging climate change impacts (e.g. extreme weather events), and to mitigation policies that pay insufficient attention to SME-specific issues in their design and implementation.

In this paper, we argue that the combination of flawed assumptions about SMEs and a lack of attention to their distinctive characteristics has had serious consequences, including the failure and underperformance

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of recent climate policy interventions [2,3]. Furthermore, perceived injustices experienced by business owners and workers in smaller businesses has contributed to a transition backlash across Europe, North America and other developed economies. This has been characterised by growing support for populist ideologies, coupled with active political resistance to net zero and other pro-environmental policies across Europe, North America and in other parts of the world [4,5].

We address these complex issues by examining the role of SMEs in climate action and energy policy through a just transitions lens. Concern for just transition emphasises ensuring that costs and benefits of climate action are distributed equitably, with different interests recognised and represented in decision-making processes [6]. This not only addresses questions of 'fairness' but also reduces risk of backlash by addressing concerns of different stakeholders, especially those at risk of marginalisation. This prompts our research questions: (1) what does just transition mean for SMEs? (2) what are the different just transition implications of climate action for different types of SMEs in different situations? (3) what does focus on SME just transition mean for future research, policy and practice?

SMEs have a key role to play as energy consumers and producers of emissions, contributing 13 % of global carbon emissions and consuming 50 % of commercial and industrial energy. Globally there are over 400 million SMEs, making them important actors in supporting climate action of others, including individuals, communities and other businesses. Despite this, they have been neglected as potential subjects of justice and injustice in climate action [7,8]. We therefore propose integrating learning from just transition literature with that on SME climate action to investigate how SMEs are implicated within just transition. As has been well-acknowledged in business and management literature, SMEs are social actors unavoidably embedded within multiple contexts and networks [9–11]. We therefore place SMEs within sets of relations that create different just transition challenges and opportunities for business owners, the people who work for businesses, and their stakeholders. We generate a novel framework to support this and future analysis of SME just transition, with potential applicability to other fields of enquiry. We believe this is the first attempt to develop a conceptual and analytical approach for SME just transition. To do so, we draw on extensive empirical qualitative research in the UK, encompassing five sector case studies and five place-based case studies, with a combined total of 167 qualitative interviews.

Our article seeks to make the following contributions to knowledge: (a) it investigates SME climate action through a novel lens, integrating just transition and relational concepts; (b) it develops a new analytical framework and demonstrates how it can be applied in an empirical investigation of SME just transition; (c) it generates robust evidence on SME climate action through the lens of just transition, with broader relevance across sectors and internationally; and (d) it sets out an outline agenda to guide future research on SMEs and just transition.

We advance our argument as follows. Section 2 outlines how SMEs as a population should be considered as a just transition challenge. Section 3 advances an analytical framework for SME just transitions, building from relational perspectives. Section 4 employs our framework through empirical analysis of SMEs; and Section 5 concludes, outlining key contributions and implications for future research and policy.

2. SMEs as a challenge for just transition

The topic of SME decarbonisation has received increasing scholarly attention in recent years. SMEs are also starting to attract the interest of policymakers as governments aim to reduce emissions across economic sectors [12,13]. SMEs are being asked more frequently to provide emissions data, whether through public procurement processes, financing due diligence, or corporate supply chain requirements [14]. A substantial body of research identifies persistent barriers to the adoption of low-carbon technologies, energy audits and other pro-environmental behaviours within SMEs, with the most common obstacles including

limited access to capital, deficits in information and knowledge, short investment horizons, and constraints linked to tenancy agreements [15,16,17,18,19]. Evidence shows that these trends and barriers do not affect SMEs uniformly [20]. The capacity of businesses to decarbonise varies significantly by size, sector, and other characteristics, and the distribution of potential benefits and disadvantages from the energy transition risks creating new inequities [8]. Despite these varied motivations and capabilities, policy interventions continue to focus narrowly on broad-based information and behaviour change approaches [21].

There are also apparent contradictions in current SME policy discourse, which places additional responsibilities on businesses while also referring to their vulnerability to external pressures. For instance, the European Commission's response to recent energy price shocks stated that, "*all stakeholders need to come together to empower and support SMEs to make them more resilient during this crisis*" [22]. While the survival of smaller businesses is seen to be intrinsically important to society, the notion of SME climate action as a *question of justice, or just transition*, remains both under-acknowledged and under-developed. To address these inconsistencies, we argue that existing moral and ethical arguments around SME climate action need complementing with a concern for justice. We argue that recent focus on just transition in energy and climate-focused social science scholarship provides a useful entry point for this.

Literature on just transition is extensive, already subject to several integrative reviews [6,23,24]. There are two broad strands of literature: scholarship aligned to worker movements and concern for labour implications of sustainability action [25]; and applications utilising justice frameworks for more general-theoretical understanding of just transition relevant to different actors [26]. Generally, justice-based frameworks comprise of distributional, procedural and recognition justice, concepts which we outline below in relation to SMEs. We adopt this broader approach to just transition and develop it further in our analytical framework (Section 3).

In terms of *procedural justice* (achieving fair and inclusive decision-making processes), despite their importance to climate neutral transition, SMEs have been under-served by climate and energy policy [7] and tend to be overlooked in climate decision-making. This issue occurs at multiple levels of governance and across different national contexts [27,28].

Recognition justice (acknowledging and valuing different experiences, identities and cultures), underpins a tendency in policy and practice to discuss SMEs as a categorical whole [29,30]. This is sometimes necessary: to generate actionable ideas for policy it is important to differentiate SMEs from large corporations, given their structural differences. But a classification based on size alone creates a homogenous category which has at least as many within-group differences as outwith [30]. This homogenisation creates challenges for effective action across diverse types of activities and for understanding how SMEs might be differently affected by or able to respond to climate action pressures. It also ignores the different roles SMEs can play in climate action beyond acting to reduce their own emissions. Much is known about SME heterogeneity and variable capabilities [31], but less attention has been paid to this in relation to climate action, and there have been few attempts to segment the SME population according to emissions profiles, nor their capabilities for climate mitigation or adaptation [27].

This also has *distributional justice* implications (equitable allocation of resources, costs and benefits). While it is known that SMEs are generally more vulnerable to exogenous change than larger firms, this depends on various factors, including size [32], sector, location, diversity of supply chain and customer base [33]. For example, variation in carbon or energy intensity across industries, the extent to which sectors are reliant on specific climatic conditions, and the availability of government support for exposed and/or sensitive industries. Vulnerability is also impacted by geographic factors, and the extent and speed of change required in different sectors.

Having outlined why it is important to consider SMEs within a just

transition framing, we now outline our novel conceptual and analytical approach to investigating SMEs as a concern for just transition.

3. An analytical framework for SME just transitions

An established body of research examines SMEs as relationally embedded [27,34,35]. This literature highlights the importance of external connections to enterprises' success. Critically, these relationships are not only transactional but also tied to emotions, identities, and broader social contexts [10,29,36–39]. This has been mirrored in the context of SME sustainability [10,40]. Building on these insights, SME climate action can be understood as a relational challenge. Understanding SMEs as a concern for just transition therefore requires considering different relationships, and their nature, to identify points of justice or injustice. This means examining how relational connections are constructed and negotiated, and the power relations within them.

