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Re-imagining the scales, dimensions, and fields of socio-ecological sustainability

Abstract

This paper critiques the two-dimensional (hierarchical-spatial) focus on scales evident in management and organizational studies, and the Capitalist Ecological Modernisation (CEM) paradigm that dominates current corporate and governmental approaches to sustainability. Our contribution is to propose a more complex and nuanced understanding of scale, which incorporates social, political, temporal, and material dimensions. We propose a heuristic framework from Harvey (2010) in order to evaluate different paradigms of socio-ecological organizing: specifically, the dominant paradigm of CEM against a Social Ecology (SE) alternative. We explore the divergent conceptions of, and relative importance placed upon, concepts of scale, grain, level, and field in these two contrasting paradigms. Our analysis highlights the limitations and contradictions of the CEM expression of scale, namely its predominant focus on measurement and expansion through 'economies of scale'. By offering an alternative conception of the links between scales, grains, levels, and social fields, we show how this enriches the conceptualisation of potential forms of socio-ecological organizing and opens up the potential for alternative modes of organizing socio-ecological sustainability.

Keywords: scale, sustainability, ecological modernisation, social ecology

Introduction

> Here at the World Business Council for Sustainable Development (WBCSD), we are strongly engaged in translating the SDGs' [the Sustainable Development Goals established by the United Nations] ambitions and words into business *action* underpinned by *business solutions*. We define solutions as business-led ventures that are impactful, **scalable**, **measurable**, **replicable**, and going beyond business as usual. These solutions enable companies to better manage their risks, anticipate consumers' demand, **build positions in growth markets**, **secure access to needed resources, and strengthen their supply chains** (*italics* in original, **bold** added, WBCSD, 2016a).

Mainstream corporate and governmental approaches to sustainability are often identified as adhering to the ideals of 'ecological modernisation' (Schlosberg and Rinfret, 2008; Mol *et al.*, 2009; Moore, 2011, 2014; Nyberg and Wright, 2013), which 'refers to a restructuring of the capitalist political economy along more environmentally sound lines' (Dryzek, 2005 p.167), as reflected in our opening quote. In this paper, we reframe the concept of scale to highlight the unacknowledged contradictions within the underpinning logics and rationales of ecological modernisation. The principal unacknowledged contradiction is that sustainability may be combined with perpetual growth in human consumption of products and services, because innovation will sufficiently reduce the material and energy inputs involved in production and distribution (e.g. Porter and van der Linde, 1995; Nidumolu *et al.*, 2009). Concomitantly, sustainability initiatives to support the greening of capitalism are to be 'scaled up' by incorporating environmental degradation as a 'structural problem' into economic processes in order to prevent, mitigate, or adapt to ensuing ecological issues

(Nyberg and Wright, 2013). Thus, ideas about the benefits of 'economies of scale' underlie both corporate sustainability initiatives and the majority of management and organizational studies, which assume that existing economic, social, and political arrangements can remain largely unchanged by applying a 'common-sense' and universal organizational principle of efficiencies via economies of scale (Scharber and Dancs, 2016).

While the Capitalist Ecological Modernisation (CEM) paradigm uses the concept of scale in terms of measurement, with the goal of enlargement and operational efficiencies, writers from human geography and political ecology have pointed to crucial questions such as: 'What is to be 'scaled'?'; 'What 'scales' should be used for measuring?'; and, 'Who decides what is to be measured and how?' (Adger *et al.*, 2005; Marston *et al.*, 2005; Sayre, 2005; Jonas, 2006; Neumann, 2009). In common with several critiques of CEM, critical authors writing in the field of management and organizational studies highlight that what is largely ignored in approaches to sustainability is the social and political context (Banerjee, 2012; Foster, 2012). An appreciation of these questions raises the issue of how organizational arrangements are produced by, and in turn reproduce, our relationship with(in) ecosystems. Re-integrating the social and political context into organizational studies of sustainability is increasingly urgent, given research in the natural sciences which suggests that changes in planetary systems threaten humankind's existence (Steffen *et al.*, 2015). Our contribution in this paper is to attempt this re-integration within management and organizational studies by both critically interrogating the concept of scale, and then proposing a way of relating scale to both CEM and a social-ecological alternative.

To achieve this aim, we employ a heuristic framework derived from Harvey (2010) that portrays the inter-relationships between six different social 'moments' or 'fields'. This

framework is utilized as a generative tool for categorization and analysis that can stimulate and enable the 'imaginative thinking' (Lê, 2013 p.738) and 'radical re-visioning' (Banerjee, 2012 p. 1783) that various authors in the field of management and organizational studies have argued is required in the contemporary context of ecological and social crises. We populate this heuristic and analytical framework not only with an analysis of CEM, but also with an alternative conception of humankind's relation to the natural world: Bookchin's (1980, 1982, 1990; 1996) Social Ecology (SE). By reframing scale and associated concepts as inevitably social and political, through our analysis of CEM and SE paradigms, we extend thinking about the scope and possibilities for what it could mean to organize business and wider society within the ecological environment in ways that are mutually respectful rather than degrading.

