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A R T I C L E

CLIMATE-PROOFING MANAGEMENT RESEARCH

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Climate change presents a variety of doomsday scenarios for human society, including more extreme and frequent storms, droughts, heatwaves and fires, the heating and acidification of oceans, rising sea levels, biodiversity decline, food shortages, as well as exacerbating geopolitical tensions and conflicts. While many corporations and communities are already anticipating and planning for various climate impacts, we argue that much management research is in denial of the profound consequences of a worsening climate crisis. This is evident in the relative neglect of climate change in our research and teaching and we argue reflects how management theories legitimize the continuation of business as usual. We suggest that if the management academy is to maintain relevance in a context of worsening climate change, then we need to rethink the focus of our research and engage with new and emerging literatures and concepts that will better enable societies to undertake the complex processes of climate mitigation, adaptation, and the limitation of human suffering.

As societies around the world struggle to address the devastating impacts of climate change, many businesses are preparing for a very different future. In the World Economic Forum's (2019) annual survey of influential decision makers, climate change was identified as the most likely and impactful economic challenge. In the Carbon Disclosure Project (2018), more than 7,000 companies identified specific climate change risks they are anticipating; for example, Coca-Cola is concerned about growing water scarcity, Bank of America fears that increased flooding will lead to mortgage loan defaults, and mining giant BHP Billiton expects that more frequent hurricanes and cyclones will adversely impact mine productivity. Companies also anticipate various opportunities in a climate-changed world. For example, biotech company CSL and pharmaceutical company Merck & Co recognize that climate change will increase the spread of disease and drive demand for their products; likewise, engineering contractor Downer EDI sees the increased frequency and impact of extreme weather as expanding disaster recovery operations, and Home Depot expects that warming temperatures will boost the market for air conditioners and ceiling fans. Thus, many corporations are already positioning themselves for a near-future world in which doomsday scenarios of disease, destruction, and scarcity are strategic realities.

However, this growing business concern over climate change is noticeably absent in academic management research. Indeed, management scholars have largely avoided engaging with what is perhaps the grandest social and political challenge of our time (Wright & Nyberg, 2017). Even worse, as Tsui (2013) noted in her keynote address to the Academy of Management, management scholarship has often exacerbated these social and environmental problems (see also Mintzberg, 2004). And yet, management scholars are uniquely positioned—perhaps even obligated—to contribute to the public discourse by applying their research to real-world challenges (Etzion & Gehman, 2019). After all, within business schools there is an ideal audience to affect change in educating future organizational leaders across the domains of business, public service, and civil society.

We argue that management research needs to be "climate proofed" and unfettered from its assumptions of "business as usual." Human society faces an

existential risk in coming decades in the form of catastrophic climate disruption (IPCC, 2018). Yet, most management research has reinforced an economic system reliant upon cumulative growth exceeding planetary boundaries (Steffen et al., 2015; Wright & Nyberg, 2015). Indeed, there is a clear mismatch between established climate science, which reveals a narrowing window to avoid dangerous (and society-threatening) climate disruption, and the message preached in business schools that supports the continuation of compound economic growth and the depletion of natural resources (Augier & March, 2011). Management theories and models legitimize the continuation of business as usual and, outside of specialist or more critical journals, rarely contest the relentless quest for new forms of profit-making (Fotaki & Prasad, 2015). Directly addressing climate change poses an enormous challenge for the field of management that has, since its inception in business schools (Khurana, 2007), supported the continued development of corporate capitalism (Augier & March, 2011). However, in overlooking the growing urgency of climate change, management researchers lay themselves open to charges of not only ignoring perhaps the most critical challenge facing human society this century but also disregarding the needs of students and practitioners who will confront the myriad impacts and changes to social and economic organization that climate change will inevitably bring.

By taking the doomsday projections from science seriously, we argue for the need for a radical shift in management scholarship to address the challenges of a climate-changed future. First, we highlight the disparity between the taken-for-granted assumptions within management scholarship and the increasingly urgent scientific projections of a climate crisis that threatens the continuation of organized human society. Second, by engaging with promising strands of management research, we aim to reinvigorate management discussions of how to better organize society in response to the climate crisis. Future forms of organizing will need to address different concerns, such as local self-sufficiency to maintain supplies of energy, food and water in the wake of infrastructure breakdowns (Williams & Shepherd, 2016), and non-corporate exchanges of goods and services (Davis, 2016). We show how management research and education has the potential to not only help reduce humanity's environmental impact but also support more equitable forms of adaptation to climate change and help alleviate the suffering that will occur in a climate-changed world (Tsui, 2013; Waddock & Lozano, 2013). Lastly, we argue that the empirical evidence of intensifying impacts provides moral and instrumental reasons to engage with the climate crisis as an urgent concern. Exceeding planetary boundaries means current patterns of economic growth cannot continue (Jackson, 2009), and building climate consciousness into management research and teaching is critical if business schools are to maintain their relevance in the coming decades.

