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The 2030 Agenda for Sustainable Development: Transformative Change through Sustainable Development Goals?

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Editorial

The 2030 Agenda for Sustainable Development: Transformative Change through the Sustainable Development Goals?

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Abstract
The 2030 Agenda of the United Nations comprises 17 Sustainable Development Goals (SDGs) and 169 sub-targets which serve as a global reference point for the transition to sustainability. The agenda acknowledges that different issues such as poverty, hunger, health, education, gender equality, environmental degradation, among others, are intertwined and can therefore only be addressed together. Implementing the SDGs as an 'indivisible whole' represents the actual litmus test for the success of the 2030 Agenda. The main challenge is accomplishing a more integrated approach to sustainable development that encompasses new governance frameworks for enabling and managing systemic transformations. This thematic issue addresses the question whether and how the SDGs set off processes of societal transformation, for which cooperation between state and non-state actors at all political levels (global, regional, national, sub-national), in different societal spheres (politics, society, and economy), and across various sectors (energy, transportation, food, etc.) are indispensable. In this editorial, we first introduce the 2030 Agenda and the SDGs by providing an overview of the architecture of the agenda and the key challenges of the current implementation phase. In a second step, we present the eleven contributions that make up the thematic issue clustering them around three themes: integration, governance challenges, and implementation.

Keywords
2030 Agenda; governance; implementation; integration; Sustainable Development Goals; sustainability; transformation; transition; United Nations

Issue
This editorial is part of the issue "The 2030 Agenda for Sustainable Development: Transformative Change through Sustainable Development Goals?" edited by Thomas Hickmann (University of Utrecht, The Netherlands), Markus Lederer (Technical University of Darmstadt, Germany), Jens Marquardt (Technical University of Darmstadt, Germany), Sandra Schwindenhammer (Justus Liebig University Giessen, Germany) and Sabine Weiland (Catholic University of Lille, France).

1. The 2030 Agenda and the Sustainable Development Goals

In September 2015, the international community adopted a global sustainable development agenda, the 2030 Agenda for Sustainable Development (2030 Agenda), at the United Nations General Assembly. It comprises 17 Sustainable Development Goals (SDGs) and 169 detailed sub-targets with which the 'transformation of our world' towards a fairer and more peaceful future is to be set in motion (United Nations, 2015). Building upon the Millennium Development Goals (MDGs) adopted in 2000, the 2030 Agenda calls on each member state of the United Nations to implement the 17 SDGs and the associated sub-targets in their own country and to support goal implementation in all other parts of the world by 2030. In doing so, the international community aims to overcome the North-South divide that still prevails in global environmental and development politics.

1.1. The Architecture of the 2030 Agenda

The 2030 Agenda acknowledges that different issues such as poverty, hunger, health, education, gender equality, environmental degradation, etc., are intertwined. As such, the 17 SDGs form an integrated system, i.e., they recognise that action in one area will affect outcomes in others and that sustainable development must balance social, economic, and environmental aspects (Nilsson, Griggs, & Visbeck, 2016). The previous eight MDGs focused on development goals, targeting primarily developing countries, with more advanced countries providing financial and technological assistance. In contrast to that, the SDGs are thematically and spatially more comprehensive and apply to all countries. To achieve them, a concerted global effort for the wellbeing of the current and the following generations and more integrated and cross-sectoral policies are needed (Sachs, 2012; Sachs et al., 2019).

The 'indivisible' 2030 Agenda responds to the lessons learned from the MDG process and its problems arising from fragmentation and siloed implementation (Vandemoortele, 2011; Waage et al., 2015). A focus on interlinkages between policy areas is perceived as indispensable and as an opportunity to realise positive interactions between the SDGs and ensure that progress achieved in some areas is not made at the expense of progress in others. These linkages, which can be both implicit and explicit, are already built into the SDGs architecture. For example, the aims of SDG 3 ('good health and wellbeing') can be found across other goals, such as SDG 1 ('no poverty'), SDG 2 ('zero hunger'), SDG 6 ('clean water and sanitation'), and SDG 10 ('reduced inequalities') (ICSU, 2017). The SDGs were therefore qualified as a 'network of targets' (Le Blanc, 2015), in which interactions can be positive, i.e., progress in one goal favours progress in another ('synergies'), or negative, i.e., progress in one goal hinders progress in another ('trade-offs'; Pradhan, Costa, Rybski, Lucht, & Kropp, 2017). This architecture opens up perspectives for cross-sectoral and integrated implementation but simultaneously presents new coordination challenges for governments, donors, civil society representatives, and other relevant political and societal actors.

Closely connected to the theme of interactions is the notion of partnership for implementation. SDG 17 explicitly focusses on 'strengthening the means of implementation and revitalising the global partnership for sustainable development.' It highlights that 'effective public, public-private and civil society partnerships' (United Nations, 2015, Target 17.17) may lead to the institutions and governance structures needed to foster comprehensive SDG implementation. A broad range of state and non-state actors is regarded as institutional agents with the potential for policy change. They invest time, issue-specific expertise, and skills to promote certain policies and strategically act as "meaning managers" by creating new cognitive frames, thus establishing "new ways of talking about and understanding issues" (Finnemore & Sikkink, 1998, p. 897). These actors often represent specific policy issues and objectives. Building partnerships between them is therefore not only a means to foster cooperation to achieve the SDGs, but also to understand how interactions look like between the policy issues or sectors they represent (Horan, 2019; Stibbe & Prescott, 2020). A second principle for turning the potential of SDG interactions into reality is SDG 16 ('peace, justice and strong institutions'), which underlines the importance of 'good governance.' Good governance promotes accountability, transparency, efficiency, and the rule of law at all levels, as well as efficient management of human, natural, and economic resources for sustainable development (Monkelbaan, 2019, Chapter 7). The key question is how to establish such institutions needed for implementing the 2030 Agenda, given the diverse institutional and normative settings that exist among nation-states.

1.2. Transformative Change through the SDGs?

The 2030 Agenda and the SDGs serve as a global reference point for the transition to sustainable development. They call for the transformation of existing institutional structures in every country and require a concerted effort of governments at multiple levels, civil society, business, and academia. The 'governance through goals' approach (Biermann, Kanie, & Kim, 2017; Fukuda-Parr, 2014; Kanie & Biermann, 2017) is characteristic of the 2030 Agenda and the SDGs. It relies on goal-setting instead of rule-based governance, while concretisation and implementation of the SDGs are left to the actors at various governance levels. Implementing the SDGs thus represents the actual litmus test for the success of the 2030 Agenda. To achieve the goals, processes of radical societal transformation are necessary. These require support through cooperation between state and non-state

actors at all political levels (global, regional, national, sub-national), in different societal spheres (politics, society, and economy), and across various sectors (energy, transportation, food, etc.).

The seeds of transformation are sown with the SDGs—but their flourishing depends on how global ambitions are translated into national contexts and adapted to their priorities, to which extent national governments formally commit themselves to the goals, and how agents of change can be mobilised. The collaborative governance architecture builds on support and interaction, similar to the hybrid and dispersed post-Paris climate governance (Kuyper, Linnér, & Schroeder, 2018). The main challenge is implementing a more integrated approach to sustainable development that encompasses new governance frameworks for enabling and managing systemic transformations. One strategy is to exploit the co-benefits between the goals by identifying those with critical leverage to achieve and accelerate systemic sustainability gains. Identifying them requires in-depth analyses to map out interdependencies between SDG outcomes (Kroll, Warchold, & Pradhan, 2019; Nilsson et al., 2018).

In this context, "The World in 2050," a global research initiative launched by the International Institute for Applied Systems Analysis, the Sustainable Development Solutions Network, and the Stockholm Resilience Centre, proposes six transformations in different thematic clusters for achieving the SDGs and long-term sustainability: (1) education, gender and inequality, (2) health, wellbeing and demography, (3) energy decarbonisation and sustainable industry, (4) sustainable food, land, water and oceans, (5) sustainable cities and communities, and (6) a digital revolution for sustainable development (TWI2050, 2018). The strategy to rely on modular transformations is an attempt to take a holistic perspective that integrates all possible domains affected while at the same time simplifying the complex interlinkages, and concomitant interventions, in the SDG system (Sachs et al., 2019). The *Global Sustainable Development Report 2019* (UN Department for Economic and Social Affairs, 2019) proposes a similar transformation strategy.

Sustainability transformations require new governance frameworks, tools, and institutions to address the enormous and complex societal challenges posed by the 2030 Agenda. In this thematic issue, we shed light on these challenges by taking stock of current debates and actions in implementing the SDGs and achieving societal and global change and transformation.

2. The Contributions to the Thematic Issue

The contributions in this thematic issue represent a spectrum of perspectives on the 2030 Agenda, the SDGs and their transformative potential. The volume includes conceptual and normative contributions to the debate as well as more empirical ones focussing on the governance and implementation of the 2030 Agenda. The articles in this thematic issue can broadly be grouped into three parts.