There has been limited consideration of the meanings and implications of scale in management and organizational studies. A key contribution is the work of Spicer (2006), which suggests that because the meanings of scale are embedded in social-political processes, the way the concept is employed can transform the possible actions that organizations undertake. In his conceptualisation of spatial scales, Spicer particularly draws on human geography that emphasises the importance of appreciating how 'process, evolution, dynamism, and sociopolitical contestation' are key to understanding scales (Brenner, 2001 p.592). The growing interest in the concept of scale within management and organizational studies includes papers that have explored the implications of different temporal scales for organizing, and are underpinned by differing notions of time (Zaheer *et al.*, 1999; Orlikowski and Yates, 2002). For example, Bansal and Knox-Hayes (2013) stress the importance of temporal scale in understanding the relationships between the physical environment and the social environment within sustainability initiatives. By drawing on ideas about scale from

human geography and political ecology, and the emerging application of these ideas in management and organizational studies, we contribute by developing a concept of scaling for sustainability that integrates political, social, temporal, and material dimensions. To show the possibilities for this developed concept of scale we suggest a model based on Harvey's (2010) framework for evaluating different approaches to sustainability. As such, the paper contributes a developed heuristic framework that has the potential to enable insights – for both organizational practitioners and scholars – into the management issues and challenges of enacting socio-ecologically sustainable ways of organizing.

Our paper proceeds as follows. We begin by illustrating the assumptions of 'scaling up' in corporate sustainability initiatives and in the CEM paradigm; as well as their predominance in management and organizational studies. We then develop a critique of scale as represented by CEM, using human geography and political ecology literature to develop a broader understanding of scales, grain, levels, and fields. This provides an analytical set of concepts for comparing paradigms of socio-ecological organization. We then introduce a heuristic framework of social fields as a way of exploring the relations between production, ecosystems, and organization. We employ this framework to comparatively evaluate CEM and an alternative paradigm of SE. In our discussion and conclusion, we consider the limitations of the conception of scale as utilised within the paradigm of CEM, and argue for the importance of integrating political, social, and material perspectives in understanding socio-ecological management and organization. We also indicate the potential of developing SE's understanding of the importance of the organization of both social and ecological relations for alternative forms of theorizing and organizing in pursuit of socio-ecological sustainability.

'Scale' in corporate sustainability initiatives, CEM, and management and organizational studies.

The WBCSD is a CEO-led organization of 200 member companies that have a combined revenue of over $US 7 trillion; it is attempting 'to create a sustainable future for business, society, and the environment' (2016b). It is a prime example of the CEM paradigm that dominates corporate and governmental thinking on tackling ecological problems. It reflects a particular conception of scale with respect to corporate sustainability. For example, it describes its 'Action2020 platform' as 'a *science-based* action plan we launched in late 2013, engaging companies to implement innovative and *scalable* business solutions and *improve the business case for sustainability*' (*italics* added, WBCSD, 2016a). Similar examples of this 'scaling-up' logic are widespread (see Forum for the Future and the Shell Foundation, 2016; World Bank, 2011, 2014; Kim, 2015). As will be developed below, such logic exhibits several of the key features of CEM. In its talk of '*scaling* solutions', 'the *scaling* capabilities of corporations', and the aim of attracting 'large-*scale* capital from commercial investors to finance the international *scale up* and replication of the most successful corporate impact ventures' (*italics* added, WBCSD, 2016a), we can see that the predominant meaning attached to the word is expansion and operational efficiency through 'economies of scale', made possible via measurement. One example of this logic in practice is exemplified in various reviews of Sustainable Supply Chain Management practice that focus on the collaborative advantage to be had from companies implementing corporate responsibility practices and achieving 'a higher efficiency in logistics performance and resource usage' (Beske *et al.*, 2014; see also: Gold *et al.*, 2010; Carter and Liane Easton, 2011).

Scaling-up sustainability in such initiatives are aspects of the economistic and utilitarian

approach of CEM, which is predicated on assumptions of trade, efficiency, and diffusion via 'economies of scale', and the commensurability of trade-offs between costs and benefits (Scharber and Dancs, 2016). For example, Böhm, Misoczky and Moog (2012), in their analysis of carbon markets as a form of sustainability management, explore how the CEM processes of financialization support the commodification of nature that informs and reinforces logics of 'economies of scale'. This is because these processes of commodifying ecosystems, in tandem with production, mean that scaling-up by replicating and expanding organization is seen as *the* way forward.

The CEM paradigm also entails processes of time-space and socio-material compression via financial measurement (Giddens, 1990; Orlikowski and Yates, 2002). For example, Bansal and Knox-Hayes (2013) argue that carbon markets compress social space by allowing carbon credits to be exchanged internationally, and that they compress social time by the use of derivatives and futures markets to calculate future carbon values via current financial instruments. In such ways, corporate sustainability initiatives informed by a CEM scale are essentially two-dimensional. In CEM, scale tends to be considered in a hierarchical-spatial manner, where the social is prefigured in terms of vertical hierarchy (Blaug, 1999, 2009) and the spatial in terms of range (or size), both of which are subject to quantitative measurement (Spicer, 2006; Taylor and Spicer, 2007; Vaara and Faÿ, 2011); for example, organizations are managed in terms of local branches of international companies, or from local to regional to international supply chains (e.g. Aguilera *et al.*, 2007).

While corporate sustainability initiatives tend to consider scale in a hierarchical-spatial manner, elements of management and organizational studies have incorporated temporal issues (e.g. Butler, 1995; Zaheer *et al.*, 1999; Orlikowski and Yates, 2002), but, arguably, this

field of study also tends to focus on the spatial and the social-as-hierarchy (e.g. Spicer, 2006; Taylor and Spicer, 2007; Beyes and Steyaert, 2012). This work, however, has not yet been applied to questions of the relationships between business and the natural environment (for example, in a recent handbook on business and the natural environment Bansal and Hoffman (2011) do not include scale in the index). Bansal and Knox-Hayes (2013) argue that insights from human geography into the inter-relationships between physical materiality and socio-materiality are necessary for organization theory to begin to adequately conceptualise the natural environment, and, arguably, to develop conceptualisations of alternative practice.