THE GAP BETWEEN CLIMATE SCIENCE AND MANAGEMENT RESEARCH

Human-induced climate change is the greatest challenge of this century. Earth has already warmed by 1.2°C above preindustrial levels, with the rate of carbon emissions suggesting a trajectory of around 4°C of warming this century (IPCC, 2018). The physical impacts of this level of warming threaten the future viability of organized human community (New, Liverman, Schroeder, & Anderson, 2011). As a threat multiplier, climate change also makes already dangerous social and political situations far worse. It feeds into an array of issues by impacting food shortages, water crises, governance failures, and interstate conflicts (World Economic Forum, 2019).

This dire situation is the result of two centuries of industrialization based on the exploitation of fossil fuel-based energy and the expansion of corporate capitalism (Malm, 2016; Wright & Nyberg, 2015). Indeed, nearly two-thirds of cumulative global greenhouse gas emissions between 1751 and 2010 can be attributed to just 90 major fossil fuel corporations and enterprises, with over half of these emissions produced since 1986 (Carbon Disclosure Project, 2017; Heede, 2014). However, despite the central role of business organizations in setting us upon this doomsday trajectory, there has been limited engagement within management research on the subject of climate change or the role of corporate capitalism in its production or amelioration (Goodall, 2008; Patenaude, 2010). Indeed, we would go so far as to argue that management research appears to be in denial of climate change as an issue of concern. In support of this claim, in the following sections we outline the problematic gap between climate science's projected doomsday scenarios and the lack of engagement with climate change in the major academic management journals.

Climate Science's Doomsday Scenario

The science of human-induced climate change dates back nearly two centuries and has focused on how greenhouse gases (GHGs), such as carbon

dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), have played a critical role in shaping the planet's energy budget and the creation of climatic conditions for the existence of life (Archer & Rahmstorf, 2010). These planetary impacts (e.g., ocean acidification and rising sea levels) will grow in intensity as GHG emissions continue to increase and feedback effects accelerate the process, most notably through increased methane emissions from the melting tundra and the reduced albedo of shrinking polar ice (IPCC, 2018). While significant changes in climate have occurred over hundreds of millions of years due to variations in Earth's orbit around the sun, fluctuations in solar output, volcanic activity, and other factors, the recent dramatic rise in atmospheric concentrations of GHGs resulting from human industrialization is unprecedented (Archer & Rahmstorf, 2010). The extraction and combustion of large volumes of coal, oil, and gas for energy, manufacturing, and transportation, as well as the depletion of carbon sinks, such as forests and peat lands, over the last 200 years have led to shifts in atmospheric GHG concentrations of a magnitude and at a pace that spell doom for humanity. The implications of this human perturbation to the planet's carbon cycle are profound.

As a "doomsday scenario," anthropogenic climate change has few equals. While the severity of various climate change impacts will depend upon the degree to which human society can reduce its GHG emissions in the coming years, estimates of the key physical impacts that are likely under existing trends include: increasing intensity and frequency of extreme weather events, such as mega-storms, floods, droughts, and wildfires; the melting of major ice sheets and glaciers and accelerating sea level rise endangering coastal and low-lying communities; the destruction of terrestrial and marine ecosystems and widespread species extinction; the demise of coral reef systems; widening disease vectors; threats to global food and water supplies; increased mobility of large volumes of people from climate-threatened regions; and heightened regional and geopolitical conflicts over scarce natural resources undermining the functioning of society (IPCC, 2018).

Moreover, the impact of these changes will worsen significantly as warming increases. For instance, the IPCC has estimated that hundreds of millions of lives are at risk if warming exceeds 1.5°C (IPCC, 2018)—a scenario that is only a couple of decades away. Of course, if nations around the world were to radically reduce their GHG emissions over the next decade, there is a chance that average global warming could be limited to 2°C. Such an undertaking would entail genuinely dramatic changes to be made in energy production and the end of all but essential fossil fuel use (Anderson & Bows, 2011, 2012). However, despite the endorsement of the 2°C goal at the 2015 Paris climate talks, tangible action on decarbonization remains elusive, and national commitments fail to deliver anything close to this target (Spash, 2016).

Moreover, major fossil fuel corporations continue to project continued growth in production despite scientific estimates that their carbon reserves are five times greater than the carbon budget left to avoid catastrophic climate disruption (Meinshausen et al., 2009). Fossil fuel corporations (at the behest of national governments) are applying their innovative capacities to unlock new unconventional fossil fuels such as tar sands development, hydraulic fracturing, and targeting the melting Arctic as a new site of extraction (Kitchen, 2014). The race to extract further oil, coal, and gas also highlights how globalized capitalism heightens interstate competition and undermines much needed cooperation to address climate change (Mann & Wainwright, 2018).

