

Chapter 10

Embracing transdisciplinary tensions on the road to 2030

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10.1 Introduction

This chapter explores Transdisciplinary (TD) research from the context of sustainability in social sciences, with the United Nations Sustainable Development Goals (SDGs) as a backdrop. We consider this contribution to come at an important time. As we write these words, reports are streaming in as to the state of the world: humanity has wiped out 60% of animal populations since 1970 (Grooten & Almond, 2018); inequality is increasing in almost all regions of the world (Alvaredo, Chancel, Piketty, Saez, & Zucman, 2018); and "rapid, far reaching and unprecedented changes in all aspects of society" are needed to limit global warming to 1.5°C (IPCC, 2018). Although there is an increasing realization that both personal and collective transformation must take place for such change to happen (O'Brien, 2012), the question of our time is *how* such transformations will take place?

In light of the 'wicked' nature of ever changing and complex sustainability challenges (Andersson & Törnberg, 2018; Rittel & Webber, 1973), there is an increasing recognition of the importance of encouraging the participation of non-academic actors in TD research. This enables actors who are not part of the dominant (Western) knowledge systems to contribute to the outcome of the sustainability-oriented research process, i.e. TD research enables them 'to be deliberately included in the future' (Arnstein, 1969, p. 216). This connects to the ambition of 'fairness-driven transdisciplinarity', as outlined in chapter 1 of this book.

Yet such fairness-driven transdisciplinarity, characterized by focussing on the empowerment of often marginalized actors, are situated in environments with strong structural and systemic barriers to realizing more sustainable outcomes through participatory research. At the root of such barriers are unequal power relations between actors, which brings about a "ladder" of varying degrees of stakeholder participation (Arnstein, 1969), whereby different relationships between actors result in different levels of participation. The main argument of this chapter is that there is a need to surface and address underlying tensions in conducting sustainability-oriented TD research, brought about by the underlying power differences inherent in multi-stakeholder environments. Confronting such tensions is a means to recognise the diverse perspectives, values and knowledge systems in society, contributing to TD as a more reflexive practice for sustainability.

In the following section we begin by exploring TD research tensions through individual co-author narratives answering the question of how underlying assumptions involved in TD research can affect the research process. In section three, co-authors compare these approaches, with a specific focus on how such TD

approaches can lead to enhanced sustainability outcomes in the context of the SDGs. Throughout these sections, the co-author narratives interact with one another in a dialogical way, signifying a conversation between authors on their differing experiences and points of view in TD research, balancing their personal experiences with generalizable observations. These sections represent more of a discussion forum at a conference, than conventional paper, but the style mirrors what we as researchers and authors consider are the multi-stranded and diverse approaches to TD research. In section four, we collectively analyse our narratives through the conceptual lens of paradox theory, highlighting the nature of the tensions in knowledge co-production between academic and non-academic actors, as well as challenges of bridging the gap between theory and practice in addressing the 2030 agenda for sustainable development put forward by the United Nations. We hope that the conversational style and multiple voices in the chapter encourages the reader to critically engage with the issues raised, while keeping in mind that the questions have no final answers, and that this is an ongoing and evolving conversation.

10.2 Carrying out transdisciplinary research in the field.

Thomas Macintyre, community-based research in Colombia, South America

Situated in the discipline of Education for Sustainable Development, my research is focussed on the role of *learning* in addressing climate change and sustainability. I am inspired by decolonial approaches to education (Grosfoguel, 2011; Le Grange, 2016), and how the generation of learning ecologies within the framework of TD emphasises the multiple forms of learning across different sectors of society (Maina & González, 2016; Siemens, 2007; Wals, 2019; Westberg & Polk, 2016). As a TD researcher who is sceptical to mainstream higher education, I am particularly interested in how to co-produce knowledge *together* with grassroots initiatives and communities, contributing to epistemological justice (Hall & Tandon, 2017). My research is part of an international project called T-Learning, which works on reframing dominant narratives in education and learning (Lotz-Sisitka et al., 2016).¹ Specifically, I am the lead researcher in the Colombian case study, based on Participatory Action Research (PAR), where our team is employing Transformation Labs to generate action-based change (see Macintyre et al., 2019).

A characteristic of this PAR methodology is the close collaboration with members of grassroots initiatives in Colombia who are acting in the capacity of co-researchers in the T-Learning project. From my perspective, TD research encourages the transgression of dominant paradigms, and the exploration of novel collaborations between researchers and society. In line with the fairness driven transdisciplinarity, I see an underlying assumption of TD research to be the validity of different knowledge systems, while at the same time appreciating that knowledge is unstable, contested, and only ever scratching the surface of how we understand the world (de Sousa Santos, 2016). Confronting such uncertainty requires creativity and innovation, with a strong focus on working together with people, communities and ideas that often seem foreign to us. Below I present an anecdote from fieldwork which highlights the tensions involved in putting these lofty aspirations into practice.

¹ 'T-Learning' is an acronym for the international multi-case study project called: 'Transgressive Social Learning for Social-Ecological Sustainability in Times of Climate Change.' See <http://transgressivelearning.org/> for more information.