We have argued that the concept of scale associated with CEM does not pay sufficient attention to the time-space and socio-material dimensions. Consequently, the assumption of universal scalability and of commensurability between scales is questionable, and requires theoretical development if scale is to be a truly useful concept in relation to sustainability. In the following section, therefore, we draw on human geography and political ecology to develop a more nuanced and complex understanding of scale that incorporates a wider range of relevant issues (including political, social, and material) through acknowledging the role of dimensions and fields. This is then developed and illustrated through a comparison of the CEM paradigm and the SE paradigm in order to enhance the understanding of management scholars and practitioners concerning the relationship between business and the natural environment.

Scales, dimensions, and fields for organizing socio-ecological life

Although ‘scale’ is a core theoretical concern within the discipline of human geography (Watson, 1978; Marston, 2000), its conceptual richness is only partially reflected in

management and organizational studies and the CEM paradigm. Temporal description and measurement, for example, involve significant epistemological issues in human geography. Temporal scales are commonly a mode of structuring organizational processes (Orlikowski and Yates, 2002), and involve various combinations of socio-material and physical material elements. For example, many daily routines of people working in organizations, such as weekly meetings, quarterly reports, or annual budgeting cycles, involve socio-material routines based around the rotation of the Earth on its axis and so can be understood as primarily socio-materially constructed rhythms using different temporal scales. On the other hand, nutrient cycles (de Vries *et al.*, 2015) or ecosystem cycles (Dietze *et al.*, 2011) are primarily physically material, even though they are increasingly affected by socio-material human practices. This conception of scaling requires active consideration of what Ricoeur (1985) has described as the relation between social 'lived' time, historical time, and cosmological time. While it is not uncommon to combine spatial and temporal scales, in ecosystem modelling for example (Dietze *et al.*, 2011), the tendency within organizational and management studies and CEM has been to prioritise the hierarchical-spatial dimension of life and so neglect the more complex relation between scale and the social. For example, van Wijk (2014) argues that many multi-scale land-use models do not capture the complexity of human-environment interactions across different scales.

There is also a whole range of qualitative ways of considering the social aspects of scale. Political ecologists, for example, have used scale to make comparisons between different levels of a governing body and the way in which they may undertake different forms of intervention (March and Saurí, 2013). Such work foregrounds the importance of considering the 'politics of scale', that is, the political dimension in choosing sites of interest and intervention, and mechanisms for measuring and observing these sites and interventions that

may be qualitative as well as quantitative (for discussions of the 'politics of scale' perspective, see Delaney and Leitner, 1997; Cox, 1998; Swyngedouw and Heynen, 2003). Penning-Rowsell and Johnson (2015), for example, argue that while the responsibility for flood risk management has been steadily decentralised and located at a local level in Britain over the last 70 years, the crucial factor is that 'the control over key decision-making tools, resources and other modalities of power remains in the hands of a few key national-level decision-makers' (p.131). Such work, rather than taking the concept of scale as a simple quantitative measure where bigger is better, is predominantly interested in the 'scalar practices of social actors' (Moore, 2008 p.212).

By developing this sensitivity to the politics of scale we can appreciate a dimension that is occluded by the two-dimensional hierarchical-spatial focus of CEM. Whereas such initiatives assume that expanding their impact is necessarily a positive thing, an awareness of the political dimension expresses the interests invoked, pursued, and developed by such initiatives. These interests are often divergent, contested, or opposing rather than unitary, as is often assumed in CEM. Consequently, 'scalar practices' – the production of modes of measuring, their application, and their development – are often presented as a technical or operational issue. Such an approach inhibits or defers the political contestation of the use of these scales (Spicer, 2006).

What we then require is a concept of scale that is sufficiently complex and nuanced to enable us to make sense of the interactions between these different social, political, spatial, material, and temporal dimensions. To do this we suggest some terminological clarification that will enable us to differentiate between them. Frequently, such dimensions are not specified and so there is a tendency for the social and the spatial dimensions to be conflated. As noted by

Marston *et al.* (2005), it is also necessary to disaggregate the notion of scale as denoting size, and the notion of scale as denoting differentially nested hierarchical levels (whether they are spatial or social in character). Therefore, in the following we restrict the use of the term scale to refer to the measurement and denotation of size. We utilise the term *level* to denote different classifications of organization that emergently constitute a particular social and political order, including hierarchical orders. Political ecologists have also argued for the need to insert the concept of *grain* as the orienting moment which, through political processes, enables measurement in the first place (Sayre, 2005).

To put the three concepts of grain, scale, and level in relation to each other: Firstly, grain refers to the smallest observable datum point (in social, spatial, temporal, or other quantitative or qualitative terms) appropriate to the phenomenon in question. In organizational terms, we might decide that the grain will be at the level of the individual worker or a functional team. Scale, in turn, can be defined as an appropriate means of measurement (e.g. of length in metres or weight in grams); in organizational terms we might decide to scale (measure) customer satisfaction or total sales value. Level, in turn, refers to different classifications of ‘‘observable levels of organization produced by processes’ (Sayre, 2005 p.283). An example of an organizational level would be a combined ‘sales and marketing’ function. Thus, decisions regarding grain, scale, and level are uncertain and are epistemologically and methodologically significant (and thus also of political importance).