2.1. The SDGs as an 'Indivisible Whole': Integration, Coherence, and Justice

The first set of articles analyse the SDGs as an 'indivisible whole'—a system of interlinked goals that can only be achieved together. The authors come to rather different conclusions depending on the perspective they take. The contribution by Bornemann and Weiland (2021) investigates the notion of policy integration in the context of the 2030 Agenda against the background of the historical sustainability discourse. While the latter was dominated by the concept of environmental policy integration, the 2030 Agenda promotes an encompassing, reciprocal, and complex integration approach. Priority goals can still be identified and serve as leverage points for improving the overall goal system. Brand, Furness, and Keijzer (2021) criticise the 2030 Agenda's focus on policy coherence as a form of technocratic believe in the manageability of the complex relations between the SDGs. The authors argue that despite the emphasis of integration, the underlying political interests of different actors will remain fundamentally incompatible, which in turn makes navigating political trade-offs pivotal for achieving the SDGs. The article by Müller, Neumann, Elsner, and Claar (2021) comes to a similar conclusion from an empirical case study that examines the notion of justice as a means to address trade-offs and enhance co-benefits in the implementation of the SDGs. Using the African energy transition as an example, progress towards SDG 7 ('affordable and clean energy') is examined with a focus on integrating an energy justice dimension to align socio-ecological requirements and people's energy needs. Finally, Konold and Schwietring's (2021) contribution addresses the discrepancy between the ambitions of the 2030 Agenda and sustainable development, and the change that is actually achieved. It is argued that this gap is not rooted in a lack of political will or strategy but rather due to the specific functional logics of the different social subsystems which have to be taken into consideration in the transformation of society towards sustainability.

2.2. Challenges for SDG Governance: Norm Interpretation, Partnership, Science and Technology

The contributions of the second part revolve around the governance challenges that the 2030 Agenda and the SDGs pose. Breitmeier, Schwindenhammer, Checa, Manderbach, and Tanzer (2021) analyse the heterogenous norm interpretations of sustainability in the context of SDG 2 ('zero hunger') that can potentially impede its implementation. Based on the literature on global regime complexes, the authors focus on inter-institutional arrangements which provide discursive exchange fora to facilitate cooperation, and thus

have great potential to achieve more aligned sustainability norm understandings. Sondermann and Ulbert (2021) take SDG 17 ('partnerships for the goals') as a starting point of their contribution. They develop partnership as a form and norm of meta-governance of the SDGs, which they operationalise along different levels of accountability and participation, as proxies for the quality of partnership. The study applies this framework to the implementation of the health-related goals of the 2030 Agenda. The contribution by Zeigermann (2021) examines strategies of scientific knowledge integration adopted by science-based actor networks with the aim to enhance the evidence base of sustainability governance. The analysis of national Sustainable Development Solution Networks (SDSNs) reveals that these strategies—be they solution-oriented, assessment-oriented, or learning-oriented strategies—are shaped by the interaction of the network actors with their institutional environment. Finally, Schwindenhammer and Gonglach (2021) study technology as a pillar for SDG implementation. In a case study of a wastewater treatment system in urban agricultural production in Germany, the authors find that the emerging technology has potential to facilitate the implementation of SDG 2, while simultaneously posing new challenges for more integrated policymaking to govern the food-water-technology nexus.

2.3. Implementing the SDGs across Different Governance Levels

The contributions of the third part examine the implementation of the SDGs across different governance levels. Bornemann and Christen (2021) discuss the implementation of the 2030 Agenda with a focus on the Swiss subnational governance context. Governments and administrations have over the past decades developed differentiated sustainability governance arrangements (SGAs) which are now confronted with the new challenges that SDG implementation poses. The analysis carves out the possibilities and limitations of the existing SGAs to meet the requirements of the 2030 Agenda. Krellenberg and Koch (2021) analyse sustainability transformation at the city level. In the context of the current COVID-19 pandemic, they explore the potentials and contradictions in implementing SDG 11 ('sustainable cities and communities') that result from the multiple tasks, actors involved, and complexity of sustainability transformations. The final contribution by Hickmann (2021) takes as a starting point the high expectations that have recently been put on the role of cities and their governments in the global endeavour to achieve sustainability worldwide. The author, in contrast, argues that urban sustainability actions are embedded in complex interactions between public and private actors, and across different governance levels. A multi-level governance approach is therefore necessary, acknowledging the interconnectedness of cities, which implies potentials and limitations for governing and implementing the 2030 Agenda at the local level.

The contributions to this thematic issue, while focusing on different conceptual and empirical dimensions and topics of the SDGs, share the common goal of shedding light on the transformation induced by the 2030 Agenda. They point to fundamental challenges in the design, elaboration, and implementation of the SDGs, and emphasise the large potential of the 2030 Agenda to foster change. Five years after adopting the SDGs and their transformative agenda, we hope that this volume contributes to further elucidating this ambitious programme and the various implications of putting sustainable development into practice.

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Conflict of Interests

The authors declare no conflict of interests.

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Article

The UN 2030 Agenda and the Quest for Policy Integration: A Literature Review

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Abstract
The adoption of the UN 2030 Agenda and the Sustainable Development Goals (SDGs) represents a milestone in international sustainability politics. The broad and ambitious agenda calls for a reconsideration of established principles and practices of sustainability governance. This article examines how the 2030 Agenda changes the notion of policy integration, which represents a fundamental principle of sustainability governance. In general, policy integration denotes forms of cross-cutting policymaking to address the complexity of real-world problems. In the context of the sustainability discourse, the concept has long been interpreted as environmental policy integration, referring to the integration of environmental concerns into other sectoral policies. Based on a review of the current SDG literature, we examine whether and how this interpretation has changed. In so doing, the reasons (why?), objects (what?) and modes (how?) of policy integration in the context of the 2030 Agenda are specified. The analysis reveals that the 2030 Agenda promotes a comprehensive, reciprocal, and complex form of goal integration which differs markedly from environmental policy integration. This novel understanding of policy integration for sustainable development calls for future research on its impact and relevance in political practice.

Keywords
2030 Agenda; environment; policy integration; SDGs; sustainability governance

Issue
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1. Introduction

The adoption of the 2030 Agenda and the Sustainable Development Goals (SDGs) by the UN General Assembly in 2015 represents a milestone in international sustainability governance. For the first time in history, the international community of states has agreed on a comprehensive, binding, and relatively concrete system of goals and targets to guide the major global transformation towards sustainability (Biermann, Kanie, & Kim, 2017). Ground-breaking and unprecedented in its scope, the 2030 Agenda poses major governance challenges. This is reflected, among others, in a shift from a rule-based mode of governance to a novel approach of governance through goal setting (Biermann et al., 2017; Kanie & Biermann, 2017; Kanie et al., 2019). Apart from changes in the global governance architecture, the 2030 Agenda also brings about shifts at the level of basic governance orientations (Bowen et al., 2017). While still in the tradition of the global sustainability discourse in normative

and conceptual terms, the 2030 Agenda represents—we argue—a transformational moment for established sustainability thinking and practice. It questions, problematises, and reinterprets existing assumptions, interpretations, and normativities of sustainability as well as approaches and practices of sustainability governance (Langford, 2016; Meadowcroft et al., 2019).

In this article, we substantiate this claim by analysing how the 2030 Agenda brings about changes in the interpretation of policy integration, which represents a long-standing key principle of sustainability governance. Sustainability problems transcend existing institutionalised areas, or 'silos,' of policymaking and call for approaches and strategies of integrative, cross-cutting policymaking (Bornemann, 2014; Liberatore, 1997; Steurer, 2010). Integration has always been a core element of sustainability thinking and governance, and it is also of central importance for the 2030 Agenda (Le Blanc, 2015; Nilsson & Persson, 2017). In line with Boas, Biermann, and Kanie (2016), we argue that the 2030 Agenda has specific implications for the interpretation of policy integration that warrant further conceptual investigation. This article will carry out such an investigation through a literature review. We reconstruct the notion of policy integration promoted in key texts that have shaped, and continue to shape, the debate on policy integration in the context of the 2030 Agenda. This conceptual exploration is meant to provide the ground for more focused empirical analyses as well as more targeted practices to realise policy integration for the 2030 Agenda 'on the ground.'

We begin with a recapitulation of the general concept of policy integration and its meaning and relevance in sustainability discourse (Section 2). We then present the literature review method and the three guiding questions that allowed us to decipher the understanding of policy integration present in the literature (Section 3). Next, we summarise the results of our analysis of the key texts and specify the meaning of policy integration in the context of the 2030 Agenda (Section 4). In the discussion, we interpret that meaning in relation to earlier concepts of sustainability-oriented policy integration (Section 5). We conclude with an outlook on future research on the impact and relevance of the policy integration conception in political practice (Section 6).

2. Background: Policy Integration and Sustainable Development

2.1. Policy Integration in Policy Research

Policymaking has traditionally been carried out in distinct, institutionalised policy sectors, with specific responsibilities and using specialised policies (Burstein, 1991; Jochim & May, 2010). With its focus on specialised knowledge and the division of responsibilities, this approach to policymaking generally reflects the modernist notion of a functionally differentiated society—and as such has led to the emergence of a 'sectoral view' in current policy research (Jochim & May, 2010). While the 'siloing' of public policy has been a dominant trend in all policy areas in recent decades, there are also counter-movements that have emerged in response to the increasing differentiation of political systems (Bornemann, 2016; Christensen & Lægreid, 2007).

Given the growing complexity and 'wickedness' of policy problems (Termeer, Dewulf, Breeman, & Stiller, 2015), as well as the emergence of ideas for the transformation of society, such as sustainable development (Meadowcroft, 2013), policymakers are increasingly opting for integrative approaches to policymaking (Bornemann, 2014; Rayner & Howlett, 2009). Many policy problems are inter-sectorial, meaning they cut across policy domains, governance levels, and established jurisdictions (Candel & Biesbroek, 2016). Climate policy, for example, would fall short if it only relied on climate action and did not include measures in adjacent policy areas, such as agriculture, economy, transport, or energy (Adelle & Russel, 2013). These efforts to organise the 'policy mess' and deal with complex problems cutting across established policy fields more comprehensively come to bear in comprehensive and integrative political strategies, such as climate adaptation or sustainability strategies (Casado-Asensio & Steurer, 2014; Meadowcroft, 2007; Nordbeck & Steurer, 2015; Steurer, 2008).