Even the expansion of renewable energy has failed to dent escalating carbon emissions (the global "fossil fuel burn" hitting an all-time high in 2019 of 11.7 Gtoe, up from 7.1 Gtoe in 1990) (BP, 2019; Saxifrage, 2019). This continued expansion of fossil fuel consumption and carbon emissions highlights the contradiction between growth dependency and planetary boundaries (Steffen et al., 2015), revealing the fallacy that infinite economic growth is somehow possible on a finite planet. Climate change is not a technological problem but rather a reflection of the social relations of production, that is, capitalism. Thus, addressing climate change requires rethinking the economic principles and the business models underlying management research (Shrivastava et al., 2019), as only fundamental changes to the global economic system can help modulate the world's escalating climate crisis (Wright & Nyberg, 2015).

Climate Change in Management Research

While the latest climate science points toward a multitude of doomsday scenarios for business and society, there has been a marked lack of attention to this issue in published management research. Over a decade ago, Goodall (2008) provided evidence of this lack of attention to climate change, noting that between 1970 and 2006, only nine of over 31,000 articles published in the top 30 business and management journals included "global warming" or "climate change" in the title, abstract, or keywords,

with not a single climate-related article in the four influential Academy of Management journals. Goodall was unable to convincingly explain why climate change had been sidelined by management scholars. Even so, she argued the two most promising explanations were: (a) a time lag between the generation of knowledge and the publication of knowledge, and (b) business school academics "prioritizing wealth creation and favoring business elites" (Goodall, 2008: 418).

In the ensuing years, growing public and political awareness of climate change has led to some improvement in climate coverage in management research. For instance, organizational journals that publish more critical articles, such as *Business & Society*, *Organization*, and *Organization Studies*, have published special issues on climate change (see, e.g., Okereke, Wittneben, & Bowen, 2012; Wittneben, Okereke, Banerjee, & Levy, 2012; Wright, Nyberg, De Cock, & Whiteman, 2013), and several business schools have introduced teaching programs on "sustainability" in which climate change features as an issue (Aragon-Correa, Marcus, Rivera, & Kenworthy, 2017). Nevertheless, in updating Goodall's analysis, we found relatively few articles in the leading management journals addressing the issue of climate change. For instance, a search of the top four management journals based on their ISI Article Influence Score (*Academy of Management Annals*, *Administrative Science Quarterly*, *Academy of Management Review*, and *Academy of Management Journal*), yielded only seven articles over the period 2007–2018 that addressed the topic of climate change (or global warming) in their title, keywords, or abstract (this included two editorials and one book review). Broadening this analysis to the top 20 management journals, we found that only 24 articles (0.2% of all articles published) mentioned "climate change" or "global warming" in their title, keywords, or abstract (see Table 1).[1]

[1] We are aware of the limitations of ranking academic journals (an issue we discuss later in this paper). Nevertheless, for the purposes of this exercise, the leading management journals were selected on the basis of their ISI Article Influence Score, which determines the average influence of a journal's articles over the first five years after publication. While a range of metrics can be used to determine journal rankings (e.g., impact factor, 5-year impact factor, and Eigenfactor Score), the list of management journals detailed in Table 1 correspond closely with similar published lists of leading management journals (Certo, Sirmon, & Brymer, 2010; Podsakoff, MacKenzie, Podsakoff, & Bachrach, 2008).

While management scholars have made prominent contributions on climate change outside of these leading journals (e.g., Böhm, Misoczky, & Moog, 2012; Campbell, McHugh, & Ennis, 2019; Ferns & Amaeshi, 2019; Hoffman, 2005, 2011; Lefsrud & Meyer, 2012; Levy & Egan, 2003; Wright, Nyberg, & Grant, 2012), our data appear to refute the former explanation that the neglect of climate change in management journals is simply a function of the lag between knowledge generation and publication. A more convincing explanation for management researchers' neglect of climate change is the continued narrow focus of business schools on the effectiveness of the business enterprise, competitiveness, and the maximization of shareholder value (Pfeffer & Fong, 2002). For instance, a similar search of the leading management journals on topics such as "growth," "competitiveness," and "profit" yielded a markedly different result, with more than 50 times as many articles published on these topics as opposed to climate change over the last 12 years (see Table 1). This focus is perhaps not surprising in that business schools in the United States and much of Western Europe were established by managerial elites to professionalize their roles and legitimize the goals of economic efficiency and profitability (Engwall, Kipping, & Üsdiken, 2016; Khurana, 2007). Over recent decades, the global growth of business schools has resulted in an increasingly competitive labor market that prioritizes publication in top-ranked management journals as the key determinant of appointment and promotion. As a result, the focus on researching managerial priorities of growth, competitiveness, and profit has been reinforced as a dominant view within business schools, while addressing topics that challenge these concerns has been seen as a risky career move (Mingers & Willmott, 2013; Prasad, 2013). Thus, in arguing that management research appears to be in denial of climate change, we suggest that rather than explicitly denying climate science, management research appears to be in denial of (a) the environmental and social consequences of continued economic growth and capitalist expansion, and (b) the challenge that climate change poses to dominant thinking within management research.