Holding these distinctions in mind helps to avoid the tendency to use scale to refer to both the means of measurement and the different levels of the phenomenon being discussed (as well as any assumed efficiencies to be generated through expansion of an activity). One significant insight that we develop below is that within CEM, ecosystems are treated as separate

observable entities: that is, in entirely quantitative and scalable (measurable) terms that render them manageable as discrete 'things'. Political ecologists (and ourselves), on the other hand, view social and ecological systems as being intrinsically intertwined, inter-related, qualitative, and mutually constitutive. Consequently, political ecologists use a range of hybrid terms such as socio-ecological, socio-environmental, and socio-natural, which are 'meant to incorporate the social and ecological, material and symbolic, and spatial and temporal dynamics that collectively constitute the analytical focus of the political ecology of scale research' (Neumann, 2009 p.403).

At the risk of terminological overload, we suggest that the concept of *field* is required to complete our proposal for a more differentiated understanding of scale, and to enable an evaluation of the complex social and political relations that are required for a critical understanding of CEM and its alternatives. Field is the background within which a foreground unit can be observed and potentially measured (Rubin, 2001). We see an appreciation of field (i.e. a fundamental and socially constructed understanding of what should be perceived or measured, how it should be perceived, and the inter-relations between that which is perceived) as a theoretical prerequisite for any conception of scale. The way in which we understand sustainability relies on the often-implicit answers to questions regarding what features of socio-ecological processes are in question. We need to ask: What is the field or site of relations that should be perceived or measured? What is the most appropriate mode of measurement (scale)? What is the smallest unit of interest appropriate (grain)? What is the most appropriate boundary of attention (level)? Finally, what are the social and political processes by which all these decisions are made? In the case of CEM, many of these questions are simply invisible. It is taken for granted that the organizational or 'market' levels are the most appropriate and that quantitative measures that reflect 'scaling-up' are the

indicators of successful sustainability.

To summarise our argument thus far, we began with the observation that scale is used in a limited two-dimensional way within most sustainability discourse that forms part of the dominant CEM paradigm. The result of this is to obscure the political, social, and material complexity involved in scaling for sustainability in CEM and alternative paradigms. We introduced a number of terms (level, grain, and field) to implant and reveal the political, social, and material complexity and negotiability of the scale concept. In our next section, we propose a conceptual model – based on Harvey's (2010) work – that can incorporate this enhanced understanding of scale and so enable a more critical understanding of scale with respect to sustainability to emerge. We use this model to both critique the CEM paradigm and to evaluate an alternative, namely Bookchin's (1982, 1990; 1996) Social Ecology.

Harvey's fields of social life

Harvey (2010) draws upon Marx's Capital Vol.1 (1976) in order to develop what he refers to as six elements of the evolution of social life that broadly equate to our above definition of 'field'. These 'fields' are key socio-ecological domains of relations that typify how different modes of social life operate, are reproduced, and change.

The six fields (illustrated in Figure 1) can be outlined as follows:

Relation to nature: The relationships in and between human and ecological systems.

Modes of production: The processes by which humankind reproduces its material, cultural, social, and political relations.

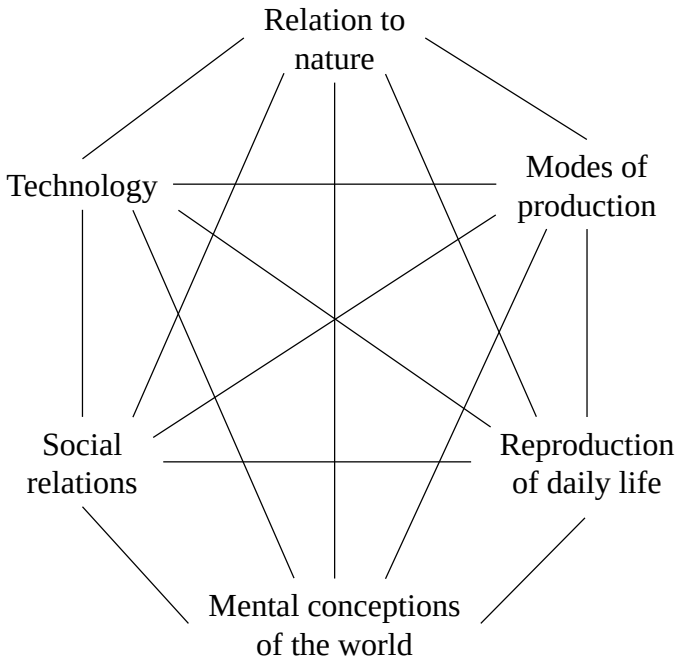
Reproduction of daily life: The processes and interactions, both passive and active, which comprise and reproduce day-to-day life and practices.

Mental conceptions: The generative symbolic frames (future-, present- and/or past- oriented) that shape human experience, perception, and understanding.

Social relations: The various direct and mediated social relationships that structure daily life.

Technology: The techniques, disciplines, machines, tools and materials, and their relations that are utilized in each of the other fields.

Figure 1: The relations between the fields of social life. From Harvey (2010, p.195)



Within each of these fields there are a variety of grains and levels in dynamic interaction with one another. So, for example, within the field of mental conceptions there are various possible *grains* of interest, such as individuals, books, or other media; some of these interact in emergent *levels*, such as scientific associations or social movements. These grains and emergent levels are involved in differing processes that reproduce, communicate, and use various symbolic framings of aspects of the world, and which have a variety of relations to each other. Each of these fields can potentially cast light upon the others through exploring

how they interact to (re)produce each other. Each field, however, can also be subject to internally driven change and dynamism, and so although each field can be affected by the others, they are not tightly coupled nor specifically determining.

CEM and Social Ecology compared

To illustrate the limits of scale as deployed in CEM, we use Harvey's model to compare it to the alternative of SE and so illustrate the utility of grain, level, and field. We compare each paradigm in relation to the six fields in Harvey's framework below. If CEM is the dominant sustainability paradigm that informs the use of the concept of scale within management and organizational studies, then SE stands in fundamental opposition to its assumptions of scaling-up and business as usual (see de Geus, 1999). SE, for example, assumes that social and political arrangements are inseparable from and are indeed constitutive of nature and ecological arrangements (Bookchin, 1982, 1990; 1996; for a critical evaluation of Bookchin, see White, 2003).