Several partially overlapping and sometimes synonymously used concepts have been promoted in policy analysis to study practices of integrative or cross-cutting policymaking (Cejudo & Michel, 2017; Tosun & Lang, 2017). These include, among others, policy coordination (Peters, 1998), policy coherence (OECD, 2018), whole-of-government (Christensen & Lægreid, 2007), joined-up government (Bogdanor, 2005), and holistic governance (6, Leat, Seltzer, & Stoker, 2002). Most comprehensively, the issue has been addressed as 'policy integration' (Bornemann, 2014; Briassoulis, 2005; Cejudo & Michel, 2017; Jordan & Lenschow, 2008; Lenschow, 2002a; Nilsson & Eckerberg, 2007; Nilsson, Eckerberg, Hagberg, Swartling, & Söderberg, 2007; Underdal, 1980). The latter term refers to attempts to combine different policy areas with specific, relatively stable problem configurations, goals and measures, as well as actor constellations and institutions, into a more comprehensive and coordinated policy of one kind or another.

2.2. Policy Integration in the Context of Sustainability Thinking

The concept of sustainable development, most prominently expressed in the Brundtland Report and subsequently institutionalised in the 'Rio process,' requires the systematic connection of the seemingly incompatible goals of economic competitiveness, social development, and environmental protection. It emerged against the background of a perceived need to bring together

environmental and development issues that had previously only been discussed separately on the international scene. Whereas growth and development had been seen as coming at the expense of environmental protection, the Brundtland Report highlighted the inherent connections between the two (WCED, 1987). Sustainable development is essentially a critique of the dominant industrial development model (Dryzek, 2013) which is reaching its limits, as evidenced by both the wealth-related environmental destruction of the Global North and the poverty-related environmental destruction of the Global South. These can no longer be perceived as singular problems but as part of a global crisis of the industrial development model itself (Brand, 2017; Purvis, Mao, & Robinson, 2019). Sustainable development aims to secure the development options for present and future generations while simultaneously preserving the natural systems on which our lives depend (Jacobs, 1999). Given the interdependencies and interconnections between different systems, spaces, and temporal horizons, policy integration became a central concept in sustainability-oriented governance (Bornemann, 2014). To be able to tackle the interconnected nature of sustainability problems, the existing fragmentation of policy systems has to be overcome and replaced by more integrated forms of policymaking.

In the context of the discourse on sustainable development, however, one particular interpretation of policy integration became dominant: The integration challenge associated with sustainability was conceived primarily in terms of environmental policy integration (EPI; Jordan & Lenschow, 2010; Lenschow, 2002a; Liberatore, 1997). Liberatore (1997), for example, identifies a 'straightforward' relationship between EPI and sustainable development, stating that:

> If environmental factors are not taken into consideration in the formulation and implementation of the policies that regulate economic activities and other forms of social organisation, a new mode of development that can be environmentally and socially sustained in the long term cannot be achieved. (p. 107)

The close link has also been emphasised in the political realm. In the EU, for example, EPI was institutionalised in article 6 of the Amsterdam Treaty according to which "environmental considerations should be integrated into other policies in order to deliver sustainable development" (as cited in Lenschow, 2002b, p. 14). From 1998 onwards, EPI has moved centre stage in the so-called 'Cardiff process' which aims at integrating environmental issues in sectoral policies of the Union.

Jordan and Lenschow (2010) distinguish stronger (i.e., pro-environment) and weaker understandings of EPI. As part of the latter reading, EPI is largely understood as policy coordination, which implies a focus on comprehensiveness, aggregation and consistency of action. The rationale of EPI is that genuine sustainable development can only be achieved if the environment is no longer treated as a separate sector in policymaking with its own actors, organisations, and institutions. Rather, environmental perspectives must become an integral part of the goals, strategies, and policymaking procedures of all public policy sectors, such as energy, agriculture, and transport, as well as of central government bodies, e.g., the economic and finance ministries, where many key policy decisions are taken (Nilsson, Pallemaerts, & Homeyer, 2009).

The stronger, more normative readings of EPI include the conception of Lafferty and Hovden (2003) who define the environment as a principled standard for policymaking in all sectors. According to them:

> Environmental policy integration implies the incorporation of environmental objectives into all stages of policymaking in non-environmental policy sectors, with a specific recognition of this goal as a guiding principle for the planning and execution of policy; accompanied by an attempt to aggregate presumed environmental consequences into an overall evaluation of policy, and a commitment to minimise contradictions between environmental and sectoral policies by giving *principled priority* to the former over the latter. (Lafferty & Hovden, 2003, p. 15, emphasis added)

This normative definition of EPI goes beyond more general interpretations of policy integration in that it aims precisely not to balance different objectives—rather, the environment should be a principled priority of any policy. As Lafferty and Hovden (2003) write:

> Most discussions of EPI assume either that the environmental and non-environmental objectives should be balanced….We would argue that the whole point of EPI is, at the very least, to avoid situations where environmental objectives become subsidiary; and in the view of sustainable development, to ensure that they become principal or overarching societal objectives. This is arguably the essential difference between 'environmental policy integration' and 'policy integration' conceived more generally. (p. 15)

In this perspective, EPI refers to a unidirectional integration of environmental concerns into other policy sectors. Moreover, EPI should be interpreted as an asymmetric integration task geared towards a revision of the traditional hierarchy of policy objectives which prioritises economic issues and neglects environmental concerns and values.

While the ambitious notion of a principled prioritisation, as suggested by Lafferty and Hovden (2003), remained contested and did not translate into a widespread practice of policy integration, EPI more generally, understood as the unidirectional incorporation of environmental goals into sectoral policies, has long dominated how policy integration was framed in the context

of sustainable development. Whenever calls for policy integration were made concerning sustainability issues, EPI was the answer.

With the emergence of the 2030 Agenda and the SDGs as a new global sustainability governance framework, however, there have been signs of conceptual shifts in the sustainability discourse. These affect, among others, the interpretation of policy integration and the orientation of related practices (see also Bornemann & Christen, 2021). The 2030 Agenda is based on the earlier Millennium Development Goals and on the preceding international sustainability debate. By combining and extending both strands, it forms a powerful overall vision of global sustainable development that aims to address, in an integrated manner, the many challenges facing humanity to ensure economic prosperity, human well-being, and the protection of the planet (United Nations, 2015). Integration is consequently a prominent leitmotif of the new Agenda (Nilsson & Persson, 2017). It emphasises that different issues such as poverty, gender equality, education, and environmental degradation etc. are intertwined and that the 17 SDGs form an 'indivisible whole' and can only be achieved together. As stated in the 2015 UN General Assembly Declaration, the goals are "integrated and indivisible and balance the three dimensions of sustainable development: the economic, social, and environmental" (United Nations, 2015, p. 1). The strong emphasis on integration is based not least on the insight that the goals of the 2030 Agenda are characterised by numerous contradictions, which have come to the fore and are further exacerbated in the transition from the Millennium Development Goals to the SDGs (Biggeri, Clark, Ferrannini, & Mauro, 2019). Overall, while the 2030 Agenda is clearly based on an integration concept, it remains rather vague concerning the precise interpretation of the term.

3. Method: Analysing the Meaning of Policy Integration in the Literature on the 2030 Agenda

In the following, we turn to an analysis of how integration is interpreted in the academic literature on the 2030 Agenda. To reconstruct current interpretations of policy integration in this context, we conducted a review of the relevant literature on the topic focussed on scholarly articles identified through the Scopus database.

The selection of articles proceeded as follows. The search string was composed of three requirements (connected through the operator AND) that the resulting records needed to fulfil: 1) publications including the search terms '2030 Agenda,' 'sustainable development goals' and 'SDG*' (with * indicating truncation to cover all variants), connected through OR, meaning that any of the search terms can be present in the result; 2) publications focussing on the topic of integration, for which a combination of the terms 'integration,' 'coherence,' 'trade-off,' 'synergies' and 'interaction' (including variations) apply, again connected through OR (search string: *integrat* OR coheren* OR trade*off* OR synerg* OR interact**); 3) publications with a policy or governance focus, including variations (search sting: *policy OR govern**), thus excluding analyses that were merely dealing with socio-ecological systems or static analyses. Only publications from the years 2015 to 2020 were included. In terms of document types, we selected articles, book chapters, reviews, editorials, and notes (we excluded entire books, conference papers, conference reviews, and letters). Finally, for practical reasons, only publications in the English language were included. The search resulted in a sample of 1,281 documents.

In a second step, we analysed the publications' abstracts regarding their fit with our research. Many publications used the 2030 Agenda and/or (selected) SDGs merely as a framing of their argumentation or 'window dressing,' rather than substantially analysing them. Others had only a vague understanding of the notion of integration, and some focussed on integration at the societal level, instead of policy integration in a narrower sense (i.e., problems, goals, and means). Such publications were excluded from further analysis, and the remaining sample included 93 records.

In a third step, we qualified and ranked the remaining publications using the Scopus Field-weighted Citation Index to select the most cited and most relevant texts in the integration discourse around the 2030 Agenda. The Scopus Field-weighted Citation Index qualifies a publication's citations in relation to the average citations expected in its field. The index thus accounts for different citation frequencies in different fields and enables a 'field normalisation,' providing a more accurate measure of discourse relevance than a raw citation count. The ranking of our remaining sample revealed great differences in their index value, ranging from 0 (not cited) to 56 (most cited). A large proportion of publications had small values, and 10 articles were yet to be cited. We defined 5 as a cut-off value, which provided us with a sample of 27 publications. A full-text analysis then led us to exclude another five publications that were not relevant for our study, which eventually resulted in a sample of 22 discourse relevant publications that were included in our analysis.