Within the SME literature, Malagueño et al. [41] conceptualise 'relational justice' to consider power dynamics within supply chains. This idea can be extended to focus on formation and maintenance of relations between different social actors involved in SME functions. To understand SME just transition from a relational perspective it is also important to better understand how sets of relations might be nested. For instance, SMEs are configured through organisational relations (e.g. between employer and employees, between board members) which are shaped by individuals as social actors whose actions are shaped by other societal relations (e.g. class, gender, ethnicity, age and so on). We then must consider how different SME organisational relations can result in individual SMEs being differently positioned within other sets of relations such as market dynamics or governmental regimes, which in turn might affect their relative position to climate action. This illuminates SME just transition as being both relational and situated. Our analytical framework builds from this point of departure.

3.1. Situating relations and justice implications

Our analytical framework builds from understanding of (1) SMEs as a concern for just transition, and (2) SMEs as relational entities. We also emphasise that these relations are negotiated and power-laden. The outcomes of ongoing negotiations between different actors produces relations which might favour one party more than another and might lead to points of injustice. For instance, large firms exercise power to influence SME behaviours in different ways [42], including coercive practices [43]; while the relationship between an SME and its workers [44] is quite different to that between an SME and the landlord of the building it occupies, or with a local municipality to whom it pays business taxes or receives licence to operate from.

This relational perspective also highlights different roles played by SMEs in different contexts. The role of SMEs in producing carbon emissions is a product of their diverse sets of social relations: the embedded emissions within the products they purchase; policy and regulatory environments; knowledge and availability of alternative production methods; market dynamics; and so on. But their position as social actors means their role in climate action is not only about the emissions they produce. For instance, SMEs can influence others' behaviour or enable climate action through provision of services [45]. These different roles confer different rights and responsibilities for SMEs. To elaborate these points, Table 1 provides a non-exhaustive list of different SME relations, and implications for research, policy and business practice for just transition. It is beyond the scope of this paper to address all the questions raised here, but these are intended to highlight the range of different challenges for SME just transition and the need for further scholarly attention.

Given these wide implications, an operational analytical framework for SME just transition requires reconfiguring existing just transition concepts. In Section 2 we outlined our broad conceptual underpinning for just transition, aligning with existing approaches that utilise a

Table 1

Examples of SME relations and just transition implications.

Relationship	Nature of relations	Just transition questions (e.g.)
SME – customer	Exchange of goods or services for money Ethic of care and reciprocity	To what extent can consumers or SMEs influence each others' practices? Do (if so, how do) SMEs enact ethic of care/reciprocity in climate action?
SME – supplier	Exchange of goods or services for money Ethic of care and reciprocity	To what extent do supplier relations affect ability and shape of SME climate action? How do suppliers' approaches to contracts create different barriers/opportunities to action?
SME – worker	Exchange of labour for wages (contractual) Employer-worker relations (formal and informal) Ethic of care for workers	How do SMEs support affected workers to manage transition (skills or alternative employment), and what support is available to SMEs to help them do so? How do SMEs engage with workers to provide knowledge and skills for climate action? To what extent do SMEs enact inclusive practices to ensure transition also supports development of inclusive workforce?
SME – community	SME operations might impact local area (e.g. direct emissions, waste, or transport) SME as citizen – supporting local community activities SME as provider of community services (e.g. food, transport, health and wellbeing) SME as community hub – where members of community might meet Social connections – business to business or between SME owner and local residents	What ethical responsibilities do SMEs perceive in relation to their communities and how does this manifest? How do SMEs engage with communities to support climate action (and vice versa)? How do businesses within communities support one another in climate action and in community action?
SME – landlord	SME as tenant – provision of premises in exchange for rent (contractual – legal/financial)	What are the justice implications of different ownership of premises (renting versus owning)? What power dynamics shape ability to achieve climate goals? How do landlords view their responsibility towards SMEs in relation to climate action?
SME – sector	SME as part of industrial grouping, including different networks and competition over customer (and sometimes over suppliers)	How are SMEs included/excluded in sector representation on climate action? To what extent are SMEs reached by sector-level groups?
SME – state	Complex social and legal contract including regulation, taxation, funding and other forms of support across different governmental organisations and functions	What are the justice implications of differential support across different sectors/sub-sectors? What are the justice implications of inclusion/exclusion of SMEs from different policy/support approaches? To what extent are (different) SMEs given a voice in policy decision-making at different levels of government? How do state bodies seek to engage with SMEs, and especially vulnerable SMEs?

(continued on next page)

Table 1 (continued)

Relationship	Nature of relations	Just transition questions (e.g.)
SME – finance providers	Day-to-day banking facilities Loans/finance from banks and other finance providers Relationship with financial advisors (e.g. accountants)	How is support for SMEs spatially distributed? What differential access to climate finance is open to different SMEs? (Through negotiated terms and conditions) how does climate finance create opportunities or constraints on business operations and strategy, and what are the justice implications of these? To what extent do financial advisors (etc.) support or constrain access to knowledge for climate action?

trivalent framework of distributional, procedural and recognition justice. There has also been concern for different ‘depths’ of just transition – from incremental change to existing norms and practice to transformation of societal organisation and values; or to the depth of change already occurring within different parts of society and their differing implications for just transition [46].

A relational perspective reorientates these conceptions towards more differentiated analysis of justice across different relations. To understand how these relations are produced and impact on just transitions also requires understanding of how they are situated in different ways that create difference between SMEs. In this article we highlight three key points of situatedness: Industry-specific (or *sectoral*) relations; *dimensional*—spatial and temporal—relations; and *organisational* relations. Situating relations in this way also helps to produce an operational framework for analysis by grouping relations together. These sets of relations shape how just transition can be understood in different SME contexts (Table 2).

First, we situate SME relations within sectoral contexts. Geels’ [47,48] triple-embeddedness framework is a helpful foundation for this aspect of our framework. Geels shows how firms’ actions are shaped by three sets of relations: (1) industry regime (sector-based relations including cultural norms as well as sector regulations and standards); (2) task environment, including suppliers and customers; and (3) socio-political environment, including policymakers and civil society. In this article, we apply these as industry relations; market relations; and socio-political relations. We add techno-material relations: engagement with technologies, material and infrastructural entities, which shape possibilities for action and have been shown to be important for consideration of just transition [49].

Second, we situate relations within dimensions of change (time and space). Spatial difference is widely acknowledged as important to understanding just transition [23]. This encompasses relations between

Table 2
Situating Relations.

Situation	Relations
Sectoral	<i>Market</i> , including with suppliers and customers, market institutions <i>Industry</i> : across other businesses and with sector representatives <i>Socio-political</i> : with political and policy bodies; to public discourse and social movements <i>Techno-material</i> : infrastructural, technological and material
Dimensional	<i>Between places and territories</i> <i>Scalar</i> (e.g. changing geographic extent of systems of provision) <i>Temporalities</i> of change: speed and variability over time
Organisational	<i>Organisational characteristics</i> , cultures, capabilities, situated within broader social relations (e.g. class, gender, ethnicity) <i>With workers</i> <i>With communities</i>

places, regions, nations as well as the geographic organisation of different sectors, and how these are impacted by decarbonisation. Businesses in different settings are faced with different temporal pressures: e.g. speed of change required, and their ability to respond at the required pace. Geographic imaginaries are also important: for instance, how SMEs think about decarbonisation in relation to different spatial and temporal horizons [50].