Murray Bookchin has been the foremost proponent of SE, which is inseparable from his thinking on social anarchism. Kinna (2005), who categorises Bookchin as one of a number of 'new' anarchists, describes his social ecology as having developed 'from a desire to probe the relationship posited by Marx between industrial development and political progress and from a concern to uncover the atomizing effects of the liberal market', suggesting that social ecology is 'about personal identity, the quality of the natural environment, and building community in a way that allows individuals to live in harmony with each other and with nature' (Kinna, 2005, p.458). Bookchin draws particularly on the late 19th, early 20th century anarchist thinker Petr Kropotkin (1970), and his proposal that cooperation and mutual aid are as significant, if not more significant, than competition in the evolution and maintenance of

natural systems (Ward, 1973). Bookchin's ideas concerning both social anarchism and social ecology have had a profound influence on the thinking and organization of contemporary radical social movements, such as the alter-globalization movement (Chatterton and Pickerill, 2010; Kinna, 2005) and environmental movements (Dobson, 2000). Bookchin's later rejection of what he saw as the anti-humanist tendencies of the 'deep ecology' movement (Naess, 1973), and specifically by the 'Earth First' movement, illustrates his conviction that social forms, human flourishing, and the preservation of the natural world are inextricably intertwined (see Bookchin (1995) and Sessions (1995) for a full account of both sides of the dispute). His integration of anarchist thought with environmentalism is reflected in the close coupling of pre-figurative forms of organization (Reedy *et al.*, 2016), horizontal democracy (Maeckelbergh, 2012), and environmentalism in recent political activism and alternative forms of organizing (Curran, 2006). His thinking thus offers a significant contrast to CEM rationalities displayed in corporate sustainability initiatives.

Unlike CEM, SE is an approach to organizing that is based around ideas of non-domination. The core idea is that the domination of fellow humans through hierarchical relations (including social, political, or economic) is reflected in, and indeed is the origin of, humans seeking dominion over natural processes (Bookchin, 1982, 1990). CEM views nature as a static repository of 'resources' to be exploited by a separate field of modes of economic production. SE argues that, instead, we have developed as part of, and out of, natural processes; indeed, consciousness is seen as the ultimate expression of natural evolutionary diversity and development. Mutual (i.e. non-hierarchical and non-dominating) relations are seen as crucial for humans in order to support the diversity and potentiality (spontaneity, creativity, and adaptation) in each other and natural processes; achieving this can foster and enable what are assumed to be natural tendencies towards ever-expanding socio-ecological

complexity and diversity (Bookchin, 1982).

We focus, therefore, on how these two paradigms contrast with respect to the identification of the key grains and emergent levels in the six social fields, as well as the key dynamic relations that take place within these fields. Since our purpose in this paper is to compare how the concept of scale may be employed in different sustainability paradigms, our presentation below is illustrative rather than comprehensive. Following Harvey, we assume that each of these fields is dynamic rather than static.

Conceptualising scale, grain, level, and dynamic relations in the two paradigms

Table 1 summarizes the comparison between the two paradigms under Harvey's analytical categories of social fields.

Table 1: Summary of the CEM and SE paradigms by social field

	Capitalist Ecological Modernisation (CEM)	Social Ecology (SE)
Relation to nature	g&l. Humankind *and* nature r. Sustainable appropriation, consumption, exploitation and the overcoming of limits	g&l. Humankind *with* nature r. Co-evolving through ever-expanding diversity
Modes of production	g&l. Capitalist enterprises; the family/individual; the economically (and sustainability)	g&l. Federated local communities – libertarian municipalism and self-regulation

	facilitative and stimulative state; universal law	
	r. The expansion of capital; employable subjects; financialization (of nature)	r. Self-governance and organization (no state, no private property)
Reproduction of daily life	g&l. Individuals; capitalist and labour reproduction processes	g&l. Emergent level reproduction processes
	r. Consumption; status	r. Mutual aid
Mental conceptions of the world	g&l. Social and organizational Darwinism; sovereignty; the primacy of private property	g&l. Cultural-nature, non-hierarchy, usufruct (common ownership and rights to use based on need)
	r. Abstraction, measurement and symbolic manipulation; instrumental rationality	r. Dialectical reasoning; eco-cosmological value rationality
Social relations	g&l. Capitalists/labour; commodities;	g&l. Municipalities
	r. Exploitation of labour; commodification/fetishisation	r. Communitarianism, non-binding direct democracy within an eco-cosmological world view

Technology	g&l. Machines; technological systems	g&l. Eco-technology (e.g. permaculture)
	r. Eco-governmentality; management	r. Selective and local technologies to increase freedom and autonomy

g&l. = Key grains and levels

r. = Key dynamic relations

A full analysis would involve discussions of each of the fields and of the dynamic inter-relations between them, but would be overlong for this paper. Here we draw attention to some key points to demonstrate the potential of this model for problematizing and rethinking the concept of scale.

Relation to nature

The comparison of the field of 'relation to nature' between CEM and SE is quite stark. For the former, nature is seen as separate from society and is to be harnessed and exploited, while the latter takes a co-evolutionary approach (i.e. culture determines environment and environment determines culture), which understands humans as having distinctive reasoning capacities that place them *with* nature (Marshall, 1993; Bookchin, 1996), indeed as the highest expression *of* nature. CEM applies the quantitative aspect of dimension to nature through objectifying it while assuming the superiority of humankind to nature, illustrated by the predilection for climate engineering (for a CEM argument for climate engineering, see Keith, 2013; for a critique, see Hamilton, 2013).