"It was a cold morning in the Ecovillage of Aldeafeliz, situated one hour from the Colombian Capital of Bogota. After three days of participatory methodology workshops, with few hours of sleep, I was exhausted. But I was also excited. As part of a Transformation Lab we were conducting with co-researchers, Andres from the initiative Colectivo Talanquera was sharing with us an 'Indigenous technology' of energetic cleansing. In the damp morning dew, sitting on big stone overlooking the ecovillage, Andres explained the ancestral practice of rubbing small balls of organic cotton between our fingers, concentrating on imparting our negative energy into the cotton which was then 'planted' into the earth as an offering to Mother Earth. Despite having participated in such rituals before, I was still struggling to move away from the cognitive level of these exercises, to really give myself up to the 'silent knowledge' as Tatiana Monroy from Aldeafeliz calls the connection with the non-rational and emotional world. Put simply, I felt disconnected to this 'umbilical cord' to Mother Earth. As I sat on the stone, feeling cold and tired, I looked around at the co-researchers, all with eyes closed and looks of contentment. Many of them are leaders in their communities, navigating complex community dynamics in the search for social and ecological justice. 'How are they able to connect?' I wondered to myself. 'What have they experienced that I have not?' How can academics like myself engage in research contexts which we do not understand?"

Textbox 1: Personal narrative by Thomas Macintyre

The above anecdote shows how working with people across different sectors of society has the power to disrupt our comfort zone, helping sustainability academics and practitioners to reflect critically on who we are and our roles in society. The anecdote also demonstrates that TD research in practice is often challenging. On the one hand is the perennial challenge in action research of bridging the institutional requirements of a scientific investigation with the realities of community co-researchers in terms of time, motivation, and economic resources (Herr & Anderson, 2014). On the other hand, is the ethical dilemma of whether the underlying knowledge constructions of many grassroots communities have more to teach higher education institutions than the other way around. In my narrative above, as I sat on that rock twirling the cotton balls, trying to move beyond the cognitive so as to understand and learn this ancestral technique, no number of lectures or books could have prepared me for this situation. I was left wondering what my role really was as a researcher?

Sigurd Vildåsen: Corporate sustainability in Norway

Positioned in the field of corporate sustainability (CS), I have a particular interest in tensions and paradoxes stemming from conflicting requirements between social, economic and environmental demands (Hahn, Figge, Pinkse, & Preuss, 2018; Van der Byl & Slawinski, 2015). The role of tensions is an interesting topic for discussion in the TD field in general, as exemplified by Thomas Macintyre's account above of how TD insights challenge the classical perception of societal actors, and especially the role of higher education. As a way to embrace tensions emerging in real-life projects, and inspired by the work of Lang et al. (2012), I ground my TD research on the assumption that companies must be involved in both designing the research questions introduced by academia and providing inputs to the knowledge creation process. This connects well with the ambition of solution-oriented transdisciplinarity (as presented in Chapter 1), whereby stakeholder involvement is extended, in this case, to include industry representatives.

In the period of May 2014–May 2018, I was involved in a TD research process involving academia, the business sector, governmental organizations and NGOs. This was anchored in the project “Sustainable Innovation and Shared Value Creation in Norwegian Industry” (SISVI).² My research activities were performed in close dialogue with representatives from the company Plasto - a small manufacturer of plastic components - that contributed approximately 5% of the total funding of the SISVI project. In the period of September 2016–May 2017, Plasto’s representative attended a workshop series with the title “SDGs–learning by doing,” organized by the Polytechnic Society of Norway. Moreover, Plasto committed to discussing the SDGs in its management group, with the purpose of identifying the most relevant goals as seen from the company's perspective. Below I present an anecdote from this collaborative process.

"In June 2016, I became involved with the board of the Polytechnic Society, a non-profit organization working to promote the SDGs in Norwegian Industry. For me, this was an interesting opportunity to link my collaborative research with the company Plasto, to a broader network of actors. Plasto's representative found the initiative promising, but he emphasized the company had to evaluate every extra activity critically due to a challenging market situation. However, to my surprise, he was able to commit the top management group and ran two internal workshops to draw on their viewpoints and experiences in applying the SDGs framework.

In December 2016, the Plasto representative presented their lessons learnt at a meeting at the Polytechnic Society, where other companies also shared their experiences. Plasto's main message was that a company, in principle, affects and is affected by all the 17 goals, but this insight is challenging to apply in a practical context. For this reason, Plasto had decided to prioritize goals nr. 9 (industry, innovation, and infrastructure), 12 (responsible consumption and production), 14 (life below water) and 17 (partnerships for the goals) in their further work. Moreover, they had established concrete targets, for example, with regard to using recycled materials in their production process.

After this interesting meeting, I started to ponder the following paradox: The SDGs are meant to represent a holistic framework, but companies state that it is impractical to work with all the goals at the same time. Is it feasible for companies to work on all SDG goals in an integrated manner? How can a company combine the practical need to focus on a few goals while at the same time ensuring credibility in their efforts by adopting a holistic perspective?