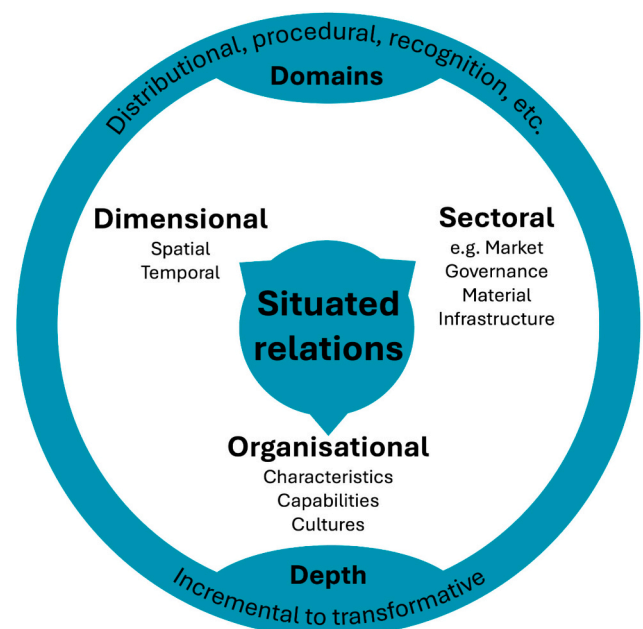
The third set of relations in our framework is organisational relations within businesses, shaped by business characteristics, capabilities and cultures. All organisations are held together in ways that give them unique properties, influencing capabilities and behaviours [51]. Extensive research has considered different SME characteristics to understand economic resilience or growth propensity [52]. Similarly, we can consider how different characteristics might matter for SME just transition, particularly those which could produce points of vulnerability and/or injustice. Individuals’ characteristics—especially owner-managers, who take on a wide range of functions in SMEs—are particularly important in smaller organisations. For instance, owner-manager and/or worker characteristics are situated in wider social relations producing disadvantages (e.g. gender, ethnicity, disability). These organisational relations in turn shape factors like strategic capabilities and organisational cultures. Oldham and Spence [53] show the importance of these for firm orientation towards ethical responsibilities, in particular highlighting organisational ‘extraversion’ (size and nature of networks) and strategic capabilities. Organisational cultures encompass collective values, identities and assumptions, and established ways of understanding the world [54]. Such capabilities, characteristics and cultures extend to specific internal relations, such as between managers and workers, which are generally less formalised than in larger firms [55].

Bringing these three sets of relations together with domains of justice and depth of change produces our operational analytical framework for a multi-faceted situated-relational approach to SME just transitions (Fig. 1).

4. SME just transitions: a UK case study

4.1. Methods

Empirically, we draw from an in-depth study of SME climate action

**Fig. 1.** Situated relational framework for SME just transition.

and governance in the UK. The study aimed to understand how SME climate action was shaped by constellations of actors including other businesses, government bodies, support organisation and communities. Using a qualitative case study methodology, the project investigated these relations through studying five sectors and five city-regions. The UK provides a good case study as a country with a relatively long-standing (if variable) history of climate policy and identified through documentary review as having deeply variable practices across sectors and between places.

Qualitative research is necessary for this investigation, which aimed to interpret different experiences in different contexts, using empirical observation to test and build out from our original conceptual framework to understand the diverse ways that SMEs are implicated in just transitions [56]. Our large qualitative sample size was used to bring understanding of a breadth of experiences, as employed in this paper, as well as more in-depth insights on specific issues (explored in other outputs from the study).

The five sectors selected were: restaurants, construction trades, hairdressers, steel supply chain, and horticulture. A rigorous selection process was employed: secondary data on market size, emissions, type of activities (e.g. primary, secondary or tertiary industries), and existing literature were analysed. The final selection employed a ‘diverse case’ case study approach [57], seeking to generate learning from sectors that demonstrated different challenges and opportunities for climate action. The focus on diverse cases seeks to capture variation (ibid.) and illuminate the range of ways that SME transitions can be explored through the lens of just transition. This was important given that there has been no previous systematic treatment of SME just transition. An alternative approach, using one sector or detailed consideration of a small number of businesses might allow greater depth on specific issues but the intention in this article is to develop and elucidate conceptual and empirical understanding of SME just transition in diverse guises. This was a deliberate strategy to explicate the breadth of SME just transition considerations, which would be less easy to achieve through a single case study approach. Five place-based studies were also included in the study to understand geographic variation of SME challenges and SME support infrastructure. These were similarly chosen to generate findings from diverse contexts. The five locations were: Belfast City Region (Northern Ireland); Edinburgh and Fife (Scotland); Oxfordshire (England); South Yorkshire (England); Swansea Bay (Wales).

The project involved a literature and policy review, and 167 in-depth semi-structured qualitative interviews with stakeholders and SMEs (see Table 3).

SME characteristics varied significantly, including between sectors. For instance, whereas steel industry respondents were primarily from companies with over 10 employees, most horticulture firms were micro-businesses (13 out of 16 respondents), broadly reflecting the characteristics of those industries. Similarly, there were demographic differences. Steel and construction industry SME respondents reflected the demographic make-up of the industry and were mostly male (14 of 16 in steel; 15 of 16 for construction), hairdresser respondents were mostly women, and those within horticulture and restaurants were more evenly mixed.

Interviews lasted 30–90 min, covering questions about business operations, climate action and related policy. Data was analysed using

thematic coding to examine different sets of relations involved in SME climate action. This analysis was brought into conversation with the theoretical framing to iteratively inform the analytical framework. Key overarching findings are outlined in Table 4 and elaborated in the following sections. Appendix 1 provides more detailed summary findings for each sector across different sets of relations.

4.2. Sectoral relations and SME just transition

Market, policy and techno-material systems within sectors have a central bearing on SME agency and climate action. Our findings particularly highlighted: (1) power relations across supply chains; (2) SMEs' position within sector-state relations; and (3) potential of collective action to address power inequalities. These were threaded through with different techno-material challenges. We centre this section on evidence from the steel supply chain, comparing to hairdressing and construction to draw out additional facets.

4.2.1. Case study: steel supply chain

The steel supply chain provides a clear example of how sector relations are important for SME just transition (summarised in Fig. 2). Steel production is energy and carbon-intensive and decarbonisation is driving sectoral change. Most steel sector research participants recognised decarbonisation was important for future business survival.

Steel SMEs' positions within supply chains represents an important just transition challenge. Firms we spoke to faced customer pressure to adopt carbon management practices, including using lower carbon primary steel for their products, and climate action eligibility requirements for government contracts. Some of the larger SMEs were more able to respond to these pressures, but smaller businesses felt they were disadvantaged in these situations because they tended to lack access to resources, knowledge and capabilities that larger firms could either develop in-house or buy in from external contractors. Maintaining relationships with customers was also important. For example, one steel SME said that investing in new lower carbon technology would potentially jeopardise their relationship with a major customer as it would require them to re-establish the quality of their products and undergo new accreditation processes. Relationships between suppliers and customers were built on long-term development of mutual trust, but were also seen as unequal.

Respondents also felt powerless to act on emissions in their own supply chain, such as the unfinished steel they purchased. For example,

Table 4
Key themes in findings.

Relations	Key themes in findings
<i>Sectoral</i>	<ul style="list-style-type: none"> - Power relations across supply chains create points of tension but in some instances have been a source of support and action - SMEs' position within sector-state relations generally places them at a disadvantage but some sectors better positioned - Potential of collective action to address power inequalities is harnessed in some sectors with differing impacts.
<i>Dimensional</i>	<ul style="list-style-type: none"> - Climate change and climate action has implications for geographic organisation of sectors, which impact SMEs differently - Existing spatial economic patterns layer onto transition implications to create different points of vulnerability and/or injustice - SMEs' consideration of their own sphere of climate action responsibility/agency matters for just transition - Variable, nonlinear temporalities of change affect SME capability to act.
<i>Organisational</i>	<ul style="list-style-type: none"> - Business characteristics shape capabilities and attitudes to change, which can produce points of vulnerability to transition - SME businesses practices create inclusion and exclusion in transitions, especially for marginalised or vulnerable groups - Dimensions of care and ethics infuse relationships with consumers and workers and are important aspects of understanding just transition.