Forms of Denial in Management Research

The concept of denial is mainly conceptualized as a cognitive process and situated within the domain of psychology by understanding, for example, individual rejection of climate change—"it's not

TABLE 1
Articles in Leading Management Journals Addressing Climate Change, 2007–2018

Journal title	ISI Article Influence Score	Articles addressing climate change	Articles addressing growth, profit, and competitiveness
Academy of Management Annals	8.628	0	13
Administrative Science Quarterly	6.629	1	20
Academy of Management Review	6.561	2	19
Academy of Management Journal	5.689	4	48
Annual Review of Organizational Psychology and Organizational Behavior	4.816	0	14
Journal of Management	4.796	0	58
Organizational Research Methods	4.325	0	17
Management Science	3.774	3	353
Personnel Psychology	3.611	1	14
Journal of Applied Psychology	3.421	1	39
Organization Science	3.386	4	74
Strategic Management Journal	3.295	2	168
Academy of Management Perspectives	3.067	0	56
Journal of Management Studies	2.967	1	58
MIS Quarterly	2.829	0	44
Journal of Operations Management	2.663	1	47
Information Systems Research	2.591	0	58
Research in Organizational Behavior	2.572	0	5
Journal of International Business Studies	2.422	4	89
International Journal of Management Reviews	2.339	0	12
Total articles		24	1,206

happening" (Edelstein, Nathanson, & Stone, 1989). Denial can also be analyzed as a broader social process (Cohen, 2001), where the dynamics of communities produce practices that limit responses to established facts. For instance, Norgaard (2011) explained the lack of community action on climate change through the process of what she termed "socially organized denial"—the collective resistance to information. Through her ethnographic research, Norgaard (2011) described how communities use three general types of socially organized denial for normalizing or minimizing disturbing information: literal, implicatory, and interpretative denial.

Literal denial involves an explicit rejection of the existence of anthropogenic climate change itself, most evident in the formalized "climate change denial industry" that has emerged over the last 30 years, funded by fossil fuel interests and promoted by conservative political organizations (Dunlap & McCright, 2011). This literal denial asserts that human activities cannot change Earth's climate and that the issue of climate change itself is a hoax perpetrated by scientists and intergovernmental organizations (Hoffman, 2011). While this form of denial is hugely influential in global and national politics, it rarely appears in management journals and debates.

In the second type of climate denial, *implicatory denial*, individuals and communities do not doubt the existence of climate change but deny the urgency to do something with the knowledge. Implicatory denial describes how, thanks to extensive coverage on television and the internet, we as global citizens witness extreme hurricanes, flooding, and droughts that displace thousands of people, recognize climate change as the cause, and yet still fail to advocate for the radical decarbonization of our high-consumption economies. This is partly unavoidable in that constantly thinking about the terrible reality of climate change is unbearable, and the sheer scale of the challenge makes it "unthinkable" (Campbell et al., 2019).

In management research, implicatory denial over climate change is evident in the great number of articles promoting wealth creation through increased efficiency, expansion, and growth without considering the contributions of these activities to social and environmental destruction (see Table 1). Management research acts as a cheerleader for big business, and this dominant emphasis is reinforced by decontextualizing a narrow economic purpose (Fotaki and Prasad, 2015). Hodgkinson and Starkey (2011) explained this by arguing that management research in pursuit of rigor assumes away all complexity, which results in an increasingly narrow focus on

strengthening corporate profit-making. While management research supports the development of corporate capitalism, often for the betterment of a specific portion of society, the underlying assumptions of the business models are not considered. As a privileged elite, business school academics may be aware of climate change but create a sense of safety in the face of this troubling reality by excusing themselves from engagement. Instead, they may continue to contribute to, rather than challenge, existing theorizations of the world. This form of implicatory denial ensures that business schools do not have to engage with or confront the underlying system of corporate capitalism or the existential problem of climate change as it is viewed as being "outside" their area of research concern.

The third and final type of socially organized denial, *interpretative denial*, reframes the catastrophic meaning of climate change by translating it into something manageable within the dominant economic system. Management researchers employ two key strategies of interpretive denial: (a) reallocating climate change to a particular class of scholarship, and (b) adopting a particular jargon to reconstruct the meaning of climate change. In the first form of interpretative denial, management scholars typically view climate change as simply another empirical space within which broader organizational theorizing can occur rather than a phenomenon that radically challenges our understanding of society and the natural world (Fleming & Spicer, 2014). Within management scholarship, the climate crisis has been seen as an issue best located within the academic specialization of "organizations and the natural environment" designated by specialist journals (e.g., *Business Strategy and the Environment*, *Corporate Social Responsibility and Environmental Management*, and *Organization & Environment*) and academic divisions (e.g., Organizations and the Natural Environment [ONE] Division of the Academy of Management) (Bansal & Hoffman, 2012). However, even within this field of business and natural environment, most articles have adopted an ecological modernist or corporate environmentalist framing (Jermier, Forbes, Benn, & Orsato, 2006) and failed to acknowledge the urgency of the climate crisis (Gladwin, 2012). Rather, business is seen as providing solutions to the "grand challenge" of climate change through improved ecoefficiency, new products, markets, and innovation (see, e.g., Abdelkafi & Täuscher, 2016; Delmas, Lyon, & Maxwell, 2019). Climate change has thus become a backdrop for the growing literature on "greening" the firm (Bansal & Roth, 2000; Ramus & Killmer, 2007), where attention is directed toward ways in which businesses can prosper by better aligning their products and services with shifting consumer and regulatory pressures (Siegel, 2009). This compartmentalization of climate change as a specialist area of business research sidelines deeper, more fundamental questions about the nature of a capitalist economic system as the key contributor to the climate crisis (Ferns & Amaeshi, 2019; Nyberg, Wright, & Kirk, 2018).