For CEM, a sustainable relation to nature requires a moderate revision of market-based modes, with nature understood as a provider of 'natural services' that in turn are capitalised as 'natural capital' and integrated into capitalism (Fisher and Freudenburg, 2001). The ultimate device for measuring (scaling) in CEM is financial, as our above WBCSD quote and the discussions of carbon markets exemplify. From an SE perspective, sustainability is about the promotion of non-hierarchical social relations to foster individual diversity and spontaneity, which then reflect and support the diversity and co-operative nature of ecosystems (Bookchin, 1982), and the adaptation of social modes to the specificities of nature in different areas (Marshall, 1993). In SE, then, there is no ultimate mode of measurement (or scaling), since all scales are seen to be contextually specific, and scales are seen as an element of practice rather than as having an ontological status (Moore, 2008).

Modes of production

The key grain of production in CEM is the capitalist enterprise, wherein the economists' formula of the factors or agents of production: land, labour, capital, and enterprise, are articulated together in the capitalist process. Success of the capitalist enterprise relates to increasing its rate of capital accumulation, which is typically achieved via expansion (globalising) and production through standardisation, obsolescence, and externalising costs, as well as intensifying the degree of exploitation of factors and agents of production through economies of scale (Pollin, 2015). Again, SE is in stark contrast to this perspective, as the focus for any provisioning is the local level of small municipalities, where production would focus on quality and durability, with local resources for local use (Bookchin, 1982).

In respect of regulation there is similar contrast; in CEM an interventionist state is relied upon to both legally and administratively promote the creation and expansion of markets and

the homogenisation necessary for quantitative extension. Capitalist needs for expansion and extension result in globalising this regulation. Capitalism requires the most extensive social, governmental, and organizational levels achievable, and measures (via scales) accordingly (March and Saurí, 2013). In SE, the state, and the modes of social domination it relies on, would be replaced by a series of nested emergent levels of self-governing and self-regulating groups, assemblies, organizations, and associations, based upon direct, face-to-face democracies; private property would be replaced by usufruct usage rights (Bookchin, 1982).

Mental conceptions of the world

The key imaginary of CEM is of social and organizational Darwinism, with the assumption that the key 'grain' is the individual and their economic liberty. There is sometimes recognition of natural limits, but by translating nature into 'natural services', nature is seen to be capable of being replicated or replaced by technology (see Reisman, 1996 for an example of this logic). The dynamic relations that enable the separation of man from nature and for the prefiguration of social Darwinian processes and capitalist economic development are those of abstraction, measurement, and symbolic manipulation and aggregation, which involve the 'emptying out' of nature, space, and time through the imposition of uniform and homogenising measures of extension and duration (Gallagher and DiNovelli-Lang, 2014). The use of scales for measuring is, therefore, a key moment in the manipulation of nature, when it is done without consideration of the different dimensions in the field of relations being measured (Cooper, 2015). The symbolic apparatus of CEM screens out other dimensions of social life by focussing solely on dimensions that are amenable to quantitative expression, where the ultimate measure (scale) is financial (Kovel, 2007). The flattening out (or compression) of social life enables the measurement and comparison that is required by instrumental rationality, whereby the capacity for choosing and improving instrumental

means impedes the question of the ends of action.

In SE, as described under ‘relation to nature’, humans are with nature and form part of non-hierarchical ‘webs’, both with each other and with eco-systems. Hierarchy is seen to be an internal ‘state of consciousness’ (Bookchin, 1982 p.4) resulting from a reversible historical process rather than a ‘natural’ state of affairs. Thus, rather than organizing nature into hierarchies that reflect those in social structures, organic societies see individuals and the sentient and material aspects of nature as playing diverse and complementary roles, but not as being arranged one over the other. Scales, within this holistic purview, are subject to considerations of the different dimensions and fields in question – they are not accorded a universal, ontological or transcendental value. Measurement is possible, but not on the assumption of the precedence of ‘empty’ space and time – extension and duration are understood as firstly qualitative, and only secondly as being capable of quantitative expression. Quantitative (extensive) and qualitative (intensive) aspects of life are seen as dialectically related to each other rather than separate. Valuing the qualities of life – value rationality – is thus accorded equal status with instrumental rationality. The tendency to perhaps reify a particular cosmology of ‘nature’ (White, 2003) is tempered through Harvey’s framework, with its recognition of the equally important practical, spatial, temporal, and social dynamics of the mode of production and the reproduction of everyday life.

Social relations

In CEM, because nature is abstracted, measured, symbolically manipulated, aggregated, and treated instrumentally, it is regarded as one input into social relations rather than as a fundamental part of the social-ecological relation itself. CEM assumes that the focal grain in social relations is the economically free individual, whose freedom is only achieved through

consumption and control of capital and commodities. The hierarchical social orientation of CEM is predicated on the relationship between capitalists (those who control the means of production) and labourers (those who must sell their labour power) (Marx, 1976). The key medium in CEM social relations is the scaling (measuring) mechanism of control via capital and the 'spontaneous order' of markets and commodification (Hayek, 1948).

In SE, the focal grain is the mutual and dynamic relationship between people and nature. A balanced co-evolution with nature is extrapolated into self-governing for social reciprocity through embracing and pursuing complementary diversity, described by Bookchin as an 'equality of unequals' (1982 p.144). Whereas in CEM, social relations are reproduced and effected through homogenising relations to capital and commodities, in SE, niche relationships are afforded priority. In SE, the socio-ecological dimension, and the reciprocity that is required to reproduce it, is afforded priority over the economic dimension that is favoured in CEM.