Table 3
Composition of interviews.

Sector	Stakeholder	SMEs	Total
Construction/Retrofit	11	16	27
Hairdressers	4	30	34
Horticulture	11	16	27
Restaurants	8	13	21
Steel	8	16	24
Place-based stakeholders	34	N/A	34
Total	76	91	167

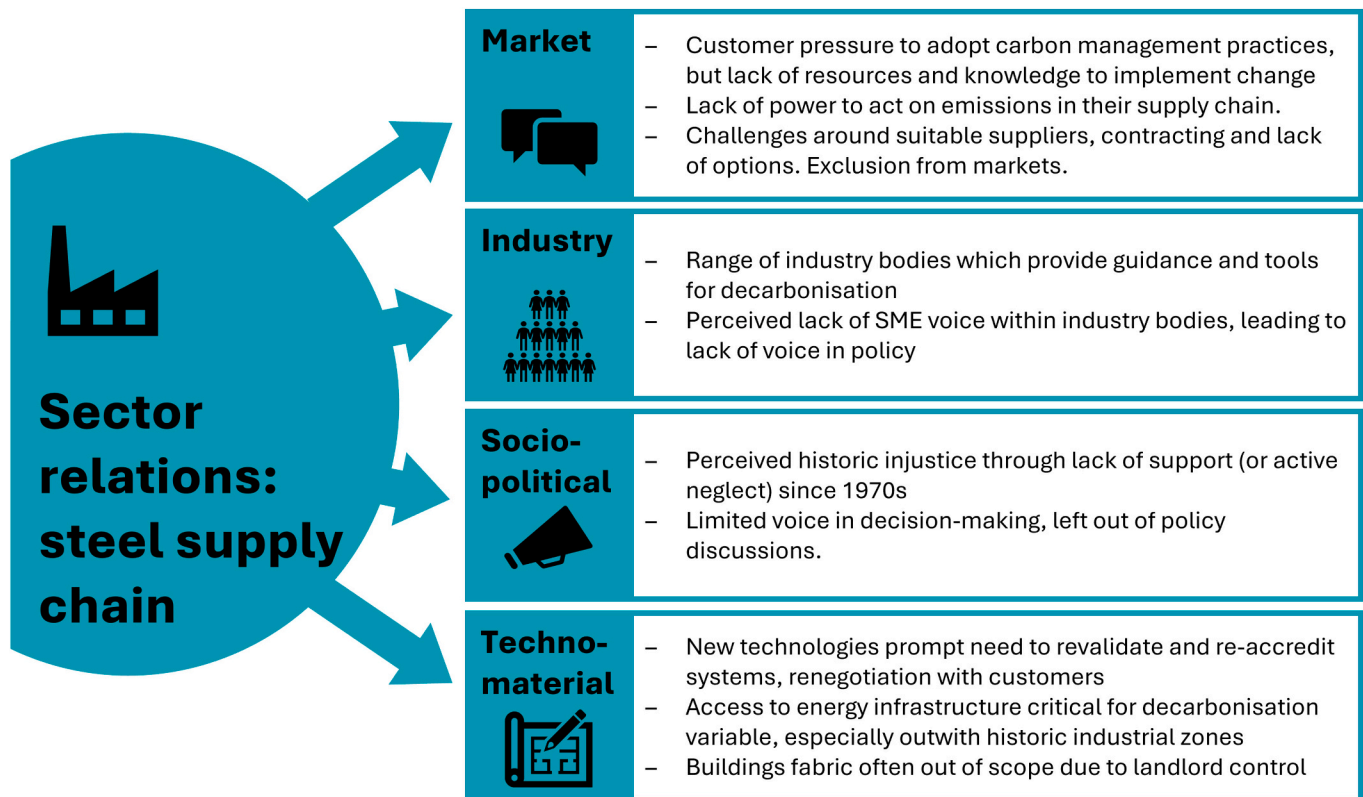


Fig. 2. Sectoral relations and SME just transition in steel supply chain.

a producer of specialist blades explained that its long-term UK-based steel supplier recently closed. This previous supply had a high recycled steel content and was produced using the UK's comparatively low carbon electricity. However, the firm was constrained by the limited availability of alternative suppliers. This led to contracting a new EU-based supplier with higher production-related carbon emissions and incurring greater transport-related emissions. The firm felt they had little option given their lack of buying power compared to larger manufacturing firms in, for instance, automotive and construction industries.

Other sectoral justice challenges relate to the position of SMEs in market-state relations, for instance, in steel recycling – a critical component of a low carbon steel sector. Metals recycling businesses and stakeholders spoke of how SMEs faced potential exclusion from markets as large producers sought to secure supply through vertical integration, alongside some calls to limit scrap steel markets through export restrictions [58]. SME participants argued that their voices were not heard in decision-making surrounding these issues. While some SMEs were well connected to sector and policy networks, most steel SMEs and stakeholders felt that policy discussions largely focused on the position of large producers, mediated by business representative organisations (see 4.2.2). There is an array of steel representative bodies, which often led development of sector sustainability standards, toolkits and other resources to support SMEs to meet climate action needs. However, participants varied on their views as to how well they represented SME needs and membership across these bodies tended to be only a small proportion of the sector:

“The average business has absolutely no voice whatsoever. If you are a member of the Chamber [of Commerce], you're filtered through so many other small members. The FSB [Federation of Small Businesses] isn't localised. [Manufacturing sector body] Make UK is only interested in big industries, so small companies have no voice” (Steel 01).

This was compounded by concern that any available support for SMEs was focused on innovation in growth-focused firms, which

excluded most SMEs, who needed practical support to deliver energy/carbon savings. Size matters too. For instance, in contrast to other sectors in our study, most of the steel businesses we spoke to employed over 10 people and with turnovers above £5 million, leaving them exempt from many sources of support:

“We are big enough to be a reasonably big consumer of energy, but nowhere near big enough to join a number of the schemes that allow you to offset that. So we're in that horrible sweet spot of neither being too big nor too small” (Steel 02).

These cases from the steel industry show how different market, regulatory and techno-material relations combine to produce specific pressures for businesses within sectors. While pressure to decarbonise is not a direct cause of injustice, SMEs' vulnerability to those pressures is a function of their relative inability to exercise agency due to their position within each of these sets of relations. Unequal power relations with customers and suppliers created procedural and distributional injustice, and relations with governance organisations highlighted recognition and procedural injustice.

4.2.2. Alternative perspectives: hairdressing and restaurants

Other sectors provided different insights. In hairdressing and restaurant sectors, decarbonisation agendas were less prominent and supply chain relations were experienced differently. SME salons and restaurants often hold exclusive supply deals with large corporates. Beside supplying products and marketing materials, some of these suppliers offer sustainability advice, and some have partnered with consultancy 'Net Zero Now' to develop sector-specific guidance alongside an online platform for carbon reduction. This provides an example of supply chain relations working to support action *with* rather than *over* SMEs. Some salon owners recognised their influence towards suppliers by “acting with their product choices” (Hairdressing 02) or actively pushing back against unsustainable suppliers, but also through working *with* them to become more sustainable. However, concerns arose

regarding conflicts of interest for corporate suppliers who wanted hairdressers and their customers to use more of their products or only a certain type of product (for example, some suppliers tried to prevent hair salon owners using a refill station for hair products). Salon owners felt these relations worked against sustainability goals. In absence of regulatory frameworks, the power of these firms to determine what mattered for climate action (and what did not) therefore shaped action by hairdressers (almost exclusively micro-firms or self-employed), as well as their relations with customers. Hairdresser participants also surfaced the challenge of landlord-SME relations. Most businesses do not own their premises, and two mentioned restrictions in their ability to install measures like solar panels:

“There’s quite a few [clients] that will say ‘why have you not got solar panels?’. And that would be amazing, but I don’t own the building. Then it’s like if I ever move building, I’m not going to take my solar panels with me.” (Hairdressing 09).