Textbox 2: Personal narrative by Sigurd Vildåsen

One of my underlying assumptions in the collaboration with Plasto was that my role as a researcher was to observe and analyse the activities of the company, acknowledging that this process will always influence decisions and perceptions of company representatives. Indeed, it is evident that I have influenced organizational actors since they were previously unaware of the SDG framework. However, ‘objectivity’ is not possible, nor is it an ideal, when conducting TD research (e.g., Lang et al. 2012). The researcher and practitioner interact and are active contributors in a relationship, in this case co-developing research questions, which in turn shapes concrete activities and the decisions undertaken in the project.

² See details about the project here: <https://sisvi.no/>

I acknowledge the risk that my role as a ‘critical’ researcher could be blurred because of my close collaboration with the company. An example is a dilemma which developed for me, concerning the SDG prioritizations by Plasto. The company Plato chose to focus on a subset of the goals, which many would argue is a limitation since the framework is based on holistic considerations of all the 17 goals. However, my emphasis was to introduce them to a step-by-step approach based on gradual learning on how to work with the framework. This is in line with my TD assumption that my role as a researcher is not to provide the ‘right’ answers, but to encourage learning and experimentation. Although my research covers all three main TD ambitions, the limited scope of the contribution of one organisation on the sustainable development of society makes that my research should be seen as small range TD (as presented in Chapter 1).

Monica Ramos-Mejia: community-based research and corporate sustainability in Colombia, South America

Situated in the field of corporate sustainability (CS), I am interested in understanding the role of entrepreneurs in fostering sustainability transitions (Grin, Rotmans, & Schot, 2010; Witkamp, Raven, & Royakkers, 2011). In this context, grassroots entrepreneurs act as niche innovators capable of transforming production-consumption systems into more sustainable assemblages from the bottom-up (Seyfang & Smith, 2007). Sustainability transitions researchers have frequently engaged in collaborative experiments with communities and local governments, aiming for novel socio-technical solutions (Luederitz et al., 2017). These experiments are usually solution-oriented and entail TD research.

As mentioned by Sigurd Vildåsen above, non-academic actors are interested in finding solutions to their own contexts when getting involved in TD research. This contrasts with conventional explanatory academia whereby research findings should either contribute to, or challenge, current debates in the literature. Conventional research requires rigorous data collection and analysis, and is often understood as a well-defined linear process driven by a research question that originated from a research gap (Creswell & Creswell, 2017). This difference can be seen in the following anecdote taken from my fieldwork in Colombia.

‘Everything you’ve said sounds very beautiful, but it’s a world away from what works here.’ This is what an ecopreneur³ told my colleague who was ‘teaching’ environmental management strategy at a training course aimed at developing business models for sustainability in rural Colombia. My colleague has had a brilliant academic career in corporate sustainability, however, despite her knowledge and experience, her points were considered out of context and thus irrelevant.

The opening remark was an eye-opener for the research group I am part of, and invited a discussion into what knowledge is and who it is for: If knowledge is not useful for a group of people in specific circumstances, does it mean that this knowledge is not valid? Or does it mean the knowledge is not being appreciated? How can we co-produce knowledge that is scientifically valid and contextually relevant

³ *Grassroots ecopreneurs* can be defined as "grassroots entrepreneurs moved by social and environmental concerns, coming up with simple and eco-friendly solutions in their quest to resolve everyday life problems" (Sarkar & Pansera, 2017, p. 327)

and useful?

The questioning attitude of the ecopreneur mentioned above inspired a two-year process aimed at co-creating ecopreneurial ventures⁴, in which an interdisciplinary team from the University of Twente (UT), the Netherlands (in which I was involved as doctoral researcher) worked together with grassroots innovators in Colombia to understand the local dynamics, resources and values underlying the innovation process.

The co-creation process that unfolded was characterised by a knowledge dialogue in which grassroots innovators and academic researchers entered a reflection process that created room for translation between different realities and expectations. For instance, the rural energy enterprise on which one of the ecopreneurs was working developed a business model that reflects a combination of context-specific knowledge related to community-based organisational management and academic knowledge related to solar energy technologies for storage and distribution.

Throughout the process, ecopreneurs used the concepts and tools they learned as resources to bring new technologies and social practices into the local landscape, with the deliberate intention of igniting changes towards sustainability. Similarly, the UT team experimented with innovative academic methods, strengthening its capacity to carry out transdisciplinary research.

Textbox 3 Personal narrative by Monica Ramos-Mejia

From my experience working with grassroots innovators, conventional research was indeed ‘a world away’ from their daily lives. Grassroots innovators were not interested in sustainable business model literature, but rather on how to develop business models that corresponded to their environmental and social concerns, while being feasible in the marketplace. As scholars, we were well informed about the debate, but lacked the experience of facing the everyday challenges that an ecopreneur has to deal with. The ecopreneurs working with us, on the other hand, were too busy sorting out everyday challenges to have the opportunity to adopt available knowledge to solve their problems.