Technology

Owing to its instrumental rationality, CEM sees nature as being replaceable by technology, such that nature's assumed commutative properties are to be mimicked, replicated and replaced (Horkheimer and Adorno, 2002). Technology itself strives towards expansion, reducing humankind to a resource input into the transformational process of capitalism (Heidegger, 1977). The use of scales for measurement enables the expansion and extension of technological processes into higher and wider social, organizational, and institutional levels. At the same time, since capitalism is fundamentally revolutionary in its technological and industrial basis, there is an accelerating obsolescence of technological artefacts, producing a form of 'discarded nature' or 'waste' that is culturally redundant. In CEM, technological,

industrial, and natural limits are to be surpassed by ‘scaling up’ technological solutions.

SE, in contrast, stresses the need for ‘technology scaled to comprehensible human dimensions…worked by decentralized communities’, accompanied by ‘direct democracy’ and ‘a high measure of self-sufficiency, for self-empowerment based on communal forms of social life’ (Bookchin, 1982 p.2). Technology then becomes a way of extending harmony with nature (e.g. permaculture) through an ethic of ‘co-evolution’. In contrast to CEM’s search for ‘scalable solutions’, for example, in permaculture, solutions are normally ‘small and slow’. In SE, limits are not to be surpassed; rather they are seen as co-determined, permeable, and dynamic.

Consequently, SE does not assume that nature is inherently inviolable. Instead, human beings guide natural development in order to create meaningful lives and freedoms. The assumption that humanity has the right to reshape natural processes has led some to criticise Bookchin on this point as inconsistent with other aspects of SE (Marshall, 1993). It is certainly a key point of difference with advocates of deep ecology, who would see it as an unwarranted privileging of the needs of human beings in the natural world (Sessions, 1995).

Discussion

From the comparison of the CEM and SE paradigms it is clear that the predominant logic in, and for, ‘scaling up’ current corporate and governmental sustainability initiatives, such as those championed by the WBCSD, the World Bank, and other bodies, and implemented in such practices as Sustainable Supply Chain Management and Carbon Markets, is predicated upon the CEM paradigm. Our analysis has clearly indicated that the preoccupation with a

two-dimensional (hierarchical-spatial) conception of scales, and of economies to be garnered from extension and efficiencies that characterise much scholarship on sustainability within management and organizational studies, is symptomatic of the dominance of the CEM paradigm. Likewise, this paradigm strongly informs corporate and governmental sustainability initiatives, which thus display a similar preoccupation with measurement, extension, expansion, homogenisation, and commodification through reproduction. They are predicated on an assumption of the necessity and desirability of economic growth, which is achieved by technological and industrial revolution, which in turn is achieved through the scientific measurement, manipulation, and domination of 'nature' and of human work. Such initiatives, and the paradigm that informs them, have the effect of making it difficult to imagine alternative socio-ecological forces, goals, or modes of organizing.

As argued by political ecologists, such CEM-informed initiatives do not even recognise the political dimension of the use, or the question, of scale (Delaney and Leitner, 1997; Cox, 1998; Swyngedouw and Heynen, 2003). Such work has shown that decisions on what are to be measured and how, who is to be responsible for measuring and who has the decision-making rights over these questions, are inescapably social and political issues. The CEM conception of scale treats it as an ontological ground and thus reduces the question of scale to quantitative technocratic and bureaucratic concerns, obstructing the potential for the social and political dimensions to come into view. Management and organizational theorising, as well as corporate and governmental sustainability initiatives utilising this two-dimensional conception of scale, thus reinforce the hierarchical social relations and mental conceptions of the world that animate the CEM paradigm. As such, they exacerbate the fundamental problems and processes that create socio-ecological sustainability challenges rather than redress them.

This contrast between a CEM and SE conceptualization of scale may be deepened by a brief consideration of (economic) growth. There are different conceptions of economic growth in relation to sustainability, and CEM is best understood as foregrounding the 'growth of production via greater energy and resource efficiency' and the 'growth of the economy's biophysical throughput', which are associated with the expansion of human consumption and (eco)technological advances to improve operational efficiency (Ekins, 2002). SE, in contrast, relates to types of growth that involve improving human well-being and increasing ecological vitality and multiplicity. This is because (economic) growth in SE involves socio-ecological regeneration through enabling natural tendencies towards ever-expanding complexity and (bio)diversity. Consequently, SE's approach to economic growth could be understood as having some affinities with ideas of 'de-growth', in that both are concerned with finding ways in which human activity may be rendered democratic and sustainable, with human flourishing no longer predicated on consumption (Fournier, 2008). However, in many ways, these affinities are superficial since the founding assumptions of de-growth, as represented by the seminal work of Nicholas Georgescu-Roegen (1971), invert the scaling logics of CEM in their assumption of fixed physical measurable limits to growth and the need to reverse these through a series of social and economic measures such as Schumacher's (1988) intermediate technologies. In SE, based on a co-evolutionary view of society and nature, both scale and growth are re-framed as qualitative concepts that must underlie the idea of advanced technologies of life found in Bookchin's formulation of post-scarcity anarchism (1996). Hence, the SE approach to growth differs fundamentally from CEM, but also in some significant ways from some versions of de-growth.

In our paper, we have highlighted a more nuanced and complex approach to scaling and used

it to adapt Harvey's (2010) model of social fields in order to critique CEM through comparison with SE. This comparison highlights the key question of social relations, whereby rather than assuming hierarchical social relations, as CEM does, SE seeks to replace such relations with mutual and dynamic ones. The universal extension of certain scales chosen by higher levels of social organization in CEM is to be replaced in SE with localised and temporary uses of particular scales in accordance with emergent social and political levels, which are chosen at the level at which they are applied.