Unlike the steel industry, hairdressers lack established sector organisations, which has prompted some hairdressers to self-organise for climate action. One example of this is the Green Salon Collective (GSC) which provides sustainability guidance and offers recycling services. GSC also support hairdressers to hold conversations about sustainable hair practices with clients. These collective arrangements can support action to address power imbalances between SMEs and larger actors. They also produce distributional and procedural injustice depending on network inclusion and exclusion.

These different systemic challenges can be seen at a sector level for SMEs but the above analysis also shows how these challenges play out differently for different SMEs within sectors. We take this further in our next analytical layer through introducing differential spatial and temporal relations for just transition.

4.3. Dimensional relations and SME just transitions

Dimensional relations encompass various challenges, of which four were foregrounded in our empirical findings. (1) Through our horticulture case study we examine implications of climate action and impacts for geographic organisation of sectors, which impact SMEs differently. (2) Through our place-based case studies we explore how existing spatial economic patterns interact with energy transition, creating just transition challenges. Finally, we provide alternative

perspectives from steel and construction to highlight, (3) SMEs’ consideration of their own sphere of climate action agency, and (4) variable, nonlinear temporalities of change.

4.3.1. Case study: horticulture localisation

The horticulture sector (Fig. 3) is relatively emission and energy intensive, also facing climate impacts affecting crop production. One potential decarbonisation approach is through localised food networks, which some argue can support more just and sustainable agri-food systems [58]. In this scenario, supply chains are shortened, with horticulture goods produced, sold and consumed within a smaller geographic area. This pathway implies transformative change, potentially recentring small producers within horticulture supply chains [59].

“To have small scale peri urban market gardens [...] should be an important part of the landscape, and it connects people to food and helps people to have a connection to food. And there’s a lot that can be grown locally within the city boundaries... So, I think they have a very important part to play, small scale growers; because they are more accessible than a big farm.” (Horticulture 23).

“It would be nice to strengthen that resilience of the local network for local people; and people to see the value more in their local growers.” (Horticulture20).

A localisation pathway also generates justice challenges. First, shorter, consolidated supply chains have potentially negative implications for existing longer-distance logistics SMEs and for smaller retailers if producers shift to direct sales or through different intermediaries. Greater pressures are placed on small-scale farmers to ensure resilience of supply within a local area, while also often lacking capabilities to adopt new roles as retailers and logistics providers.

Although locally organised horticulture systems create potential for cooperative working, addressing elements of procedural justice, research on local agri-food cooperatives has found exclusion of vulnerable SMEs who are less well networked or unable to comply to specific qualification rules within cooperative/networks [60,61]. SME climate action therefore reminds of the potential lure of the ‘local trap’ [62]. Geographic change has both positive and negative implications for SME just transition.

4.3.2. Case study: place inequalities

Our place-based case studies illuminated how existing economic

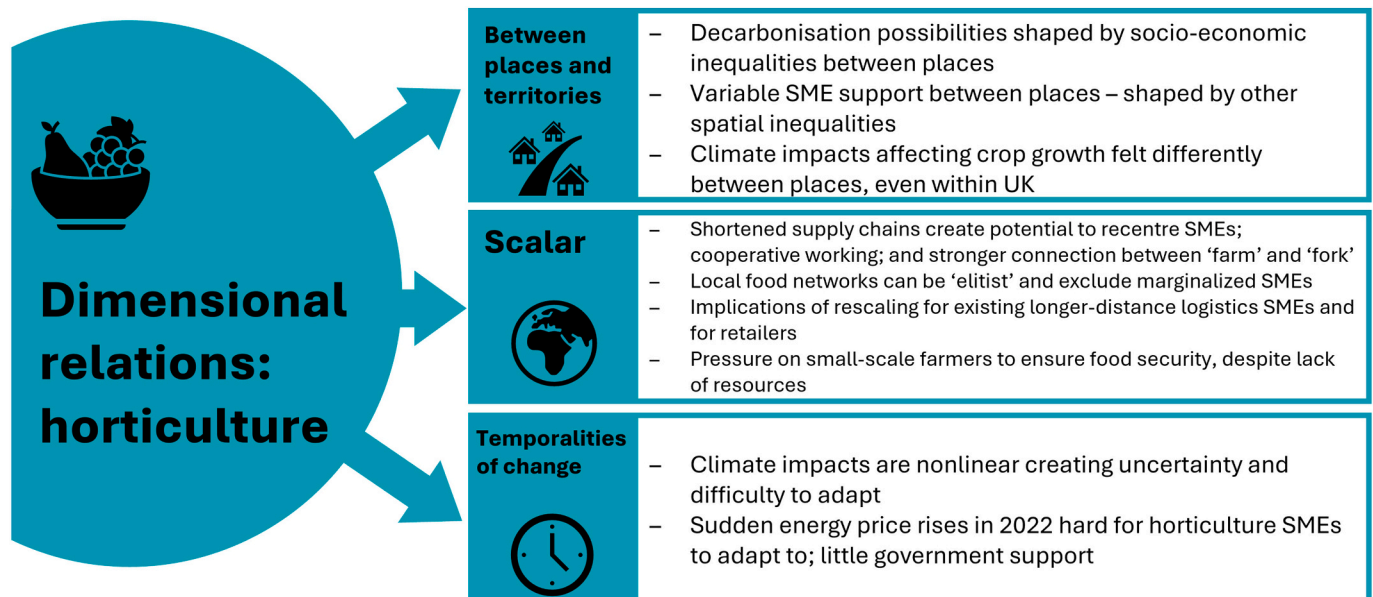


Fig. 3. Dimensional relations and SME just transitions in horticulture.

geographies matter for SME just transition. For example, in the UK, SME steel activity is concentrated in four regions, including South Wales and South Yorkshire – two of our place case studies. Stakeholders and businesses in these areas explained how industrial change over the last 40–50 years has damaged economic and social wellbeing, leaving a legacy of economic vulnerability: arguably an unjust transition which also brings calls for correcting past injustices (retribution justice). This spatial vulnerability has implications for SME just transitions. SMEs operating in areas of relative economic vulnerability are at particular risk of economic change, not only for businesses in exposed sectors (such as steel) but also wider SME networks which are directly or indirectly dependent on that industry. When there is a cluster of exposed businesses in one place this creates wider risks to other local businesses. Another dynamic in areas undergoing economic restructuring is the hope and expectation placed on start-ups for delivering innovation, economic diversification and growth. Local authorities and other anchor institutions such as universities invest resources to support SMEs with growth potential, yet by their nature, SMEs are often the most vulnerable to closure, relocation, or take-over.