To address this research disjunction, the Dutch and the Colombian teams decided to engage in a co-creation process, facilitated by design science research methods. This design process is experimental in nature, whereby the purpose is not to design one single solution, but many alternatives for action (Ramos-Mejia, 2018). This process highlights the insider’s perspective rather than the observer’s on the problem-solving process, meaning that the knowledge that seemed very distant for the ecopreneurs was translated and re-interpreted by them into local realities. This highly participatory process is also iterative, making room for cycles of action and reflection, which is a key aspect of the process (Ramos-Mejia & Balanzo, 2018). Sitting together to reflect on what happens throughout the project loosens the tension related to the outcome of the research process. Furthermore, as is mentioned in the textbox 3 above, both academic and non-academic researchers contributed to creating novel business models responding to context-specific sustainability challenges. We can, therefore, understand this form of TD research to combine both a solution-oriented process, as well as a fairness-driven ambition to transform the forms of collaboration between the different academic and non-academic stakeholders.

Sjors Witjes, corporate sustainability researcher in Europe and Latin America

⁴ Ventures that deliver social and environmental value, besides the economic one.

Situated in the discipline of Corporate Sustainability (CS), my research is focussed on reflexive learning concerning the integration of sustainability in organisational systems. As organisations are accountable for their sustainability performance, I am motivated by accompanying the process of reflecting on interventions in the organisational system aimed at enhancing sustainability performance (see, for example, Jansen, Tempelaar, van den Bosch, & Volberda, 2009; O'Reilly & Tushman, 2013). Inspired by engaged scholarship of Van de Ven and Johnson (2006), I reflect on sustainable practices with organisational members, bringing together their practical knowledge with my academic knowledge aiming for enhanced awareness and knowledge on how to improve the organisation's sustainability performance (Eccles, Ioannou, & Serafeim, 2014; Maletič, Maletič, Dahlgard, Dahlgard-Park, & Gomišček, 2016).

As a teacher dedicated to preparing future generations for their role in society, I am particularly motivated to integrate students from different academic levels in the CS reflection process (Schulz, Finstad-Milion, & Janczak, 2018). Below, I present an anecdote from my research which highlights the tensions involved in putting this into practice.

I have just received an e-mail from a dairy company requesting academic reflections on the integration of sustainability into their organisational system by offering an internship for a master thesis student. The development and supervision of participatory action research on corporate sustainability at master level enables me to build bridges between the corporate and academic worlds. Although companies should take responsibility for their (un)sustainable actions, or pay for it by hiring additional staff or external consultants, I see a huge opportunity of combining the preparation of students for their future role in society with participation in a research project that aims at generating meaningful outcomes for the company as well as the production of knowledge contributing to debates on Corporate Sustainability. Furthermore, small-scale research projects based on Master theses have the potential to enhance a company's understanding of the added value of scientific research for improving corporate sustainability performance that could lead to bigger research projects in the future. Although academic-corporate research collaboration could create alternative funding schemes in a Dutch academic world experiencing reduced governmental funding for scientific research, it does generate tensions between knowledge production and the need for financial support. Although the outcome of the research project is used to reflect on improving corporate sustainability performance, there is the disconcerting risk of the research being used for corporate "greenwashing": in exchange for a company accepting academic research, the collaboration with a university can be used to show that the company is dealing with sustainability. Although I have signed many Non Disclosure Agreements to ensure that I do not pass on company data, I have never requested a company sign an agreement to ensure ethical use of research outcomes. How can I be assured that the collaboration between business and academia leads to meaningful change, and not just window dressing for both actors? Although I trust my experiences with previous projects, and the positive appraisals from my company contacts as well as my academic counterparts, increasing academic/non academic research collaborations raise ethical as well as practical tensions which must be addressed."

Textbox 4 Personal narrative by Sjors Witjes

My research is based on a practical question from an organisation wanting to improve its contribution to the sustainable development of society. Faced with complex and wicked problems in society, companies

must decide whether or not to embed their contribution to these problems into their organisational system. I aim at understanding and facilitating the integration process of CS into business activities that can lead to CS becoming an added value with respect to corporate goals (see Witjes, 2017; Witjes, Vermeulen, & Cramer, 2017). By applying participatory action research (PAR), the data gathering process is combined with supporting the company in making CS an integral part of their daily business activities and, simultaneously, enabling the feedback of research outcomes between researchers and the company (Lang et al., 2012). This continuous reflection process is used to validate the research outcomes, as well as encouraging corporate self-reflection on CS as an added value to a corporation's future goals.