While the CEM paradigm assumes the hierarchical nature of social and political relations, the comparative evaluation with SE generates an interrogation of this field of social evolution that highlights the assumptions behind the CEM use of the concept of scale as measurement and expansion. Consequently, from an SE perspective, the CEM approach of scaling-up is understood as promoting the hoarding of power, which blunts social-ecological evolutionary potentialities and with it thwarts any possibilities for sustainability. Conversely, from a CEM perspective the SE approach to scale – localised and dynamic – would likely appear niche and unambitious towards sustainability. However, as we have argued, an SE informed 'alternative' approach to organising and scaling for sustainability can be part of helping managers to substantially re-imagine how their praxis can reproduce (un)sustainable socio-ecological relations.

Bookchin's central proposition within SE is that non-dominating social organization is integral to a harmonious mutual relationship with the natural world. These organizational aspects of Bookchin's thought are the ones that tend to predominate, both in recent political and social movements and in organizational and management studies. Within management and organizational theory there is a growing interest in 'alternative' organizing, based on the

principles of Bookchin's Social Ecology (see Parker *et al.* (2007) and Parker *et al.* (2014) for additional examples). For example, a recent special issue of the journal *Ephemera* (2016, Volume 14, Issue 4), explored a comprehensive range of points of intersection between anarchist thought and organizational studies. However, despite a number of references to Bookchin's work, they are predominantly in relation to non-hierarchical organizing. The articles that specifically deal with ecological issues do not refer to SE.

There are many examples, both historical and contemporary, of attempts to pursue consensual non-hierarchical forms of organization. Contemporary movements such as the Kurdish anarchist Rojava movement (Watkins, 2015) are directly implementing Bookchin's ideas of municipal democracy. Abdullah Ocalan, a founding member of Rojava, worked closely with Bookchin in order to develop his own 'democratic confederalism' (Ocalan, 2011). In all these cases, we would argue that it is the 'social' rather than the 'ecology' that is being stressed. Our use of Harvey's model indicates that both the social and the ecological aspects of Bookchin's thought need to be brought back into relation within management and organizational studies and treated as integral aspects of sustainability. Thus it might be argued that both CEM and recent conceptions of SE tend to privilege social relations through particular mental conceptions of society-nature relations, whereas there is a need to 'think of social-ecological relations in their full historical and geographical complexity' (White, 2003 p.56), which, consequently, requires a more nuanced and contextual use of the concept of scale.

Future management and organizational research into socio-ecological sustainability, therefore, could usefully employ, adaptively develop, and re-contextualize the heuristic framework presented here. One task would be to expand the evaluation of CEM and SE, as

well as other paradigms, in order to develop the analysis. This would usefully involve an extended engagement with how the logics and assumptions within these paradigms are variously applied in different sectors and contexts, or further consideration of the different forms and types of 'growth' in alternative paradigms. In particular, as Bansal and Knox Hayes (2013) and Allen *et al.* (2017) argue, there needs to be a much closer engagement with both physical materiality and socio-materiality in relation to understanding the implications of sustainability for managing and organizing. Also, as Spicer (2006) and others have argued, there is an urgent need to integrate political and social dimensions into considerations of the applicability of the concept of scale in management and organizational studies.

There are also practical implications from the heuristic framework – for example, whereas the practice of Sustainable Supply Chain Management has focussed very much on collaborative advantage, it has tended to do so from the perspective of purchasing and commissioning organizations, and has not fully addressed the asymmetric power relations between purchasers and suppliers, nor the ecological systems in which such chains are embedded. More broadly, therefore, the framework offers a reflexively critical lens through which to aid policymakers and practitioners in designing, developing, and evaluating future (corporate) sustainability initiatives.

Conclusion

In this article, we have argued that current corporate and governmental sustainability initiatives are animated by a conception of scale from the CEM paradigm that assumes the desirability of economies of scale in sustainability practice. We have also shown that these assumptions are reproduced in a variety of management and organizational research that

reproduces the CEM paradigm. In adding to critiques of this literature, we focus our critique on the CEM conception of scale, and present an alternative conception of scales, grains, levels, and fields. By using these interconnected concepts we have developed an analysis of the CEM paradigm and of the SE alternative. Through this analysis we have shown the limitations of the CEM conception of scale as well as the broader limitations of the CEM paradigm. We have argued for the importance of integrating political, social, and material perspectives in understanding socio-ecological management and organization; we have also indicated the potential of developing the SE understanding of the importance of the organization of both social and ecological relations for alternative forms of theorizing and organizing in pursuit of socio-ecological sustainability.

To conclude, in contrast to the preoccupation with 'scaling up' sustainability initiatives, the alternative conception of the logical interconnections between scales, grains, levels, and fields would suggest that rather than attempting to simply apply 'solutions' that are 'impactful, scalable, measurable' and 'replicable' across different social sites and levels (as suggested by the WBCSD), potential 'solutions' should be 'scaled out'. That is, rather than trying to simply reproduce or extend potential solutions (a strategy that assumes a homogeneous and unitary social universe and a single form of sustainability), potential solutions should be encouraged to grow and evolve organically. Potential solutions need to be adapted and adopted in different social sites and levels, which acknowledges the multiplicity inherent in social life and the diverse socio-ecological sustainabilities potentially realisable if CEM were to be transformed before humankind undercuts the socio-ecological processes that make us possible. Such potential solutions will inescapably be grounded in the interaction of politics and the social with the ecological.

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