The quality and availability of SME decarbonisation support differs between places. In the UK, changing approaches to sub-national governance over time and government fiscal retrenchment have produced geographically fragmented arrangements. These are difficult to navigate and result in spatial injustices for SMEs in areas with less well-developed support. The strength and availability of support maps onto uneven distribution of economic and social capital. While not representative of all regions, we found that SME networks and support infrastructure were weaker in the two places with greater economic challenges. This was especially pronounced in Wales, which used its 2014–20 European Regional Development Fund (ERDF) earmarked for supporting business decarbonisation to support SME R&D and community renewables. Unlike all regions of England and Scotland there were no projects dedicated to energy/resource efficiency for SMEs. By contrast, Oxfordshire boasts a plethora of business networks and support specifically for decarbonisation and low-carbon innovation, mainly led by the private or third sector.

4.3.3. *Alternative perspectives: scope and speed in steel and construction sectors*

Finally, drawing from examples in steel and construction sectors, we consider just transition implications of scope and speed of climate action. Dimensions of concern emerged as one consideration within these sectors: how SMEs understand the geographic and temporal scope of their agency and responsibility. In Section 4.2, we described the sector challenge of international steel production markets, which led one SME to change the source of its steel supply, increasing embedded emissions. Other steel SME participants reflected on their steel sources, sometimes arguing that embedded emissions were not their concern, given they had no direct relation to its production. Instead, they felt that responsibility lay with the country where it was produced. Lack of available data on such Scope 3 emissions also hindered decision-making, leading some SMEs to consider these as beyond their concern.

SMEs also face variable timescales for change. In some cases, the speed of transition is rapid. For instance, if goals to decarbonise buildings emissions are to be met, the construction sector will need to rapidly shift operations to low carbon construction, retrofit and maintenance. This leaves a large proportion of the workforce—notably heating engineers and related tradespeople—exposed to change within the next 5–10 years. Stakeholders and SMEs felt that most construction trade SMEs were not ready for this:

“They have got their head buried in the sand... The plumbers have got this general attitude that it's not going to affect us, I don't need to be worried” (Retrofit 02).

Sudden energy price increases in 2022 created acute pressures across sectors, producing additional vulnerability across all SMEs. In 2022, company insolvencies reached their highest rate since the 2008 global

economic crisis [63]. The changes required to mitigate for or adapt to climate change can be unpredictable and nonlinear, taking place over different timescales between sectors and places. This creates differential points of challenge for SMEs, which layers onto other potential justice challenges.

In summary, these dimensional facets overlay sectoral and organisational challenges to produce spatially and temporally variegated processes with important just transition implications for SMEs.

4.4. *Organisational relations*

We now analyse how organisational relations shape just transition potential. Beyond well-known influences of vulnerability like business size and owner-manager characteristics [64], our findings highlighted three areas of challenge for SME just transition: (1) business characteristics shaping capabilities and attitudes to change; (2) SME practices creating inclusion and exclusion in transitions; and (3) care and ethics in relationships with consumers and workers. These highlight different roles of businesses within just transition, not only as subjected to change but also as shaping the capabilities and experiences of others.

4.4.1. *Case study: construction trades*

We centre our analysis of organisational relations on construction trades (Fig. 4). This sector will be a critical transition enabler: retrofit-related construction trade activities are forecast to grow significantly [65].

First, climate action requires shifts in technologies and practices. In the UK construction and maintenance trades, one important change is the move from gas-powered space heating to lower carbon options, like electric air- or ground-source heat pumps. The UK government has targeted installation of 600,000 heat pumps per year by 2028, rising from 55,000 in 2022 [66]. This creates opportunities for new SME entrants as well as for growth of existing SMEs. From a just transition perspective, it is also important to consider firms currently focused on legacy construction and maintenance practices, such as gas heating engineers. Stakeholders outlined this challenge as a key consideration for just transition. From a sector perspective, stakeholders and SMEs felt there was insufficient communication and support for SMEs to refocus towards low carbon technology, and that inconsistent government policy created uncertainty, hampering SME decision-making. From an organisational perspective, business cultures were a challenge, with upgrading of skills commonly achieved through informal learning and on-the-job practices [67,68]. These SMEs tended not to seek formal advice, instead finding information through other businesses and trusted intermediaries, such as builders' or plumbers' merchants [69]. Respondents perceived that many SMEs and their workers were vulnerable to rapidly changing demands for energy technologies (see Section 4.3.3).

Second, retrofit sector growth highlights the need to support inclusive business practices to tackle existing injustices through entrenched inequalities relating to diversity and inclusion. For instance, only 15 % of workers in the UK construction sector are female [70]. Likewise, only 9 % of UK construction workers are categorised as Black or Minority Ethnic, compared to 20 % of the overall workforce [71]. This has created concerns about dominant ‘masculine’ cultures in construction SMEs that are resistant to business change, creating a non-inclusive environment for workers who do not fit this culture [72]. Growth in the sector through low carbon transition presents opportunities to address this. Further, research participants outlined challenging work conditions in construction trades, including emphasis on self-employment and enterprise as opposed to salaried labour. While such options can be appealing to some, offering potential flexibility and financial rewards, it also can be challenging for people who—for example—have caring responsibilities or do not feel able to risk ‘going alone’. Stakeholders therefore emphasised the need to support more diverse owner-manager characteristics through changing organisational and sectoral cultures; or potentially offer alternative routes to employment not based on the

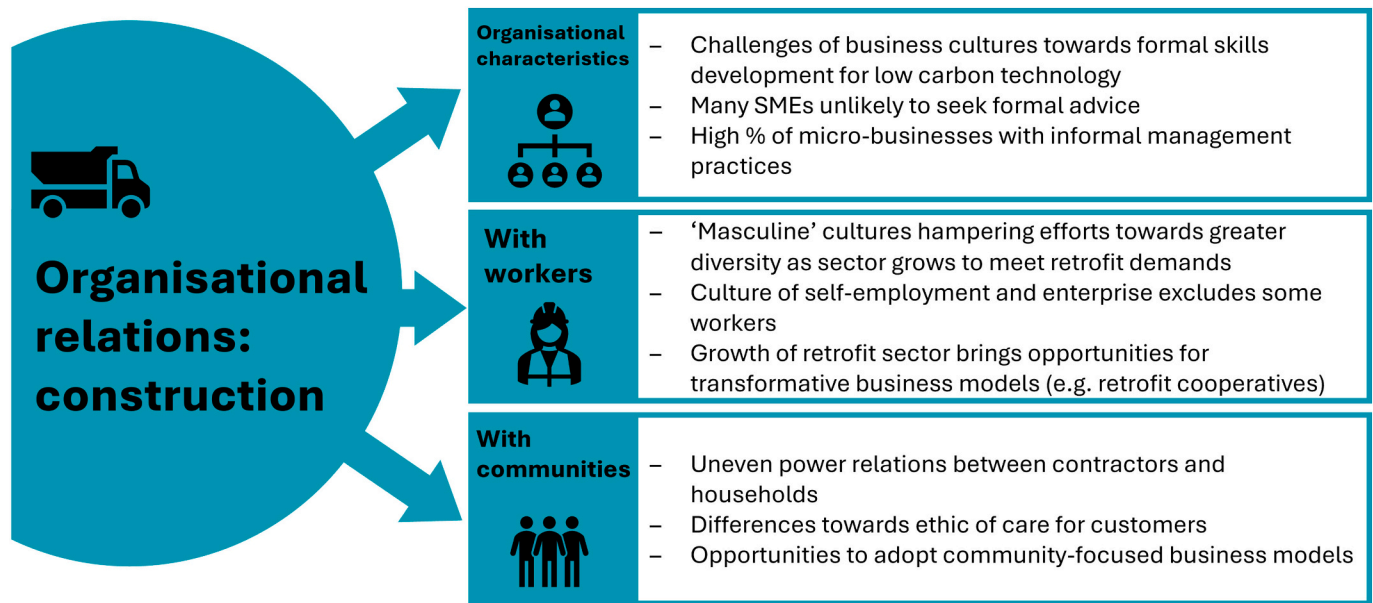


Fig. 4. Organisational relations and SME just transition in construction trades.

construction SME as the standard business model. In this sense, SMEs might produce barriers to just transition better addressed through alternative business models. Yet, the recent emergence of the retrofit sub-sector has created space for new entrants to experiment with different business models, such as retrofit cooperatives. One example, People Powered Retrofit, adopted a cooperative model as a 'one-stop shop' to support SMEs and residents to navigate retrofit. For SMEs, this includes training and retrofit opportunities. People Powered Retrofit thus provides an example of entrepreneurial action to address an identified just transition challenge while also adopting a business model that seeks to be inclusive and return value to the community.