Through interpretive denial, climate change is also converted into the terminology of "business strategy," "resilience," and "sustainability." For instance, management researchers who have addressed climate change have often framed this issue within the context of business strategy and risk and opportunity (Lash & Wellington, 2007; Pinkse & Kolk, 2010; Weinhofer & Hoffmann, 2010). Climate change is translated into a "business case" in which potential regulatory, market, technological, and physical risks and opportunities are identified and managed. Through better anticipating and preparing for climate change-induced extreme weather events, corporations are seen as building greater climate "resilience" (Linnenluecke & Griffiths, 2010), which is the latest terminology entrenching corporate solutions (Bothello & Salles-Djelic, 2018). More generally, the managerial framing of climate change as a subset of "sustainability" emphasizes balancing the business needs of profit-maximization and shareholder value with the interests of the natural environment and local communities (Delmas et al., 2019). In this way, the greatest threat to the future of human civilization is transformed into the more mundane but familiar language of how business organizations can minimize risk and maximize opportunity in their interactions with natural resources and communities (Porter & Kramer, 2011).

Through implicatory and interpretive denial, management research has supported business as usual. While admitting to the reality of climate change (Howard-Grenville, Buckle, Hoskins, & George, 2014), management scholars have interpreted the issue within the dominant paradigm of business growth and expansion, compartmentalized "climate change" as a fringe issue, and denied the looming consequences. In management research, there has been limited engagement with ideas beyond capitalism's relentless pursuit of the highest possible rates of growth and profit (Adler, 2015), and even within the field of business and the natural environment, corporate capitalism is the only "game in town" (Gladwin, 2012: 660). The dominant "sustainability" agenda has been captured by corporate interests (Ferns & Amaeshi, 2019; Tregidga, Milne, & Kearins, 2018) that legitimize increased GHG

emissions (Wright & Nyberg, 2017). Thus, management scholars, in line with political and corporate elites, participate in a collective acceptance of catastrophic climate disruption and associated doomsday scenarios.

MANAGEMENT RESEARCH FOR A PLANETARY FUTURE

So how can management scholars adopt a different path and develop theories that are more relevant to a climate-changed world? We suggest that through a radical reimagining of the purpose and focus of management research, the field can be "climate proofed" by engaging with three critical aspects of climate change as a social phenomenon: (a) mitigation, (b) adaptation, and (c) suffering. In using these terms, we are not arguing for a continued emphasis on the phantasmatic win–win scenarios of environmentally friendly, faster-growing, and more-profitable corporations. Rather, in the sections that follow, we aim to shift current management theorizing to better fit the scenarios of climate science and challenge thinking about how we as an academic community can respond to the existential threat posed by climate change.

Mitigation of Carbon Emissions through Alternative Forms of Organization

The idea behind mitigation is to reduce carbon emissions to avoid the most catastrophic consequences of climate change (IPCC, 2014b). However, as outlined earlier, global carbon emissions continue to increase year on year (BP, 2019), and despite the fanfare accompanying the 2015 Paris climate agreement, most signatory countries have failed to fulfill even modest national commitments that still would not come close to achieving the 2°C target (Climate Action Tracker, 2018). While scarce on details, international agreements and leadership have promoted business as usual through pro-growth and market-based mechanisms (Rawhouser, Cummings, & Hiatt, 2019). Similarly, the dominant underlying assumption in management research has been that capitalism can be greened—"green growth" (Woo, Chung, Chun, Han, & Lee, 2014) or "green economy" (Zahra, 1999)—through innovation and green technology (Bansal & Roth, 2000; York, Vedula, & Lenox, 2018). The logical response to the acknowledged need for future "negative emissions" is then technologies such as bioenergy combined with carbon capture and storage (BECCS) (Anderson & Peters, 2016) and, more alarming, potentially disastrous "geo-engineering" (Augustine, Soderstrom, Milner, & Weber, 2019). Thus, the answer is to materially reconfigure the Earth so as to avoid reconfiguring the economy (Keller, Feng, & Oschlies, 2014).