The collaboration between the researcher and the company in preparing and executing the research process is based on two assumptions (Schaltegger & Beckmann, 2013): first, the company understanding and accepting the scientific method and research process as an added value resulting in corporate self-reflection. Second, the researcher understanding the day-to-day life in a company as a source of data. As illustrated in textbox 4, this collaboration can, however, result in undesired outcomes: students carrying out menial jobs like cleaning floors for the company, or companies enlarging research outcomes for marketing purposes. With these undesired outcomes being an inevitable part of working in a diverse team of actors with pluralistic views on specific situations, a TD team of academic and non academic actors guarantees the existence of conflict (Stokols, 2006). During my TD research, creative conflict management has been a central challenge through the acknowledgement that suppressing situations of conflict does not enable the freedom needed for exchanging knowledge between the different actors in the process of reflection (Cundill et al., 2019; Van de Ven & Johnson, 2006).

Although corporate-academic collaboration can enable the CS scholar to be actively involved in transforming corporate society, the dilemma is that it can reduce the need for companies to take full responsibility for their potentially unsustainable behaviour. From a methodological perspective, my TD research also contributes to the challenges of scientific knowledge creation, exploring how a reflection process between academic and non academic actors can lead to decision making on the integration of CS into organisational systems. As is the case with the research of Sigurd Vildåsen, my research covers all three main TD ambitions, the limited scope of the contribution of one organisation on the sustainable development of society makes that my research should be seen as small range TD (as presented in Chapter 1).

10.3 Comparing TD concepts and approaches in the context of the SDG framework.

In this section we will compare our TD approaches and assumptions in the context of the SDGs. The agenda 2030 SDG goals provide an ambitious global agenda aiming to “*free the human race from the tyranny of poverty and ... to heal and secure our planet*” (United Nations, 2018). With 17 goals aimed at transforming society in the fields of poverty, inequality, climate, environmental degradation, prosperity, and peace and justice, the SDGs provide a shared framework for addressing global sustainability challenges. While Sigurd Vildåsen and Thomas Macintyre discuss the relative versus more critical perspective to approaching the

goals individually, highlighting a few goals for focus, Sjors Witjes and Monica Ramos-Mejía focus on the goals as a framework, reflecting on their use from a wider perspective.

Sigurd Vildåsen: The SDGs help link local challenges to global challenges

The SDGs and the Agenda 2030 framework address a broad array of societal issues, giving space for a large set of actors to converse, collaborate and disagree. Thus, the role of the TD researcher in such a context is especially interesting. Interaction between academia and SDG practice entail a special role for the researcher, for example, by actively critiquing the behavior of industrial companies based on their sustainability performance. That being said, such critical distance must be balanced with the TD principle of treating stakeholders worldviews as knowledge inputs (e.g., Lang et al. 2012). We do not own the truth as researchers and scientists when operating in the TD domain: we are legitimate actors in an ongoing knowledge debate.

In practice, actors in a decision-making setting framed by the SDGs typically represent different interests. In a workshop I co-organized in October 2017, as part of the Polytechnic Society, I observed a representative from the organisation Transparency International promoting goal number 16, which deals with accountable institutions, as a way to counteract corruption. In the same meeting, several business representatives talked about goal number 12, focusing on the issue of responsible production and consumption. What I learned is that actors tend to promote a few goals linked to their own organizational interests. This creates a setting defined by negotiations, with each participant arguing their viewpoints.

Interestingly, even though actors promote different interests, it is possible to link their lines of reasoning. This can be accomplished, for example, if a workshop facilitator emphasises a holistic understanding of the framework during discussions. Indeed, the role of actors collaborating based on a common platform is reflected in SDG number 17, which focuses on the partnerships between governments, the private sector and civil society to reach sustainability outcomes. In my research, SDG goal number 17 was used actively by companies and other actors in the private sector, to facilitate collaborative projects. I have experienced the framework as means for myself to ease the communication with Plasto's representatives through linking the local activities of Plasto to global societal challenges.

Thomas Macintyre: The SDGs are meant to be critiqued and re-framed according to local contexts

Negotiating worldviews and visions of future activities is one of the biggest challenges for reaching the SDG goals, and top priority for TD research and researchers. Despite the usefulness of the SDG framework in concentrating the world challenges in concrete themes, as Sigurd Vildåsen mentions above, it is important to note that the SDGs are built on certain underlying assumptions. For example, goal number 8 states "decent work and *economic growth*," which is a contentious assumption given finite global resources (Jackson, 2009). With my own interest in more radical forms of learning which transgress inbuilt sustainability barriers, I therefore see fairness-driven TD research as a means to bring together different people and perspectives to discuss, critique and re-frame the SDGs according to local contexts and needs. Alongside a systems approach in implementing the SDGs (Reynolds, Blackmore, Ison, Shah, & Wedlock, 2018), there is a need for a decolonial approach to sustainable development and transdisciplinary research (Chilisa, 2017).

This differs to Sigurd Vildåsen's approach above in which actors connect their interests to specific SDGs, and argue their own interests, rather than taking a critical look at the power relations and assumptions inherent to the different actors. Rather than a relativist approach where everyone holds the truth, I think it is important to take a more disruptive and critical approach, generating discussion about the extent to which, for example, a company's focus on only a few SDGs can address underlying structural barriers to addressing sustainability, in line with fairness-driven transdisciplinarity.