The sample was then analysed using systematic review methods (Petticrew & Roberts, 2006). Both authors thoroughly read the selected texts and condensed central information in the form of spreadsheets, which were discussed and iteratively refined. The unit of analysis was not the entire publication with its respective analytical or empirical focus, but the underlying (explicit or implicit) understanding of policy integration. We based our analysis on a set of questions to which, arguably, any systematic concept of policy integration must respond (Bornemann, 2014): The first question, 'why to integrate?' is about the reasons underlying and justifying policy integration. The second, 'what to integrate?' refers to a clarification of the objects of policy integration regarding the 2030 Agenda. The third, 'how

to integrate?' relates to the modes of policy integration that are present in the literature about policy integration in the context of 2030 Agenda. In the following section, we present the results from our analysis of the different questions. Table 1 in the Supplementary File provides a synopsis of the key findings by articles.

4. Results: Reasons, Objects and Modes of Policy Integration for the 2030 Agenda

4.1. Reasons for Policy Integration

Regarding the underlying reasons for policy integration, i.e., the question of why policy integration should take place at all, there is considerable convergence in the literature we analysed. Most generally, policy integration is considered a crucial prerequisite for sustainable development in general, and for the successful implementation of the 2030 Agenda and the SDGs in particular (Biermann et al., 2017; Biggeri et al., 2019, pp. 642; Nilsson, Griggs, & Visbeck, 2016). Underlying this call for integration is the diagnosis known from policy integration literature that the prevailing pattern of sectoral policymaking and governance has led to an "insufficient understanding of and accounting for trade-offs and synergies across sectors [that] have resulted in incoherent policies, adverse impacts…on other sectors, and ultimately in diverging outcomes and trends across broad objectives for sustainable development" (Le Blanc, 2015, pp. 176–177; see also Liu et al., 2018). Similarly, Boas et al. (2016) write that the problems that are usually related to "different domains—for instance, water, energy and food—[which] are interconnected and can thus not be effectively resolved unless they are addressed as being fully interrelated and interdependent" (Boas et al., 2016, p. 449; see also Collste, Pedercini, & Cornell, 2017). Stafford-Smith et al. (2017) specify that integration is needed because "uncoordinated action" can "create internal conflicts, such as subsidies for both renewable *and* non-renewable fuel sources" or lead to "missed synergies," e.g., "targeted investment in renewable energy reduces emissions [that…] could *also* reduce pollution, improve human health, and increase equality" (Stafford-Smith et al., 2017, p. 912, emphasis added).

While these concerns relate to the more general pattern of fragmented policymaking that has been deemed responsible for unsustainable development, other authors derive the need for integration more directly from the 2030 Agenda and the SDGs themselves. Allen, Metternicht, and Wiedmann (2019, p. 422) argue that the "integrated nature of the SDG targets means that progress towards one target is also linked through complex feedbacks to other targets," which is why "interdependencies between targets [need to be] taken into account in strategy and policy formulation." Taking into account interdependencies between targets serves to exploit synergies or cross-sectoral benefits between goals, as well as to reduce or avoid trade-offs (Bai et al., 2016; Boas et al., 2016; Liu et al., 2018; Nerini et al., 2019; Nilsson et al., 2018), or even to turn trade-offs into synergies (Kroll, Warchold, & Pradhan, 2019; Scherer et al., 2018).

In addition to directly addressing synergies and trade-offs between (sectoral) goals and targets through more integrated policies, a better understanding of the integrated nature of the SDG system is seen as a prerequisite for the meaningful prioritisation of policy activities (Allen et al., 2019; Bai et al., 2016; Kroll et al., 2019; McCollum et al., 2018). Weitz, Carlsen, Nilsson, and Skånberg (2018, p. 531) state that by "considering how a target interacts with another target and how that target, in turn, interacts with other targets, results [in] a more robust basis for priority setting of SDG efforts." This is very much in line with Nilsson et al. (2018, p. 1490) who argue that "systematically focusing the MOI [means of implementation] (finance, technology, capacity building, trade, policy coherence, partnerships, data, monitoring and accountability) on SDG interactions can lead to more integrated decision-making and coherent policy approaches.''

Furthermore, some authors argue that policy integration in the context of the 2030 Agenda may also "reveal unrecognized opportunities" (Bai et al., 2016, p. 69) and enhance policy effectiveness not only from an overall system perspective but also from the point of view of individual policymakers:

> If they look outside the priorities of their sectoral turf and at how they influence—and are influenced by—others, they are likely to find common interests and (unexpected) alliances and that more integrated policymaking is likely to pay off in terms of more effective development outcomes. (Nilsson et al., 2018, p. 1499)

Thus, greater knowledge about and recognition of SDG interactions drives policymakers toward socially more desirable development pathways (McCollum et al., 2018).

4.2. Objects of Policy Integration

As regards the second question on the 'what' of policy integration, the general debate on policy integration has brought up multiple understandings of potential objects of integration, ranging from comprehensive policy domains and sectors to various specific policy elements, such as policy problems, goals or means (Bornemann, 2014, pp. 106–153). The 2030 Agenda prima facie points to policy goals and targets, thus implying an understanding of policy integration as 'goal integration' (Biermann et al., 2017). The emphasis on goals as objects of policy integration however needs to be differentiated further. Whereas some texts in our sample point to the SDGs (Barbier & Burgess, 2017; Boas et al., 2016; Waage et al., 2015), others emphasise that it is the targets, rather than the goals, which need to

be integrated (e.g., Allen et al., 2019; Le Blanc, 2015; McCollum et al., 2018; Weitz et al., 2018).

These differences seem to be connected to differing perspectives on where integration is taking place. Some articles analyse the general architecture of the SDGs as an 'indivisible whole' or a system in which all goals are interlinked. As such, the SDG system functions as "an enabler of integration," and "a common benchmark against which development progress can be assessed" (Le Blanc, 2015, pp. 180–182), meaning integration is achieved through goal integration (Biermann et al., 2017). Others, in contrast, focus on the contextual implementation of the SDGs as the process in which integration is to be achieved (Allen, Metternicht, & Wiedmann, 2018; Bowen et al., 2017; Nilsson et al., 2018; Weitz et al., 2018). The goals and targets are to be integrated into concrete settings, in which their respective relevance and interactions differ. For this reason, any implementation action—and thus any integration effort—has to be context-specific. Waage et al. (2015) further qualify integration of the various SDGs by assigning them to three concentric layers (individual well-being, social infrastructure, environmental conditions) to indicate their interlinkage, with each layer being associated with different governance settings.

4.3. Modes of Policy Integration

The third question, concerning the 'how' of integration, refers to the mode of policy integration. This is to specify what kind of relationships between different policies or policy objects are promoted or considered adequate in the light of the 2030 Agenda. Although the degree of elaboration varies (with some contributions shifting the specification of the integration mode to the policymaking process itself; see Biermann et al., 2017), the literature broadly converges on a common overarching modal profile of the 2030 Agenda. Based on a number of pairs of opposites to characterise modes of (policy) integration (Bornemann, 2014, pp. 76–105), we observe the following general tendencies.

Firstly, more pronounced than earlier concepts of sustainability, the 2030 Agenda is meant as a comprehensive development agenda for a global society. This feature is emphasised to different degrees in all analysed texts. It goes hand in hand with a far-reaching integration mission and implies an extensive conception of policy integration, most distinctively referred to in Weitz et al.'s (2018) explicit reference to a 'whole-of-government' approach. In other words, every goal should in principle be part and parcel of any policy integration attempt. This does not entail that all goals play, or should play, an equal role, but is to say that no goal can, or should be, excluded from policy integration considerations from the outset. This general tendency, which resonates with the claim that the SDGs are 'indivisible,' holds for most contributions. Some accounts, however, focus their reflections about goal interdependencies and implications for policy integration on thematically more selective 'nexus' problems (Boas et al., 2016; Bowen et al., 2017; Liu et al., 2018; McCollum et al., 2018). While still adhering to the system perspective characteristic of the 2030 Agenda, nexus thinking is a way to 'navigate' through the various interlinkages between the various goals and targets and to find an inroad into the SDG's complexities. Nexus governance thus refers to the consideration and treatment of interactions between two or more problems (and related SDGs) that are usually regarded as separate (Allen et al., 2018; Bowen et al., 2017).

Secondly, there are strong indications in the literature analysed that policy integration in the context of the 2030 Agenda goes beyond a one-sided understanding of integration, as is for example implied by the concept of EPI. Virtually all texts point to 'systemic' (Weitz et al., 2018) interactions between goals and targets, and identify different types of goal interaction that need to be understood and considered in integrated policymaking (e.g., Allen et al., 2019; Kroll et al., 2019; Nilsson et al., 2018; Singh et al., 2018; Weitz et al., 2018). While assessments of the system of goals and targets reveal a broad diversity of different degrees (strong vs. weak; Weitz et al., 2018) and kinds of linkages (reciprocal vs. one-sided; Kroll et al., 2019), the basic tenet of policy integration is that relationships between the SDGs potentially exist. Therefore, as a basic principle, reciprocal relations and interlinkages between goals and targets are to be considered, at least at the level of scientific analysis.

Thirdly, based on a distinction between simply networked and complex forms of policy integration (as measured by the maximum number of relationships that can be established between different integrated policies), we observe policy integration in the context of the 2030 Agenda to be based on a highly multilateral, i.e., complex form of policy integration. The numerous analyses of potential interactions or interdependencies between individual SDGs (e.g., Kroll et al., 2019; Nerini et al., 2019; Singh et al., 2018; Weitz et al., 2018) indicate that a policy system aligned with the SDGs should basically be thought of in terms of a maximally networked structure in which each policy is potentially related to every other. However, some authors expound that the SDG system is unevenly integrated, "an unequally knit network, with some goals being linked to many other goals, while others have fewer links with the rest of the network" (Le Blanc, 2015, p. 178), pointing to the existence of 'nexus' problems, which link SDGs in thematically selective ways and with differing degrees of complexity (Allen et al., 2018; Boas et al., 2016).