This faith in market innovations achieving decarbonization at a faster rate than capital accumulation is arguably blind because (a) aggregate decarbonization is not occurring (BP, 2019; Saxifrage, 2019), (b) future decarbonization will not be sufficient given continuous economic growth (Jackson, 2009), and (c) greater efficiency in energy use leads to lower costs and increased consumption to maintain corporate profitability (the so-called Jevons effect) (Hickel & Kallis, 2019). Capitalism is growth dependent, and research has shown that economic growth is the key driver of greenhouse gas emissions (York, Rosa, & Dietz, 2010). What we refer to as "creative self-destruction" (Wright & Nyberg, 2015) is an illustration of the contradiction between capitalism and the environment: capitalist competition constantly expands production through increasing energy and material throughput. These physical impacts undermine the conditions for future capitalist production through environmental destruction (e.g., CO_2 emissions) (O'Connor, 1998; Schnaiberg, 1980). This incommensurability of economic growth and environmental limits was recognized in early influential publications in management (see, e.g., Gladwin, Kennelly, & Krause, 1995; Levy, 1997; Shrivastava, 1994) and thus needs to be reinvigorated for a field currently supporting business as usual (Hahn, Figge, Aragón-Correa, & Sharma, 2017).

Considering that the global economy is already breaching a range of critical planetary boundaries (Whiteman, Walker, & Perego, 2013) and the atmosphere cannot cope with continued economic growth, degrowth in economic activity is inevitable (Kallis, Kerschner, & Martinez-Alier, 2012). The question is whether degrowth is going to be managed or enforced by planetary collapse. Thus, the argument is less about the desirability of economic degrowth and more about how it can be managed for a future equitable quality of life for 9 billion people (Roulet & Bothello, 2020). This possibility has found support in research showing that economic growth has a much stronger connection to environmental degradation than to human well-being (Mikkelson, 2021). This suggests that there is an opportunity for management research to contribute to the development of social well-being and GHG mitigation without relying on economic growth.

The support of *sufficient* production and consumption of goods and services, in terms of their quantity and quality, can fruitfully be developed within research into alternative forms of organizing (Parker, Cheney, Fournier, & Land, 2014). The key is making already existing alternatives fully visible (Cameron & Gibson-Graham, 2003). Below the surface of capitalist hegemony, there is an array of different forms of organizations for management research to further pursue: alternative forms of markets (e.g., local trading systems and barter) (Daskalaki, Fotaki, & Sotiropoulou, 2019) and nonmarket transactions (e.g., indigenous exchanges and household flows) (Whiteman & Cooper, 2000), alternative forms of labor relations (e.g., cooperatives and reciprocal labor) (Audebrand & Barros, 2018) and unpaid work (e.g., housework and volunteering) (Kornberger, Leixnering, Meyer, & Höllerer, 2018), and noncapitalist organizations (e.g., communal and independent) (Farias, 2017; Gibson-Graham, 2006). These alternative forms of organization provide a conceptual path toward staying within planetary boundaries (Steffen et al., 2015).

A research agenda for alternative forms of organizations requires opening up the economy to new economic subjects with different relations, identities, and values (Gibson-Graham, 2006). For example, Daskalaki, Fotaki, and Sotiropoulou (2019) demonstrated the collaborative coproduction of nongrowth values in parallel-currency and nonmonetary exchange schemes in Greece. Within these grassroots organizations, new social relations were forged in support of sustainable living that escaped the logic of relentless growth. These organizations were developed in response to the Greek financial crisis and provided a realistic and unromantic picture of the struggle to form new types of organizations. Explaining how collective values drive alternative forms of organizations can assist in the potential shift away from growth fetishism and toward the support of mitigation efforts (see, e.g., Perkmann & Spicer, 2014).

More democratic forms of organizing can also address environmental degradation through reduced working hours. Mikkelson (2021) outlined the logic behind this: longer working hours facilitate a firm's control (e.g., costs of job losses and increased unemployment pool), and workers who own and control businesses spend less time on the job (e.g., worker cooperatives). Thus, there is an urgent need to better understand issues related to reduced work hours and the equitable redistribution of paid employment in the shift from carbon-intensive to renewable energy systems (Evans & Phelan, 2016). This also connects with current discussions on meaningful work and compensation, with alternative forms of organizing, such as collective ownership and longer investment cycles, positively influencing pay dispersion (Connelly, Haynes, Tihanyi, Gamache, & Devers, 2016) as well as potentially providing employees and communities with a more meaningful contribution and purpose beyond paid labor.

As the dominant organizational form within shareholder capitalism, corporations are particularly ill-suited to address climate change due to their growth and profit imperative (Wright & Nyberg, 2017). However, organizational forms are not naturally occurring but are rather the product of specific political, economic, and social contexts. In seeking to better climate-proof management research, researching new ways of organizing society to better respond to the need for urgent and dramatic emissions mitigation is an important role to play.

Organizing Adaptation to Climate Change

Beyond mitigation, human society must adapt to inevitable climate disruptions. Climate change is happening now, as is evident in record-breaking heatwaves, droughts, floods, wildfires, and hurricanes that have increasingly begun to dominate the news. As warming increases beyond 1.5°C, these impacts will worsen, straining urban and rural infrastructures, health systems, power networks, water supplies, as well as communities and governance structures. Adapting to these multifaceted changes will require coordinated planning and investment by both governments and businesses (IPCC, 2014a). As we have seen, corporations in different industries are already factoring in the need for different forms of climate adaptation through risk-management and scenario-planning techniques.