However, as my own experience on that rock on the ecovillage demonstrates (see textbox 1), although we may want to understand and experience other realities, we each hold entrenched values and ways of understanding the world which are difficult to transgress. To move effectively towards the SDGs, I believe we need to both negotiate differing interests while attempting to disrupt our own ways of thinking so as to better empathise with those we find it difficult to connect with.

Sjors Witjes: The SDGs require the continuous feedback between actors

I see the dominant paradigm of growth as a rooted belief in the corporate world. With corporate growth mainly reflected by key performance indicators representing quantifiable corporate processes impacting the SDGs, it distracts attention from qualitative social outcomes of informal processes, such as those represented by SDG 17. This relates to the tension of research 'greenwashing' based on quantifiable results, without considering qualitative outcomes. To avoid the potential abuse of outcomes, the aim of my research is to accompany companies in reflecting on their past and current sustainability performance from a quantitative and qualitative perspective in order to establish a more realistic strategy for improved future performance. In this way, my TD research approach can also be seen as corporate support as the research outcomes can also be used to improve corporate performance, and therefore, to contribute to SDG 12 on Sustainable Consumption and Production. From a TD ambition perspective (see chapter 1) I work from a problem orientation through an inter-academic solution orientation towards enhanced fairness within a limited, organisation oriented, scope. The contribution to knowledge creation in the integration of CS in organisational systems, as well as the organisation of reflection between academic and non-academic actors on strategic decision making processes for CS integration enables me to generalize outcomes and upscale my research scope from an organisation focus. This is achieved via a sector or supply chain focus (see for example (Witjes & Lozano, 2016), linked to a societal scope on regional, national (see Sartori, Witjes, & Campos, 2017) or international level.

To ensure legitimacy of my research within the academic world, the participatory action research method I apply includes a continuous feedback between meaningful outcomes for practice, and knowledge created by a continuous collaboration between academics and non academics for a broader perspective such as for science. By providing tools for companies to reflect on their sustainability performance, my research aims at changing the dominant paradigm in organisations from corporate growth towards a new development paradigm prioritizing the environment of which we all are part of (Nobre et al., 2016). I also see an important role for academia to enhance critical reflections in collaboration with non-academics aiming for the SDGs, and support companies to improve their contribution to a more sustainable society while being attentive to the possibilities of companies abusing research outcomes for 'greenwashing'.

Monica Ramos-Mejia: The SDGs must be translated and contextualised to co-create knowledge

Although there is general agreement on the desirability of the SDGs and their specific targets, there is little agreement on the means to achieving them. One of the reasons for this is the disconnection between dominant forms of knowledge and local realities. As I mentioned in textbox 3 above, mainstream Western knowledge may be alien for local realities in the Global South. When single knowledge systems prevail, solutions are usually not relevant nor feasible for local contexts. In this particular case, the assumptions and values that shaped the contents of the environmental management workshop did not match the context of our co-researchers. The contents had been developed for wealthier and more formal economies, operating under formal rules. The context of our co-researchers was characterised by informality and insecurity.

Like Sjors Witjes mentions above, TD research helps surface these differences through continuous and reflexive dialogue, where knowledge is not being 'transferred' from the academic to the practitioner team, but translated and contextualised between actor groups. Following Sjor's argument about organisations working towards inclusiveness towards contributing to the development of society, I would argue that something similar happens with communities when they engage in a TD research process. TD research creates spaces for knowledge forms to interact, even if this can be disruptive and confusing, like Thomas Macintyre's emphasises in his section.

In my case, the example of the rural solar-energy community-owned company demonstrated that despite the inefficiencies according to conventional key performance indicators in the sector, the cycles of action and reflection that emerged throughout the TD process made possible the translation between different knowledges, realities and expectations, resulting in solutions that were feasible according to local resources and capacities. This solution-driven and co-created knowledge is what could enhance sustainability outcomes in the context of the SDGs.

10.4 Discussion: TD approaches in knowledge co-production and action.

In the above section we have compared different approaches to conducting TD research amongst the co-authors, and the assumptions these approaches are based on. The common thread between the narratives above is the inherent tensions involved in integrating knowledge from various scientific and societal groups, and translating this knowledge into meaningful action. This has been explored from the perspective of community-based learning in Colombia, and corporate sustainability in Northern Europe. In this section, we carry out a collective discussion on how our disciplinary TD approaches can inform a more reflexive form of research through highlighting and addressing unequal power relations between actors, thus generating meaningful societal outcomes through embracing TD tensions.

To do this we will employ a paradox lens to explore how surfacing and addressing tensions are generative of new ways of understanding wicked sustainability challenges. Rather than juxtaposing opposite views, which can be weighed against each other, paradox theory takes a holistic approach, acknowledging that contradictory elements are interrelated, and can be dealt with through cyclical responses (Smith & Lewis, 2011). In line with earlier work on paradox theory by sustainability-oriented scholars (Hahn et al., 2018; Van der Byl & Slawinski, 2015), the following three sections each present a discussion of paradox having arisen in the sections above.

Trying to be participatory risks replicating inbuilt unsustainable structures.