Third, rapid and uneven growth in the retrofit industry, exacerbated by short-lived government funding schemes that encouraged high turnover of businesses, prompted concerns about some SMEs' business practices. An influx of funding in 2020–21 through the UK government's Green Homes Grant provides one such example. Stakeholders and SMEs outlined how sector challenges (uneven regulation, uncertain policy, skills shortages) combined with specific dimensional facets (short-lived non-targeted funding) to create opportunities for new market entrants operating with what some respondents felt were unethical practices. SMEs' capacities to attain relevant standards, like the UK's PAS2035 retrofit standard, were variable but limited and some businesses circumvented other standards like the UK's Microgeneration Certification Scheme through sub-contracting to non-accredited installers. Returning to the heat pumps example, this prompted concerns that customers regularly received incorrect advice and poorly installed systems.

"The main issue you've got with air source is a lot of companies do it, they don't know what they're doing and this is where it's causing problems ... it gives it a bad name." (RT05).

Redesigned regulatory systems could reduce this problem but it also highlights how some SMEs' organisational cultures resulted in neglecting an ethic of care for customers. This produces relational injustice between SMEs and customers. Retrofit work is underpinned by trust between contractors and households [73] which is damaged by such activities, also highlighting uneven power relations between contractors and households who lack the technical knowledge to assess recommendations made to them. However, these concerns were raised by firms who stressed their own ethic of care towards customers, often—they argued—going against 'rational' business practices.

4.4.2. Alternative perspective: restaurants

Across our study we also encountered an ethic of care towards workers, as in the case of our research with restaurateurs. Over half of restaurant owners interviewed said that investment in energy saving technologies was centred on staff wellbeing ahead of cost-savings. This included more reliable cooking controls, cooler kitchens, and better air quality. Our research included a restaurateur who was experiencing climate impacts through extreme heat, having to close their kitchen during record UK temperatures in 2022. Their investment in more energy efficient technology aimed to reduce heat in the kitchen partly to adapt to a changing climate. While not always connected to direct action, this care for workers was apparent across our study, also pointing to how SMEs can be supported to enact decarbonisation measures that enhance worker wellbeing.

Our examination of organisational relations and SME just transition illuminated the power dynamics, values and ethics inherent within these relations and resulting just transition implications for SMEs. This section also highlighted interactions between sector, dimensional and organisational relations to produce just transition challenges: for instance, the temporalities of retrofit and related governmental programmes combine with existing business practices and cultures to produce conditions for unethical business practices and challenges for reskilling/reorientation of SMEs and their workers.

5. Conclusion: implications for transformative SME climate action

This article has advanced understanding of SME climate action by developing a distinctive approach to investigating SME just transitions, making it the first detailed academic treatment of this issue. Our key contributions to knowledge are as follows:

- Our primary conceptual contribution is to advance understanding of SME energy transitions and SME climate action by developing an integrated framework to investigate variable SME vulnerability and points of (in)justice across different sets of relations.
- We have contributed to empirical knowledge through investigation of just transition for SMEs in five sectors in five places, with transferability to many global north contexts. This deliberately wide-ranging approach was appropriate to examine the range of

relations and differing potential justice challenges across SMEs. Further research is necessary to produce more fine-grained analysis of specific issues and differences between SMEs.

- We made a novel contribution to just transition literature through (a) introducing SMEs as a subject of concern for just transition and (b) through our novel analytical framework, which has potential for application in other fields beyond SME studies and other geographic contexts.

Bringing together the analytical framework and empirical findings, we conclude by outlining three implications for transformative SME just transitions. The challenges are: identifying, reaching and supporting the most vulnerable; identifying intervention points; recognising and supporting SMEs as climate citizens.

5.1. Identifying, reaching and supporting the most vulnerable

Our framework was designed to highlight and identify heterogeneity across SMEs and their variable position in relation to just transition. We did not explore all aspects of this – for instance, we sacrificed more detailed engagement with differences between SMEs within each category for illuminating different ways that SMEs were implicated in just transition challenges. However, the framework can be used to more systematically investigate differences between SMEs, through triangulation of sectoral, dimensional and organisational traits. We focused on outlining each domain separately but nonetheless points of interaction arose, for instance between speed of transition (dimensions) and organisational cultures (organisation) in retrofit businesses.

A specific intention of focusing on different experiences across different types of relation is to allow identification of the most vulnerable. Our framework and empirical analysis allowed understanding of comparative vulnerability and how this is produced through sectoral, dimensional and organisational relations. While we took each element separately to explore challenges in different sectors to highlight variation, the framework can also be used in a more diagnostic capacity to identify firms or groups of firms within sectors that might be particularly at risk of an unjust transition. For instance, the framework can help identify businesses in sectors with strong regulatory and supply chain pressures with limited SME agency or self-organisation which are also geographically exposed due to location in economically vulnerable places, and possess organisational characteristics that make them more vulnerable to change.

5.2. Identifying intervention points

Overlaying sectoral, dimensional and organisational relations in specific situations helps to identify points of tension and potential intervention. While space prohibits a more detailed exposition here, the retrofit sector example showed how sectoral conditions such as skills provision and uneven government policy combined with organisational cultures and SME business practices to produce worker-related just transition challenges. There are diverse relations bundled into this challenge, such as between the SME and local skills providers (or intermediaries who might support access), employment pathways, their workers, and different SMEs. To give another example, in hairdressing, *influence* sits at the heart of relational dynamics between SMEs, corporate suppliers, other businesses and clients. Yet the ways influence plays out have key implications for justice and carbon emissions. The provision of sustainability support by large corporates is, on the one hand, a resource which offsets the need for public resources to support SMEs. On the other hand, haircare product suppliers have a vested interest to promote frequent washing and treatment of hair, with implications for excessive energy and water use. Interventions which promote grassroots, collective efforts such as the Green Salon Collective might help to balance the relational dynamics within the sector as it transitions.

5.3. Recognising SMEs as climate citizens

Moving towards more transformative SME just transition requires applying understanding of SMEs as socially embedded to engage more directly with their role as climate citizens [45,74]. This requires qualitatively understanding relations as built on numerous social ties and intentions. We found several examples of how SMEs see their business operations as a duty of care, which shapes how they approach climate action with workers, customers and communities. Fostering these relations and the values held within them is critical to strengthen points of promise for SME just transition. A corollary to this is in using or strengthening bonds of care and trust to encourage climate action in SMEs. There is existing literature on who SMEs trust to provide knowledge and information on climate action, although there is less on how vulnerable or marginalised businesses might be reached [75]. There is need for further in-depth study on how, and which, ‘care-full’ [76] relationships can be supported to enable SME climate action.