Fourthly, referring to the distinction between forms of symmetric and asymmetric policy integration, with the latter assuming a prioritisation of certain policy goals and the former denying the possibility (and desirability) of equal consideration, or a principled balancing of policies, the 2030 Agenda seems to come with another shift. As mentioned, the 2030 Agenda calls for an extensive, reciprocal, and multilateral assessment of

goal interactions, which may result in the identification of nexus issues, selectively connecting multiple SDGs. While these kinds of interaction analyses are themselves based on the notion of a principled equal weighing of the goals, their results may suggest a prioritisation of goals. In fact, in most of the articles analysed, the identification of priority goals is the purpose of an integrated analysis of SDGs. The aim is to identify those goals or bundles of goals (nexus) that have a central position in the SDGs' network and therefore serve as powerful entry points for governance interventions. Focussing on these allows one to achieve the greatest number of goals possible, or to reap the greatest possible benefit from achieving them (Allen et al., 2019; Barbier & Burgess, 2017; Biermann et al., 2017; Kroll et al., 2019; Weitz et al., 2018). An exception from this pattern can be found in Waage et al. (2015) who argue that the goals are ordered a priori in terms of their location in the three spheres (well-being, social, environmental). This in turn points to an asymmetrical mode of policy integration, following a logic of goal prioritisation based on their system embedding.

Finally, it is interesting to note that regarding the relationships between goals and targets, most of the analysed texts emphasise that these are positive. In other words, it is not trade-offs and conflict, or neutral relations between the goals, but synergies and co-benefits that are the dominant interaction mode. The prevalence of positive accounts is observable on the empirical level in analyses of the actual relations between the SDGs and targets and their evolution (e.g., Allen et al., 2019; Kroll et al., 2019; Maes, Jones, Toledano, & Milligan, 2019; Singh et al., 2018; Weitz et al., 2018). It is also a focus on the political-strategic level. For example, Kroll et al. (2019, p. 1) suggest setting off a "virtuous cycle of SDG progress" in which trade-offs are transformed into synergies. By looking at successful examples, policymakers are challenged to emulate positive relationships between different SDGs in fields where trade-offs dominate (see also Allen et al., 2019; Boas et al., 2016). Sustainable development, in this perspective, is viewed as a self-reinforcing process that makes strategic use of interlinkages in the socio-ecological system and strives to steer it beneficially.

5. Discussion: Reconsidering Policy Integration for Sustainability

Our literature review reveals a considerable convergence in the conceptualisation of policy integration for the 2030 Agenda. Policy integration in the context of the 2030 Agenda refers to the identification of critical points of policy intervention that allow for the greatest achievement of as many SDGs as possible, based on a sophisticated understanding of the interactions between all goals of the SDG system. Policy integration in the context of the 2030 Agenda thus becomes a knowledge-based undertaking of policy priority setting, based on a more or less context-related analysis of the interactions between the elements of a complex target system, which is to provide indications of the most efficient allocation of resources. In the following, we discuss this understanding of policy integration for the 2030 Agenda in relation to the dominant understanding of policy integration for sustainability, i.e., EPI. While there are some similarities, we argue that policy integration for the 2030 Agenda deviates in some key respects from EPI.

Regarding the *reasons* for policy integration, we first of all note that the more recent discussion on policy integration in the context of the 2030 Agenda is based on different justifications than the one on EPI. The central basis for policy integration in the 2030 Agenda context is the belief that integration can make policymaking more rational. Not only can synergies be realised through policy integration, but also contradictions between policies can be eliminated. With the help of focussed interventions in relation to critical goals or sets of goals, the allocation of policy resources can be optimised in a way that the greatest impact on sustainable development as a whole can be achieved. While this may evoke rationalistic ideas of policy integration, which also characterise large parts of the general discussion on policy integration, EPI's mission is different. EPI is concerned with the elimination of a non-rational pattern of policymaking, too, in the sense of realising effectiveness and efficiency gains by considering environmental concerns at the early stages of policy design (as opposed to, for example, end-of-pipe measures). However, some interpretations of EPI articulate the idea of a fundamental shift in the normative basis of policymaking, namely the prioritisation of environmental concerns over sectoral goals (Lafferty & Hovden, 2003). Here, policy integration is no longer functionally geared to the achievement of specific goals, but rather to their re-orientation. Viewed against this far-reaching normative claim of EPI, ideas of policy integration in the context of the 2030 Agenda are more modest in that they are directed at the (most efficient and effective) realisation of an existing system of objectives.

Considering the *objects* of policy integration, i.e., the findings regarding the question 'what to integrate,' we note a continuity between EPI and policy integration for the 2030 Agenda. Both concepts emphasise goals as integration objects but tend to neglect other conceivable objects of integration, such as policy problems or policy instruments (Bornemann, 2014; Briassoulis, 2005). EPI is about the integration of environmental goals into the normative system and structure of particular policy fields (such as agricultural policy), whereas policy integration for the 2030 Agenda is concerned with the relations between individual SDGs and their associated targets. This conceptual focus makes integration a normative endeavour, but overlooks other (cognitive and instrumental) aspects that present both opportunities and challenges for integration.

As regards *modes* of policy integration, we again find some crucial differences. First, while EPI is based

on an understanding of integration that is specifically oriented towards the achievement of environmental goals, but disregards the broader normative implications of sustainable development, policy integration for the 2030 Agenda implies an extensive policy integration understanding. This is demonstrated by the fact that the contributions reviewed cover the entire spectrum of sustainability by referring to all goals of a broadly defined universe of goals of political action, i.e., the SDGs. Given its comprehensiveness, policy integration for the 2030 Agenda does justice to the normative breadth of the sustainability idea, which has already been enshrined in the Brundtland Report, but which has at times been overshadowed by selective interpretations focusing on specific economic, social or, in the case of EPI, environmental dimensions of the concept.

The turning away from selective understandings of policy integration also comes to bear in another mode of policy integration referring to the direction of integration. In contrast to EPI, policy integration for the 2030 Agenda cannot be conceived in terms of a one-sided activity aimed at incorporating environmental goals into sectoral policies. Given the comprehensiveness and complexity of the SDG system, an adequate concept of policy integration involves the consideration of reciprocal relationships between goals, which are more or less linked to specific policy sectors (Nilsson & Persson, 2017). Moreover, while EPI involves a rather simple form of policy integration in that additional environmental concerns are only related to particular sector policies, policy integration for the 2030 Agenda involves a high level of integration complexity. Consequently, many more (sectoral or overarching) goals are of importance, and these goals are interrelated in every conceivable way.

While extensity, reciprocity, and complexity mark clear structural differences between EPI and policy integration for the 2030 Agenda, both approaches converge to some extent concerning the weighting of goals. Both EPI and (large parts of) the literature on the 2030 Agenda-related policy integration have their vanishing points in a prioritisation of goals, which distinguishes them from symmetric approaches to policy integration aiming at balancing goals (Bornemann, 2014, pp. 287–288). However, EPI assumes a normatively founded principle of prioritising environmental goals over other sectoral goals, whereas the prioritisation logic of policy integration for the 2030 Agenda is more functionalist. It serves to identify critical leverage goals whose implementation promises the greatest impact on the goal system as a whole. From a historical perspective, this change in the logic of prioritisation corresponds to a more fundamental change in the understanding of sustainability: From a rule-oriented and principle-based (ecological) interpretation of sustainability, represented by EPI, to a goal-oriented, evidence-based and comprehensive understanding of sustainable development.

This change has fundamental implications for governance. One of them concerns the relationship between science and politics in the context of sustainability governance. In the context of EPI, the prioritisation of environmental goals is based on a politically legitimised rule supported by principle-based and factual scientific considerations about the centrality of ecological systems. However, in the context of policy integration in the 2030 Agenda, science seems to move to a more central governance position. Although not all of the analysed texts explicitly refer to who is involved in integrative policymaking, a majority of them give scientific experts the role of mapping and evaluating the interactions between the SDGs to provide evidence about which are the most important goals within the system, and which should be prioritised in policymaking and implementation. In other words, scientific experts provide evidence of and for reasonable goal prioritisation. This comes with considerable technocratic implications in that policymakers appear as implementers of scientific knowledge. As a result, policy integration seemingly becomes the technocratic endeavour that some have always believed it to be: An effort to tackle fundamental political and value conflicts through improved knowledge of how to optimise the realisation of multiple goals by creating a smoothly functioning and seamless policy system that creates and perpetuates societal progress (Allen et al., 2018; Biggeri et al., 2019; Collste et al., 2017; McCollum et al., 2018).

Considering these technocratic connotations, we should, however, bear in mind that integration in the context of the 2030 Agenda refers to a system of integration objects, i.e., the SDGs and related targets, which is essentially political in nature. As a number of authors emphasise, the SDGs are the result of a political decision process involving national governments and multiple political actors from various contexts (Biermann et al., 2017; Le Blanc, 2015). The agenda as a whole therefore represents a compromise of different political ideas and interests. This explains the inconsistencies and contradictions within the resulting system of objectives, i.e., the trade-offs between objectives introduced by different interest coalitions. This in turn presents the supposedly central role of science in governance in a slightly different light. Rather than setting targets, science is concerned with analysing the possible interactions between the elements of a politically defined target system. The role of science is not to 'speak truth to power,' but rather to analyse and interpret a politically constructed framework of goals regarding its integrative implications. The SDGs represent a politically defined, comprehensive, and complex system of objectives which must be scientifically researched and understood in order to identify knowledge about systemic points of intervention for integrative policy designs.