Academic education is considered a key contributor in shifting the mindsets of individuals and society towards more sustainable forms of living (Wiek, Farioli, Fukushi, & Yarime, 2012). At its best it promotes critical thinking and reflection. Yet in an age of climate change scepticism, of which the extent of human induced global warming is illustrative, science as a bedrock of progress is in question. As Sjors Witjes mentions in section two, academic institutions are receiving less government money, and having to forge alliances with the private sector, which is problematic in terms of negotiating competing interests. From a higher education perspective, Thomas also critically reflects on the limits of what are taught at the university, in comparison to life skills learnt out in the field. With decreasing funding and legitimacy concerns, academia is in desperate need to reinvent itself as a useful actor in society.

As transdisciplinary scholars, we as co-authors have shared the methodology of Participatory Action Research as a means to actively engage *with* stakeholders, and promote the co-creation of knowledge and action-based change at the local level. Yet a paradox evident in the narratives above is the extent to which our research really is *participatory*. The underlying assumption is that knowledge is a co-production process, relevant to both academia and non-academic partners. But what do we give back to our non-academic partners through our investigation? And how much are they actually participating in the research process? Participation, both as a concept and as practice, addresses a broad range of actor involvement aiming at the redistribution of power. It goes from ‘the empty ritual of participation’ where power-holders are enabled to ‘educate’ or ‘cure’ the participants to having the real power to affect the outcome of the process by way of high degrees of decision-making (Arnstein, 1969, p. 217). As Thomas Macintyre's anecdote illustrates, rather than a co-production of knowledge, the researcher was the one left confused, wondering what his role was in the community setting. Ignoring such unsettling encounters and only writing in academic journals about what experts know and understand risks replicating inbuilt unsustainable

societal structures, with less tangible and unknown phenomena marginalised in favor of dominant sustainability discourses. Much like the 'greenwashing' Sjors Witjes writes about in section two, reflecting on such paradoxes encourages us to question our own assumptions and worldviews. This is highlighted by Monica Ramos-Mejía's anecdote, which shows how projects which bring academia and grassroots communities together have the potential for an intervention to be contextualised, and required skills and technical tools provided by outside actors (see Lantz, Viruell-Fuentes, Israel, Softley, & Guzman, 2001).

By trying to be contextually relevant we question the scientific validity of TD research

The experiences brought by the co-authors above show the tension between scientific validity and contextual relevance. The former refers to robust methodologies and fluent dialogue with existing literature. The latter refers to practice-related challenges in specific contexts. Often, they do not match, which results, for example, in the practice-component being either overlooked or oversimplified by scientific approaches and conceptualisations.

The paradox arises when focusing on both the goals of scientific validity and contextual relevance. On the one hand, when a research project is transdisciplinary in terms of people, disciplines and fields, and directly related to the local context, there are more perspectives and, therefore, a more precise look into reality. However, the more diverse the group, the more difficult it is to agree on the process of co-designing, co-complementing or co-analysing the results in a scientific way (Akpo, Crane, Vissoh, & Tossou, 2015). On the other hand, although non-academic actors often feel more comfortable with simple and easy-to-picture models, complex theoretical frameworks are better suited to embrace more detailed data: the simpler the model the more variables it overlooks or keeps as constants. This is particularly relevant to contextualising research, where looking at spaces, scales and places (Truffer et al, 2015) or at the institutional diversity (Ramos-Mejia et al, 2018).

The generative aspect of this paradox lies in the fact that it is precisely this tension that nurtures TD research. If a TD group manages to deal with such difficulty, it is more likely that innovative methodological approaches are developed, as well as more comprehensive results achieved. For example, in the research project mentioned by Monica Ramos-Mejía in section 2, the process became more relevant to the community involved when the academic members of the team stopped analysing each case separately from their own perspective, and started having meetings together to carry out the analysis collaboratively, creating a dialogue that transcended disciplinary boundaries.

By trying to be collaborative, we risk not being credible in TD research

The SDGs framework has become popular in societal discourse and most people would agree that it helps focus attention on global sustainability challenges. However, critics such as Spangenberg (2017) argue that the lack of formal obligations leaves too much navigational space for individual companies to take full responsibility for their actions. As Sigurd Vildåsen's narrative illustrates, the application of the SDGs among companies tends to be at a high level of abstraction without clear linkages to daily operations. Along the lines of Sjors' reasoning, it is questionable whether the popularity of the SDG framework in the business sector is something that benefits society as a whole through actual results, or whether it is a means of avoiding stricter legislation by signalling future actions in a collaborative though uncommitted manner.