5.4. Concluding remarks

Taken together, the implications of this research highlight the need to understand SMEs as a concern for just transition in scholarship, policy and practice. A relational approach to SME just transition should also prompt more holistic approaches to understanding the position of SMEs within climate action and detailed specific interrogation of SMEs' different interactions with their stakeholders will be useful to further explicate SME just transitions in specific situations.

Our framework situates individual relations within broader sets of relations, partly as a way of organising our analysis but also to show how a relational perspective needs to be considered systemically and holistically, with relations situated within different contexts. It is not enough in itself to say SMEs are engaged with diverse relations—such a framework needs to be practically operational too, especially for action beyond academic discourse—but it is important to understand these relations to fully grasp SME just transition implications. Our approach chimes with recent work arguing for policymakers to better understand climate action as driven through emotional ties as much as through financial decision-making [77]. Following this argument, this article contributes to just transition literature by foregrounding SMEs as crucial actors for climate action. Not only as organisations which will innovate and implement the solutions needed to decarbonise the economy, but as actors which can also be vulnerable to injustice, and agents of change.

CRedit authorship contribution statement

Will Eadson: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sam Hampton:** Writing – review & editing, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Richard Blundel:** Writing – review & editing, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Elpida Apostolopoulou:** Writing – review & editing, Investigation, Formal analysis, Conceptualization. **Briony Latter:** Writing – review & editing, Investigation, Formal analysis. **Dawn Witherley:** Writing – review & editing, Investigation, Formal analysis. **Ben Hardy-Jones:** Investigation, Formal analysis. **Katherine Sugar:** Investigation, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1. SME just transition challenges across five sectors

Sector	Climate Exposure	Sectoral relations	Dimensional relations	Organisational relations	Just transition implications
<i>Steel supply chains</i>	Energy intensive processes. High embedded emissions (primary steel production).	Increasing international regulation, and pressure from customers to decarbonise. Uneven power relations and lack of agency with suppliers and customers. Position of SMEs in some sub-sectors threatened by vertical integration for circular steel flows.	Spatially concentrated sector (mostly in economically vulnerable places) creates additional exposure/vulnerability. Distanced supply chains create challenges for bounding of responsibility.	Large proportion of family firms with long history (50–100 years). Evidence of paternalist cultures – care for workers but not usually as stakeholders in decision-making. Skilled workforce, used to working within strict specifications but formal training often limited (e.g. reskilling for climate action).	DOMAINS: Constrained agency with regards to suppliers and customers; lack of technological solutions – distributional implications. DEPTH: Conservative industry – focus on incremental technological change.
<i>Horticulture</i>	Exposed to climate impacts (e.g. extreme weather, supply chain disruption). Energy intensive processes.	Disjointed sector, with no clear governance structure and lack of adequate policy frameworks to facilitate the net zero transition. Exclusion of small and micro horticulture businesses from existing support schemes. Market-regulated sector, with suppliers and retailers putting pressure and creating unfavourable conditions for small-scale growers. High barriers to entry, due to land access limitations. Some sub-sectors (e.g. cut flowers) highly dependent on uninterrupted international trade.	Highly diverse over space and time: diversity of product type (fruit, vegetables, flowers, plants) each with different geographic, climatic and market dynamics, and different pathways to decarbonisation.	Ephemeral business, often with short business lifespan, due to intrinsic volatility. Some sub-sectors (e.g. floriculture) with large female labour force. Highly variable adaptive capacity, i.e. resources available and technical know-how. Labour intensive industry, but variable employment practices including informal/seasonal labour and migrant workers – creates justice concerns for climate impacts.	DOMAINS: Distributive implications due to lack of resources of horticulture SMEs to implement net zero technologies; Procedural and recognition justice implications due to lack of active participation of various horticulture growers/businesses in decision-making processes; lack of sectoral representation. DEPTH: Largescale shift in agricultural practices likely: key challenge to democratise innovation, so that new transformative technologies can be widely adopted by SMEs.
Sector	Climate Exposure	Sectoral relations	Dimensional relations	Organisational relations	Just transition implications
<i>Retrofit /Construction trades</i>	Key role as enabler of transition. High embedded emissions in some trades (e.g. concrete, steel use).	Disjointed and variable retrofit support creates uncertainty for action. Focus on demand side (buildings and households) risks neglecting employment, skills and supply chain support.	Speed of scale-up pressures creating uncertain economic pathway for retrofit scale-up. Relatively even geographic spread.	Workers in 'legacy' construction roles unable or unwilling to reskill for retrofit / low carbon construction. Challenges in new, rapidly growing sector to support responsible and inclusive business practices.	DOMAINS: Distributive challenges for reskilling/reorientating 'legacy' SMEs to low carbon sectors; and variable employment (e.g. inclusion) and relations with customers. DEPTH: rapid growth of sector required to meet retrofit goals; challenge to embed transformative change to business practices to achieve inclusive and equitable transition.
<i>Hairdressers</i>	Energy intensive processes. Role as everyday influencers on climate change.	Relationship with suppliers offers both opportunities and barriers to action/ conflicts of interest. Self-organisation for climate action. Two-way relationship with clients. Links to local businesses and networking groups, but not necessarily other local hair salons. Participation in industry events and involvement with industry bodies. Adoption of more sustainable practices and technologies within salons related to haircare and general business activities.	Extremely widespread industry. Differences in local connections to e.g. other hair salons, local businesses, business groups or networks in local area or wider region. Differences in municipal provision e.g. recycling which can have a knock on impact on salon actions.	Climate action led by owner/director – variation in how embedded this is in individual salon culture. Education and training opportunities at different career stages. Can have long-term, knowledgeable and caring relationships with clients. Widely situated within communities. Potentially different characteristics depending on type of salon and clientele.	DOMAINS: Procedural and recognition challenges due to lack of widespread engagement across the sector. Distributive challenges for sustainability knowledge and education, and how equally distributed the impact of decisions are between different actors in the sector. DEPTH: Mixed ability to change, from incremental (e.g. dependent on client base, lack of support or knowledge) to transformative (e.g. if led by a knowledgeable and proactive owner).

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Sector	Climate Exposure	Sectoral relations	Dimensional relations	Organisational relations	Just transition implications
Sector	Climate Exposure	Sectoral relations	Dimensional relations	Organisational relations	Just transition implications
Restaurants	Energy intensive processes. Significant non-energy (Scope 3) emissions. Vulnerable to food supply chain shocks	Diverse supplier relationships (large corporate to small, local producers). Extensive franchise model with associated power-relations. Cuisine-type (e.g. national) a key factor in sector relations	Extremely widespread, but diverse identities (e.g. cuisine-type). Local embeddedness dependent on size (independent vs chain vs franchise). Geographical relations influenced by food sourcing	Increasingly precarious labour market and recruitment challenges. Skills challenges (e.g. finding qualified chefs) can be fundamental to business model, but affect independents, and high-end SMEs disproportionately. Ethic of care: staff wellbeing (comfort, indoor air pollution, controls) key driver of energy-related investment	DOMAINS: Recognition challenges as SMEs compete with dominance of large chains and suppliers. Cuisine-type market structures and varying tastes can generate unique exposure for marginalised groups (e.g. minoritised ethnic groups, immigrant labour). DEPTH: Electrification (of heat and cooking) requires significant capital investment, while reducing Scope 3 (food) emissions will encounter structural and social barriers by many (e.g. steak houses).

Data availability

The authors do not have permission to share data.

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