6. Conclusion

In this article, we analysed the notion of policy integration in the context of the 2030 Agenda and the SDGs against the background of the historical sustainability

discourse. We found that the current notion of policy integration departs significantly from the EPI concept which has long dominated the debate on sustainable development. Turning away from the rather one-directional and selective EPI approach, the 2030 Agenda promotes an encompassing, reciprocal, and complex integration approach. In contrast to the principle-based and rule-oriented prioritisation approach of EPI, policy integration in the context of the 2030 Agenda is based on a functionalist logic of prioritisation, which—starting from an evidence-based analysis of goal interactions—identifies priority goals as leverage points for improving the overall system. The role of evidence and knowledge is paramount because they provide the basis for managing and optimising the complex relations between goals and targets. In addition, the strong emphasis on synergies and co-benefits, and the idea that conflicts and trade-offs can be overcome, adds to the managerial account of sustainable development. Beyond that technocratic outlook, one should however not forget that the 2030 Agenda and the SDGs are a political goals system, representing a compromise between the UN member states which was made in a specific historical situation. It is in the nature of the 'governing through goals' approach (Kanie et al., 2019) that the political intervention is made on the level of objectives, leaving the further steps, in particular implementation, to the subsequent political process. Consequently, we can understand the 2030 Agenda and the SDGs to promote a specific interpretation of the (policy) integration challenges posed by sustainability.

The 2030 Agenda and its concept of policy integration raise an array of questions for future research. Next to further analyses of SDG interactions in specific contexts with the aim of providing scientific support for their practical implementation, we see three main research perspectives for policy integration in the context of the 2030 Agenda. Firstly, as a continuation of existing empirical work on the implementation of the 2030 Agenda in general (Allen et al., 2018) and on policy integration in particular (Tosun & Leininger, 2017), research should focus on whether and how the specific form of policy integration of the 2030 Agenda actually becomes relevant in political practice. Does its implementation lead to new governance arrangements and practices? Do these differ from the earlier implementation of EPI? How do interaction analyses and goal prioritisation look like on the ground? Are there new forms of integration-oriented cooperation between science and politics? Secondly, a question arises regarding the political-institutional prerequisites, the conditions or mechanisms that enable or hinder the practical implementation of policy integration for the 2030 Agenda: Under which conditions is policy integration of the SDGs successfully implemented? Finally, the empirical effects of new arrangements and practices of policy integration should be examined: To what extent does a political practice of policy integration that is consistent with the 2030 Agenda lead to integrated steering impulses and ultimately to an integrated sustainable development of society? These questions are paramount for any research aiming to promote the achievement of the 2030 Agenda and the SDGs.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the authors (unedited).

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Article

Promoting Policy Coherence within the 2030 Agenda Framework: Externalities, Trade-Offs and Politics

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Abstract
The promotion of Policy Coherence for Sustainable Development is one of the 169 targets of the 2030 Agenda, and considered a key means of implementation. The 2030 Agenda, while noble and necessary to put humanity on a sustainable path, has vastly exacerbated the complexity and ambiguity of development policymaking. This article challenges two assumptions that are common in both policy discussions and associated scholarly debates: First, the technocratic belief that policy coherence is an authentically attainable objective; and second, whether efforts to improve the coherence within and across policies make achieving the Sustainable Development Goals more likely. We unpack the conventional 'win-win' understanding of the policy coherence concept to illustrate that fundamentally incompatible political interests continue to shape global development, and that these cannot be managed away. We argue that heuristic, problem-driven frameworks are needed to promote coherence in settings where these fundamental inconsistencies are likely to persist. Instead of mapping synergies ex-ante, future research and policy debates should focus on navigating political trade-offs and hierarchies while confronting the longer-term goal conflicts that reproduce unsustainable policy choices.

Keywords
2030 agenda; European Union; development policy; policy coherence; policy trade-offs; Sustainable Development Goals

Issue
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1. Introduction

Policy Coherence for Sustainable Development (PCSD) has become an integral aspect of the discourse on the 2030 Agenda and the Sustainable Development Goals (SDGs). This reflects the Agenda's central conviction that global sustainable development requires a transformative and differentiated approach, away from 'business as usual' decision-making that perpetuates economically, socially and environmentally unsustainable policy choices.

While central to the 2030 Agenda, the commitment to PCSD is somewhat buried among the 169 targets associated with the 17 SDGs, appearing towards the end as target 17.14. Official pleas for "governments and stakeholders [to] recognise the relevance of PCSD for identifying, understanding and managing interactions among highly interconnected SDGs" (OECD, 2018, p. 13), raise the questions of (1) whether PCSD is really attainable as an objective, and (2) whether efforts to make policies more coherent make achieving the SDGs more likely.

These questions arise because policy coherence is often framed as a 'win-win,' where complex puzzles could be solved with more logical decision-making, and political or even ideological conflicts of interest can be resolved technocratically (OECD, 2014). The politics of development has mostly been ironed out of debates about policy coherence since the 2030 Agenda was adopted in September 2015. Indeed, most of the 2030 Agenda's many stakeholders in governments, international organisations, the non-governmental 'development industry,' the for-profit private sector, and the world of research and expert commentary, are happy for the PCSD debate to remain technocratic. It is much easier for stakeholders to focus on processes, instruments and institutional mechanisms rather than on taking on the political conflicts and trade-offs that are essential if development deficits are to be addressed, and goals achieved.

The shortcomings of the technocratic approach to coherence have become even more apparent as the Covid-19 pandemic has swept around the world. While 'the science' must drive public health responses, governments have acted in response to political as well as scientific factors as the socio-economic crisis caused by the pandemic has had varying impacts across the world and within countries. The pandemic has also highlighted the 2030 Agenda's internal contradictions. The UN's 2020 Sustainable Development Report noted that the pandemic had stalled progress towards every SDG, and that its impacts were particularly severe in the most political parts of the 2030 Agenda: inclusion, equity and sustainability (UN, 2020a). In an editorial published five years after the adoption of the 2030 Agenda, the journal Nature argued that the Covid-19 pandemic requires a fundamental reappraisal of both the assumptions underlying the Agenda, and the processes that have been put in place to achieve it. Notably, the willingness of nation states to further invest in international cooperation has diminished. Rather than continuing with Covid-19 recovery plans that promote precisely the unsustainable policy choices that the 2030 Agenda seeks to move away from, decoupling the pandemic recovery and the SDGs from economic growth is needed (Nature, 2020).

This article's purpose is normative and agenda-setting. We aim to show how PCSD and related ideas of 'manageability' and 'governability' of policy 'interactions' are linked to the implementation of the complex, often ambiguous and sometimes contradictory 2030 Agenda. This overoptimistic understanding of PCSD's potential does the actual implementation of the ambitious 2030 Agenda a disservice. We rather suggest a heuristic approach that acknowledges that development is a political game at every level, and that fundamental political conflicts between certain objectives, and between the actors pursuing them, will persist. This approach emphasises the highly complex relationship between policy processes, that outcomes are integral to policy processes, and that while solid scientific evidence is essential, its availability is neither a necessary nor a sufficient condition for 'development-friendly' decisions. We argue that promoting coherence requires a problem-driven approach, based on a more pragmatic conceptualisation considering the interaction of the policies relevant for achieving specific development objectives. Our focus on navigating policy hierarchies complements other approaches that are ex-ante in focus and seek to identify processes for promoting synergies across policies (Andrews, 2013; Ramalingam, 2013).

The rest of the article is structured as follows. The next section sketches the policy and academic debates about PCSD and re-focuses attention on externalities and trade-offs, which may not be able to be managed to the degree that they disappear. We argue that the illusions associated with PCSD that dominate academic and policy debates on the 2030 Agenda should be recognised. The third section presents a heuristic framework for a different approach to analysing PCSD. Identifying incoherencies is a necessary first step in asking whether there is an available trade-off that could be negotiated, for instance by creating or changing incentives. If this is not the case, it is likely to be due to the power relationships among the actors involved. The quest for coherence, then, becomes a matter of political pressure rather than technocratic management. We offer some examples from development policy practice to illustrate that certain objectives are politically incompatible, and contrast our normative approach with others that focus on prioritisation. The final section concludes that the 2030 Agenda is a political project, which can only be achieved if the political momentum to prioritise it can be created. Future research on policy coherence needs to engage with these political dimensions in a much more serious way.

2. PCSD and the Implementation of the SDGs

Current PCSD discussions evolved from the earlier policy coherence for development (PCD) agenda, which emerged in Europe in the 1990s and 2000s. PCD was framed as capturing both deliberate and unintended impacts of other policies on development policy, in the spirit of weeding out incoherencies for the sake of more development-friendly policy solutions (Carbone, 2008). The PCD agenda was, however, reaching its natural limits even before it took up its stronger focus on 'sustainability' (Carbone & Keijzer, 2016). In the EU context, for example, where PCD had its highest profile and greatest successes, many of the 'low-hanging fruits' of policy incoherence were dealt with not only for development reasons, but also due to political and economic factors unrelated to development such as compatibility with international agreements or competition among interest groups in EU member states. These low hanging fruits included the removal of export subsidies from agricultural products and the conclusion of the 'Everything but Arms' agreement, which granted duty- and quota-free access to the EU Single Market for all products (except armaments) from least developed countries. Both reforms were

primarily introduced to conform with WTO rules, rather than being driven by concerns about the effects of policy incoherence on development cooperation (Mackie, Klingebiel, & Martins, 2013).

It is against this background that we need to consider PCSD's potential for supporting the implementation of the ambitious SDG agenda which, from its very inception, included many internal inconsistencies as well as clashes with external policy objectives (Verschaeve, Delputte, & Orbie, 2016). Following the 2030 Agenda's adoption, 230 indicators were defined to measure progress against the 169 targets associated with the 17 SDGs, a total figure that includes nine indicators that are used in two or three different targets (UN, 2020b). This global framework of indicators was expected to be complemented by indicators at the regional and national levels, to be prepared by the UN member states. For many commentators, an agenda of such scope and width lacked the necessary focus for developing strategic momentum (Glover & Hernandez, 2016). The fact that the indicator framework was still being refined five years after the Agenda's adoption appeared to support this sceptical view (UN, 2020b).