However, management scholars have been slow to recognize these developments, with one review noting only a limited number of studies of firm and industry adaptation to climate change and "little cross-disciplinary work integrating findings from the natural sciences into business thinking" (Linnenluecke, Griffiths, & Winn, 2013: 397). Management studies in this area have included: explorations of adaptive capabilities in the energy sector (Haigh & Griffiths, 2012), firm relocation as a result of climate change impacts, and the ability of businesses to build "resilience" in the face of environmental shocks (Linnenluecke & Griffiths, 2016). However, much of the management research on climate adaptation has

remained wedded to a consideration of firm-level responses that minimize risk to shareholder value and open up new business opportunities. This climate adaptation constitutes a form of interpretative denial in which business interests ignore community and civic concerns, exacerbate social and economic inequality, and increase environmental harm (Sovacool & Linnér, 2016). Taken to an extreme, climate adaptation involves a form of "disaster capitalism" in which corporate and political elites exploit environmental crises as opportunities to impose profit-maximizing policies that further worsen the position of vulnerable communities (Klein, 2014).

One way to "climate-proof" management research is to broaden the canvas of scholarship and engage more directly with both the latest climate science and other fields of research in which scholars are exploring how societies and communities are responding to climate impacts (Adger, Barnett, Brown, Marshall, & O'Brien, 2013; Berkhout, 2012). This entails going beyond an enterprise focus on risk and opportunity and engaging meaningfully with the interactions among firms, industries, communities, government, and civil society. For example, more management research is needed to examine how businesses interact with communities, nongovernment organizations (NGOs), and different layers of government in responding to worsening climate impacts (see, e.g., Wissman-Weber & Levy, 2018). Climate change adaptation involves a variety of actors at all levels of society with context-specific and place-based responses (Bowden, Nyberg, & Wright, 2019). Similar to other crises (Kornberger et al., 2018), the majority of practices in caring for the community will be performed by unpaid labor and dependent on voluntary organizations and NGOs.

Broadening the focus of management research also includes acknowledging the essential inequality that underlies current proposals for climate adaptation. Current climate impacts are the result of cumulative GHG emissions over the last two centuries, the vast majority of which were produced by the United States and Western Europe. However, as recent extreme weather events have highlighted, poorer nations and developing economies are likely to be most affected by climate change given their lack of resources and infrastructure (IPCC, 2014a). While multinational corporations may be able to relocate their operations to areas less affected by climate impacts, communities generally lack this mobility.

Confronting how economic and social inequality will exacerbate climate impacts must be a key focus of management research in the future. For instance, a focus on how businesses engage with climate adaptation can also involve seriously considering the broader range of stakeholders who interact with businesses in local regions and communities and include goals beyond a narrow focus on maximizing shareholder value. While concepts such as "creating shared value" partly recognize how corporations are socially embedded (Porter & Kramer, 2011), further development is warranted, particularly in exploring locally bound examples of businesses working with civil society on adaptation measures that are both participative and democratic (Schlosberg & Collins, 2014).

Considering the impact of climate change, organizing adaptation also involves a reimagining of society itself (Levy & Spicer, 2013). This includes activities ranging from redesigning urban centers and retrofitting infrastructure to better cope with extreme weather events and sea level rise (see, e.g., the Rockefeller Foundation's 100 Resilient Cities program) (Martín & McTarnaghan, 2018) to regenerating natural ecosystems (often at the cost of traditional business expansion and extractivism) (Wise et al., 2014). Importantly, this reimagining will require the more challenging recognition that adaptation itself may involve retreat, sacrifice, and acceptance of the demise of established understandings of society—what some have termed a philosophy of "deep adaptation" (Bendell, 2018).

Adapting to climate change is now inevitable, and the scale will only increase as climate impacts worsen. This is a key area in which management scholarship can be rejuvenated from its narrow focus on business operations and shareholder value to a far broader and more challenging agenda of transforming society to better share the costs and gains that will accrue in a climate-changed world (Hoffman & Jennings, 2018).

Supporting Communities to Alleviate Suffering

Of course, in taking climate science seriously and acknowledging that global capitalism is materially reshaping the world, many of the features of climate change may well be beyond humanity's adaptive abilities. Some scientific projections have estimated that global warming of between 3°C and 5°C is essentially incompatible with organized human society; the myriad impacts of extreme weather events, biodiversity collapse, and sea level rise are likely to result in mass mortality on a scale never before experienced (New et al., 2011; Wallace-Wells, 2019).

In this "doomsday" future world, one could plausibly ask: What possible role could management researchers play? However, entertaining such apocalyptic scenarios can potentially disrupt current delusions that business can continue as usual. That is, in taking seriously the language of disruption, crisis, and collapse that physical scientists now suggest is only decades away (IPCC, 2018), researchers can trigger a reawakening of the social role of the business school beyond the narrow confines of operational efficiency, shareholder returns, and quarterly growth figures. After all, a significant body of management research has explored issues of sensemaking, change, and identity in circumstances of crisis and disaster (Weick, 1988). An important future role for management scholars is exploring how individuals and communities seek to make sense of catastrophic climate events and deal with the loss and suffering that will inevitably follow.