Within this issue is the paradox between *creatively* bringing diverse actors together to address shared challenges, and the *credibility* of such collaboration resulting in action-based change. On the one hand, the SDG framework provides a common frame of reference upon which diverse actors can agree upon, in line with a pluralist epistemology (Vildåsen, Keitsch, & Fet, 2017). As Sigurd Vildåsen argues, this enables creative learning processes, where for example business representatives can meet with NGOs to share social and environmental issues in a constructive manner. In many cases, companies do not have the competencies and motivation to evaluate SDG issues from a societal perspective, which places an important role on researchers to facilitate learning in TD contexts. On the other hand, discussing the SDGs in themselves do not lead to actual change, and the related multi-actor debate can result in superficial statements without committed agreements. Thomas shares his scepticism to companies only choosing a few SDGs to focus on, instead of focussing on the deeper systemic change which he feels the SDGs aspire to, and which are needed in society. The related knowledge stemming from such processes risk a lack of credibility whereby actions and measures signalled by companies are difficult to verify.

This paradox can be seen as an invitation to both academic and non-academic actors to be more bold in exploring innovative solutions to societal challenges. As all authors have stressed, tensions are natural to all collaborations between academic and non-academic actors. Beyond limited time and resources (Schaltegger & Beckmann, 2013), a source of tensions are conflicting assumptions and worldviews. The important aspect is to promote critical and reflective thinking through engaging in learning and feedback between diverse actors (Cash et al., 2003). This involves challenging company representatives in how they understand the relationship between SDGs and corporate goals, and to challenge the TD researcher to explore creative research methods, which capture the collaborative spirit, but which is also scientifically credible and meaningful to society. In this way, in the words of Sjors Witjes, we can promote a paradigm shift from business-as-usual towards more inclusive and creative approaches towards developing more sustainable societies.

10.5 Reflecting on how to embrace TD tensions on the road to 2030.

The four co-authors of this paper have embarked on an experiment in collaborative writing in which we have seen the messy sustainability challenges as an opportunity to contribute to the TD debates around the need for more inclusive and reflective societies (Smith & Lewis, 2011).

Through the multiple voices of the co-authors, we have explored how underlying assumptions involved in TD research affect the research process. The authors of this paper are in general agreement about highlighting the plurality of epistemologies present in society, highlighted by Sigurd Vildåsen noting that, 'nobody owns the truth.' For this reason it is important to accept the knowledge domains of other actors (Wiek, Withycombe, & Redman, 2011), as highlighted by Sjors Witjes in the need for companies and researchers to accept each other as valuable sources of information.

The narratives above, however, show that in practice this is complicated. Thomas Macintyre struggles with understanding the 'silent knowledge' being explored with co-researchers, questioning his own contribution

to the community he is studying, while Sigurd Vildåsen is left to consider the extent to which the company he is collaborating with will put the SDGs into actionable change. Sjors Witjes feels a tension with how student research(ers) will be utilized by companies. Taking the disconnection between academic and non-academic actors as a starting point, Monica Ramos-Mejía's narrative emphasises the TD assumption that research should be solution-based, and shows how this assumption drives a desire for participatory action research, a methodology shared by all co-authors, which can address local contextual problems.

The question as to *how* such TD research can lead to enhanced sustainability outcomes produced more nuanced narratives amongst the authors. Sigurd Vildåsen stresses that although the SDG framework can result in only some of the targets being emphasised by actors, resulting in a negotiation between divergent interests, the framework can unite competing interests around a common language. This places an important role of academics to be facilitators and take the role of raising critical questions as to how the goals are interpreted. Sjors Witjes takes this a step further by arguing that the role of academia to generate corporate reflexivity around the SDGs that can lead to a paradigm shift away from an economic paradigm of economic growth, towards a paradigm of inclusivity. More critical to how this works in practice, both Thomas Macintyre and Monica Ramos-Mejía's question the extent to which our roles as academics is really benefiting the realities and local contexts of non-academic actors. Thomas Macintyre questions whether it is enough to just bring actors together to in inclusive collaboration, or if a deeper transformative process is needed.

Underlying these different perspectives is an important assumption in employing a TD framework: that bringing together academic and non-academic, in a process of collaborative and reflexive learning will lead to a new shared consensus. As the narratives above show, this is not given outcome. At display is the lack of ability or opportunity to address the issue of unequal power in stakeholder relations. This begs questions as to the TD research conditions which make multi-stakeholder projects productive, and importantly, which address the source of these power imbalances and ultimately lead to socio-ecological transformations. Exploring these questions proves important avenues for further TD research in the sustainability sciences.

To conclude, the SDGs are without doubt a highly ambitious project. With its focus on its impacts "for all," through its universal applicability, it represents in theory at least, a disruptive break with the status quo. TD research is an apt approach to moving towards these goals through its ambitions to bring together various stakeholders in a participatory context which addresses complex issues in a reflexive manner. Yet as the narratives above show, transformations across sectors of society are not easy, with context specific realities contributing to complex socio-ecological challenges. It implies academic and non-academic researchers and practitioners to embrace the inherent tensions of working collaboratively with others who think and understand the world in a different way. This requires on the one hand, understanding that opening up room for participation implies a redistribution of power along the research process. And on the other, it requires TD research to be a reflexive practice so as to shake up our mindsets, contributing innovative approaches to tackling these challenges. Its success will ultimately depend on learning to embrace inherent transdisciplinary tensions on the road to 2030.

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