The 2030 Agenda's complexity seemed to convey the simple truth that, realistically, there was no easy solution to the problem of how to achieve all the SDGs together, in order to meet the 2030 deadline. The Agenda did not come with a recipe for prioritisation and positioned politically incompatible goals such as poverty reduction via economic growth and reducing carbon emissions next to one another (Spaiser, Ranganathan, Swain, & Sumpter, 2017). This was partly the result of the conscious effort to integrate the poverty reduction and environmental protection agendas, as promoted in the run-up to the Rio +20 Conference in June 2012 when the sustainable development goals were first hinted at (UN General Assembly, 2012). The inconsistencies within the 2030 Agenda are also partly due to the dynamics of the international bargaining processes that produced the SDGs. Linkages between goals were deliberately created via common targets and indicators so that the Agenda itself would be a coherent whole. This was only partly successful, due to the political compromises needed to forge consensus among all UN members (Le Blanc, 2015). The central aspects of the 2030 Agenda that are compatible, such as the goals on health, education and renewable energy, are not grouped or considered as focus areas, which could help address incoherence via progress. The approach to implementing the 2030 Agenda has become a technical, rather than political, process. This has been characterised as 'governance by goals' where states cooperate informally on a non-binding agenda with plenty of room for manoeuvre (Biermann, Kanie, & Kim, 2017)

Despite this apparent oversight, the PCSD concept was introduced as a key tool for achieving the SDGs. Already during the negotiations for the 2030 Agenda, international policy discussions strongly emphasised the need for concerted and multi-level policy responses (Dodds, Donoghue, & Roesch, 2016). The OECD was instrumental in designing and promoting the idea of PCSD during the negotiations. Titled "Policy Coherence for Inclusive and Sustainable Development," one of its position papers made the case for "[a]n updated and broader approach to PCD, based on collective action, common but differentiated responsibilities and mutual benefits, and seeking coherent policies at global, regional and national levels (including advanced, emerging and developing countries)" (OECD, 2015, p. 1). This focus on mobilising different policies and coordinating more closely was markedly different from approaches to promoting coherence in earlier decades, which were mostly driven by direct observations of incoherent policies such as tariff escalation or production-coupled subsidies (ECDPM & ICEI, 2005).

The PCSD narrative thus posited that there was a way to address complexity and level out inconsistencies in the SDGs through clever policy design. The first step in applying PCSD to the 2030 Agenda was to identify where policies were interacting positively, as synergies, and negatively, so that trade-offs would have to be made between them. In particular, the OECD points out that 'trade-offs' needed full attention: governments should work to "harmonise policies and mainstream the SDGs so that [they] can address interlinked and indivisible goals and targets with full attention given to trade-offs, inter-linkages and complementarities between social, economic and environmental goals" (OECD, 2017, p. 25). This implied that once acknowledged, such trade-offs could be made, and integrated solutions designed "to ensure an effective implementation" (OECD, 2017, p. 88). This narrative has subsequently solidified, with the OECD confidently arguing that:

> [A]pplying a PCSD lens can help to identify critical interlinkages among goal areas, manage potential trade-offs, promote synergies, and address negative impacts. Once interlinkages have been identified, frameworks such as the Inclusive Growth Framework and the Framework for Sound Public Governance can help to guide policymakers respond to those interlinkages. (OECD, 2019, p. 51)

Whereas the policy world has deployed PCSD as a conceptual tool for shaping debates about implementation, the academic debate has largely focused on its component concepts such as 'interlinkages,' 'trade-offs' and especially 'synergies.' The focus has mostly been on exploring the potential for identifying and exploiting synergies, and on managing trade-offs as much as possible, rather than acknowledging that they are usually only necessary when political interests are at stake. As Nilsson, Griggs, and Visbeck (2016, p. 320) observe, international negotiations tend to "gloss over tricky trade-offs." And so do most references to PCSD in official documents on implementing the SDG framework published by leading development institutions. It is, however, apparent

that many academics share this spirit of technocratic do-ability as regards implementing the 2030 agenda. For example, the UN's flagship report on global sustainable development, prepared by a group of eminent scientists, states that "the true transformative potential of the 2030 Agenda can be realised only through a systemic approach that helps identify and manage trade-offs while maximising co-benefits" (UN, 2019, p. xx). While incompatibilities and clashing goals/policies are often noted in both the academic literature and in scientific reports for policymakers, they are seldom the main focus of discussion. In the few instances when they are, the focus tends to shift towards 'design' questions about how to turn trade-offs into synergies, that invariably leave the reasons why trade-offs have to be made in the first place in the 'black box.'

Such 'SDG optimism' is common in the research on policy interactions. Nilsson et al. (2016, p. 32) consider the main problem to be "policymakers and planners operat[ing] in silos." This places emphasis not on the SDG agenda itself nor on the politics of its implementation, but rather on the structural design of political decision-making systems. Design problems are considered to stand in the way of effectively addressing negative policy interactions and making the most of synergetic linkages. If silo thinking could be overcome, PCSD might contribute to the creation of shared perceptions and enhance the likelihood of identifying trade-offs which were not recognised in the past due to segmented, partial and non-holistic perspectives. Strengthened coordination in the spirit of PCSD could help overcome the most important barriers. Promoting PCSD is, therefore, less about political choices, and more about better dialogue, design, assessment, and coordination processes.

There is a consequent demand for more elaborate tools and techniques for identifying linkages more precisely (Collste, Pedercini, & Cornell, 2017; Janetschek, Brandi, Dzebo, & Hackmann, 2020; Nilsson et al., 2018; Nilsson & Weitz, 2019). This work is, however, based on strong assumptions that trade-offs and their effects are calculable and logical (they can be identified and understood); obvious (a critical mass of decision-makers and their constituencies will agree on what they should be); and a-political (once identified, they can be implemented without using power to overcome opposition). Similarly, the OECD-led policy discussions, and SDG target 17.14 itself, assume that such tools can achieve PCSD when appropriate institutional mechanisms and monitoring systems are in place.

This causal chain is common in the literature: diagnosis (recognition, identification, classification) triggers the sensitisation of actors involved, which is then followed by smarter re-design (holistic approaches; strengthened coordination; appropriate mechanisms), and continuous impact assessment and evaluation. From this approach, ever more optimised and integrated policy solutions will emerge, and the achievement of the SDGs will become more likely.

A good example of this approach can be seen in the work of Scherer et al. (2018, p. 70) who state that:

> The mapping of trade-offs [i.e., counteracting SDG interactions] and synergies between different development goals will become increasingly important as policy implementation accelerates….This work provides important information to policymakers….Further quantitative mapping of other interactions will be necessary to explicitly reveal the implicit trade-offs, synergies, and challenges posed by making progress towards multiple SDGs.

Similarly, Barbier and Burgess (2017, p. 2) argue that it is "possible to measure the welfare effects of an increase in the indicator level for one SDG by identifying the trade-offs that occur with achieving another goal." Some observers have gone even further, suggesting that trade-offs might not only be minimised but resolved, potentially turning them into synergies (Kroll, Warchold, & Pradhan, 2019). Although such conclusions are not incorrect, and can be useful for informing decision-making, their value for supporting the 2030 Agenda itself is limited at best.

Our scepticism of this reading of the 2030 Agenda and the SDGs is not because we do not share the Agenda's normative purpose and ambition. Nor do we dismiss efforts to improve conceptual understanding and the quality of empirical data on the SDGs, the value of tracing interactions more closely, and the necessity to communicate this new knowledge as a means of raising public consciousness and incentivising policy change. Our point is not that research on synergies and trade-offs is misguided, but rather that it either ignores or downplays essential aspects of an agenda that is inherently political and thus misrepresents the processes through which the agenda must be realised. Indeed, an over-optimistic belief in the potential of steering and managing profoundly political conflicts comes with risks that have to be acknowledged. The SDGs have to be achieved not in research seminars, workshops or laboratories, but in the real world of policy-making, which is about interests, winners and losers, short-term considerations and pressure to take action. This reality is indeed recognised in the preamble to the 2030 Agenda, which refers to "bold and transformative steps" (UN General Assembly, 2015, p. 1). If the 2030 Agenda does not start to demonstrably improve outcomes, it will lose relevance both as a set of guiding principles and as a call for systemic change. This would be disastrous, because the SDGs represent a set of goals that must be reached in the interests of the sustainability of our civilisation.

3. An Alternative Conceptual Approach: Externalities, Trade-Offs and the Development Policy Cycle

Rather than searching for the PCSD holy grail, we consider that debates about policy coherence need to re-focus

on the political realities of the 2030 Agenda. Attempting to redefine complex political questions as synergies, and searching for technical solutions to trade-offs, results in a detached perspective on policy making. Even before the Covid-19 pandemic, the 2030 Agenda was hindered by its misrepresentation as a largely apolitical set of management challenges. Ignoring its profoundly political nature risks that it will become even more marginalised in times of social polarisation, populist denigration of international cooperation, and de-prioritisation of the long-term policy approaches necessary for supporting development.

The question of how to achieve the SDGs can aptly be considered an example of a 'wicked problem.' This is due to several factors, including incoherencies among some of the SDGs themselves, the sheer size of the policy matrix required if all of the goals are to be pursued, and the myriad interests that lie behind the policies that have to be mobilised in support of specific SDGs or parts of the 2030 Agenda, as well as those that undermine progress towards particular SDGs. There is also a 'spatial' element to the 2030 agenda, since progress by one nation state in relation to its priorities regarding one SDG (e.g., electricity generation) may undermine another nation's priorities for progress towards SDGs at a regional level (e.g., river basin management). Since attempts to resolve incoherencies in the policy world require prioritisation, this means dealing with politics, since all priorities that could be set involve political constituencies and their interests.