A major part of this engagement with loss and suffering requires considering the psychological implications of unimaginable death and destruction and identifying ways for individuals and communities to cope with such catastrophic events. Organizational activities can mitigate employee distress following traumatic events (Williams, Gruber, Sutcliffe, Shepherd, & Zhao, 2017), and research has suggested the importance of supporting employees in extreme contexts, with emotions playing a central role in people's responses to these events (Wright & Nyberg, 2012). While negative emotions appear to slow down responses to emergencies, extreme contexts can also give rise to positive emotions related to courageous and compassionate behaviors that build resilience in alleviating suffering. In their extensive review of extreme contexts, Hällgren, Rouleau, and de Rond (2018) highlighted the importance of managers in making sense of traumatic situations and reducing employee stress. This underlines the moral obligation of the field to develop these strands of research.

Beyond the boundary of the organization, there is a key role for management researchers in identifying better systems of coordination, communication, and reinvention in situations of inadequate disaster response. For instance, crisis management and disaster recovery failures in New Orleans in 2005 following Hurricane Katrina have become a case study in maladministration (Congleton, 2006). Unfortunately, more recent examples of climate-induced disaster, such as the 2018 decimation of Puerto Rico following Hurricane Maria and the unprecedented wildfires in California and Australia, suggest that there is still much to learn about organizing disaster relief responses to alleviate suffering. As a starting point, existing literature has suggested the importance of organizing local communities to ensure rapid resource delivery in affected areas (Shepherd & Williams, 2014).

Ultimately, in facing the inevitable suffering and loss that climate change will bring, management scholars need to challenge the now dominant assumptions that carbon-profligate lifestyles bear no cost and can continue based on future technofixes. The true cost of globalized, ever-expanding consumption is, of course, much harder to accept, as one must account for past and current victims of colonialism and resource extraction (Banerjee, 2008), residents of "sacrifice zones" (Klein, 2014), as well as the countless species and habitats rapidly made extinct during the Anthropocene era (Kolbert, 2014). Understanding these hard truths is something that management scholars will need to increasingly confront in a climate-shocked future.

CONCLUSION

Government and business responses to climate change within the next decade will determine whether the planet continues to be viable for human life. While some businesses are preparing for future doomsday scenarios, management scholars have exhibited limited engagement on these issues. In this paper, we have suggested how management scholars can help respond to the consequences of climate change by developing community-based and local forms of organizing to mitigate carbon emissions, adapt to a climate-changed world, and alleviate suffering.

Of course, given that mainstream business education exists to support the current system of corporate capitalism, the skeptical reader might ask why management scholars should worry about climate change if meaningfully action threatens the basis of the system they defend? To this we would reply that there are empirical, moral, and instrumental justifications for management researchers to put climate change front and center of their research and teaching. First, and returning to claims from the beginning of this paper, climate change is viewed by leaders as a key economic challenge, and cities and communities around the world are responding to the impacts (see e.g., Bowden, Nyberg & Wright, 2019; Wissman-Weber & Levy, 2018). Climate change is becoming increasingly important to organizations and managers in developing strategies for mitigating carbon emissions, adapting to changing circumstances, and

lessening the impacts of climate change events. Researching and teaching climate change in business schools is thus crucial for developing the skills that managers of different forms of organizations need to respond to the challenge.

Second, there is a moral argument that management scholars should shift their focus beyond a narrow conception of shareholder value and consider the greater societal good that can result from improved organizational and social relations (Tsui, 2013). Management scholars spend significant time and resources investigating how people and organizations can operate more effectively and efficiently. However, as privileged and influential voices in society, they also have a moral obligation to seek to improve social relations by confronting the "grand challenges" that humanity now faces (George, Howard-Grenville, Joshi, & Tihanyi, 2016). This is particularly salient as practitioners recognize their moral responsibility and a growing number of citizens are mobilizing and protesting to safeguard our planetary future.

Finally, there is also an instrumental reason why management scholars need to engage with climate change: the danger of irrelevance (Hoffman, 2016). As daily newsfeeds demonstrate, climate change is not some distant possibility; human activities have already irreparably altered the Earth system (Steffen et al., 2018). In this new climate-shocked world, business students, business professionals, civil society, the media, and government will look not only to physical scientists but also to social scientists in seeking to respond to the existential threats to human civilization. As management scholars, we can choose to ignore the reality of a physically changing world and pretend business as usual can continue, or we can step up and engage with the doomsday scenario that humanity now faces and seek to generate more equitable and just solutions for a civilization under threat.

With limited time left to radically alter the organization of the global economy, management scholars are standing at a crossroads. We can continue to research corporations and strive to identify better ways to maximize profitability, irrespective of social and environmental costs, or we can develop scholarship fit for the inevitable consequences of a climate-changed future. The question remains: Are we up for the challenge?

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