Figure 1 depicts a simplified conceptualisation of a policy nexus, where two policies interact. Of course, as 'policies' usually involve interest groups, decision-making and legislative procedures, executive and implementing actors, and outcomes that are understood both subjectively and in accordance with given 'hard' or objective criteria, such a conceptualisation is not intended to reflect reality. It is, however, useful to visualise some of the most important considerations when we think about coherence.

As depicted in Figure 1, all policies—whether tied to the SDG framework or not—are meant and designed to achieve certain ends. However, at each stage of the policy process from formulation through implementation to outcome, externalities can occur that affect the outcomes of other policies, both positively (i.e., helping another policy to achieve its goal) and negatively (i.e., undermining another policy's prospects of success). Such externalities may be either intentional or unintended in terms of both their design and consequences.

This basic conceptualisation has three key implications: First, it means that the relationship between policy processes is highly complex. Externalities can occur at any of the three stages, and there can be any number of them. When we consider that figure 1 only shows a binary nexus between two policies, the picture becomes incredibly complex very quickly if we add more policy processes, as we inevitably must when applying it to the 2030 Agenda. There is also a temporal dimension which the figure does not capture. Policies A and B will also typically be out of sync with each other: one may be formulated while another has been through several years of implementation. In a multi-policy environment like development cooperation, the notion that any externality may potentially affect any other policy makes the matrix of variables potentially limitless.

A second implication is that outcomes are an integral part of the policy process. Considerations of coherence must, therefore, take into account which outcomes are actually desired, and how these relate to each other. This means that goal hierarchy is inescapable, which logically implies that the priorities of policymakers, and therefore the interests of the constituencies they represent, are crucial. Inherent in the 'PCSD concept' is the normative notion that 'sustainable development' is the priority outcome that other policies have to be coherent with. The coherence of outcomes has to be considered on two dimensions: the context of the SDGs themselves; and the broader context of the coherence of 'sustainable development' with other sets of political objectives. Indeed, PCSD means policy coherence for sustainable development, but there can just as easily be policy coherence for other objectives, such as national security, corporate profits or social welfare, whether in cooperation partner countries or in donor countries. Policymakers are challenged to find ways to address all of these sets of objectives, and they have to respond to the demands of constituent groups that consider their particular interest to be of higher order than the others.

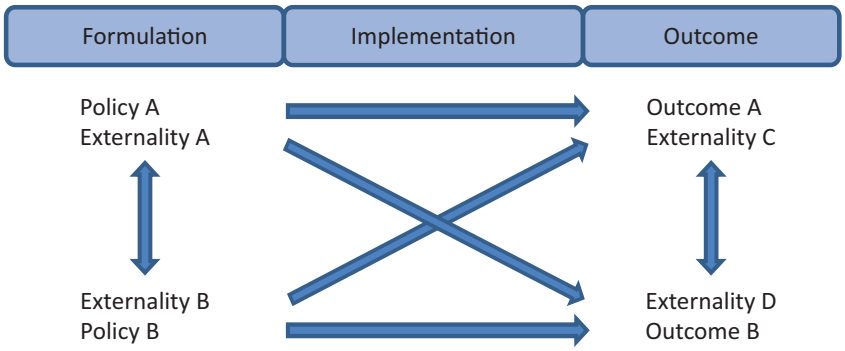

Figure 1. Externalities and outcomes in a policy nexus.

A third implication is that while better evidence about the impacts of 'non-development' policies on development is valuable, the availability of evidence is neither a necessary nor a sufficient condition for 'development-friendly' decisions. Accordingly, we face a political problem-structure, which is not reducible to considerations of the conceptual and practical incoherence that flows from the 2030 Agenda itself. Rather, it is the incoherence of the constellation of political interests that inevitably influence the chances of implementation of parts of the agenda. This is where the real battle is.

3.1. Real World Examples of Policy Incoherence

Examples of wicked problems abound in the real world of development policymaking. The EU's development cooperation programmes in Africa have long provided rich empirical material for policy coherence researchers. The nexuses between trade (especially in agricultural products) and development policy have provided many examples of policies designed by Europeans to benefit their constituencies—European farmers and agribusiness—undermining development initiatives, such as technical assistance programmes designed to increase the productive capacity of farmers in African countries, or improve governance systems. One recent example to receive media attention was exports of fat-filled milk powder, including palm oil imported to Europe from Indonesia, to West African countries. Milk powder products are considered essential for food security and therefore carry lower tariffs than other dairy products. According to Oxfam, this particular product can be sold 30% cheaper than full-fat powdered milk (Matthews & Soldi, 2019, p. 70). The impact of the cheap, and arguably nutritionally inferior, protein on West African dairy farming has been severe. The smallholder farmers and herders who produce fresh milk in West Africa have been unable to compete and some have been driven into poverty, while the development of local dairy production industries has stalled (Marks & Livingstone, 2020). A study commissioned by the European Parliament confirmed that while EU agricultural subsidies may have an indirect impact on export prices, there are various domestic producer and consumer preferences that explain the demand for milk powder as opposed to fresh milk (Matthews & Soldi, 2019, pp. 65–70). There are competing views on how damaging these exports have been for West Africa. The European Commission has argued that they are necessary to make up shortfalls in local production in countries with rapidly increasing populations, and that aid programmes targeting industry capacity in Africa are working. Observers have nevertheless pointed out that European dairy exports, while not subsidised directly, are artificially cheap, and furthermore that they encourage overproduction and low prices for farmers in Europe (SOS Faim Belgium, 2019).

The milk powder debate provides an example where there are at least three priorities that have not been resolved: food security in West Africa, the modernisation of West Africa's dairy industry, and the need to find a market for dairy products that cannot be sold in Europe. Behind these three priorities are the interests of several constituencies with varying levels of power: European dairy giants, European dairy farmers, West African governments, West African smallholders and herders, and West African consumers. These groups disagree about whether trade-offs between the three priorities are needed, and if so where they should be. Must the interests of European agribusiness be sacrificed so that the West African dairy industry can develop? If food security is the highest priority, what is the best way to achieve this—via milk powder imports or via domestic production? The technical solutions to these questions cannot be implemented until the political decision about priorities have been taken.

A second and perhaps more egregious example of the difficulty of achieving PCSD in highly politically sensitive decision-making environments is the debate around the EU's "Emergency Trust Fund for Stability and Addressing Root Causes of Irregular Migration and Displaced Persons in Africa" (EUTF). The migration management trust fund was initiated in 2015, and has a budget of around EUR 5 billion, most of which is Official Development Assistance. The EUTF's documentation does not feature a clear and realistic set of development goals for this aid to be spent on. Rather, its professed aims are expressed in very broad terms: to improve stability and development in Africa, to foster a more inclusive political and economic environment, and to create new opportunities for local populations. The EUTF promises to "help expand and strengthen the rule of law, increase economic productivity and social cohesion, and build resilience for the most vulnerable to natural and man-made disasters" (European Commission, 2015, p. 1). These are, of course, unrealistic expectations for a trust fund, which will never be able to achieve all of this, especially as several decades of EU and bilateral development cooperation have not managed to do so.

It is no coincidence that the EUTF was set up at the same time as irregular migration from Africa to Europe was increasingly being framed as a security threat. Irregular migration across the Mediterranean has become a major humanitarian crisis and a security challenge for Europe in recent years and especially since the tragic civil conflicts in Libya and Syria starting in 2011. Policing and protecting the EU's external maritime borders have become priority topics on the EU agenda, while addressing the 'root causes' of migration and displacement has become a policy mantra. As the constituencies behind security interests are invariably more politically powerful than those behind development interests, efforts to improve the complementarity of security and development policy risk securitisation, with negative implications for core development objectives (Furness & Gänzle, 2017).

The Libya coastguard example illustrates the fact that 'sustainable development' often has to compete with, and is sometimes misappropriated for, other political agendas. While most drivers of displacement in Africa are long-term development issues, using development resources to address a phenomenon that has been framed in security terms is, from the PCSD perspective, highly problematic. The EUTF is diverting aid for purposes other than poverty reduction, while still being labelled 'developmental' in intent. It also resembles a clear case of domestic political agendas and constituencies trumping internationalist, development concerns. Lurking behind this are further problems such as a likely shift away from long-term programmes to short-term 'emergency' measures, effectively ignoring long-established aid effectiveness principles, and the allocation of funds based on cooperation on migration rather than on development needs (Kipp, 2018).

3.2. A Pragmatic Approach to Problem-Solving

Reorienting PCD into PCSD as a key means for promoting the SDGs implies a conceptual and practical shift from business as usual, with development policies formulated, implemented and evaluated by donors on a standalone basis. We argue that PCSD needs to adopt a problem-driven approach, based on a more pragmatic conceptualisation of coherence considering the interaction of all relevant policies for achieving specific development objectives.

Figure 2 suggests that the first stage is to decide what should be achieved in a specific area, for example economy, health, education, or the so-called 'root causes of migration.' This requires a profound understanding of the problem that needs to be solved, which enables the identification of the points of change that have to be addressed. While this may seem obvious to some, doing so is far from simple or easy, as indeed those calling for better understanding of the interactions between goals and policies have pointed out (Janetschek et al., 2020). At this stage especially (although this can happen at any other stage in the cycle), evidence may be gathered and/or selectively used to support choices made, a seemingly technocratic yet inherently political process that has been referred to as "policy-based evidence" (Strassheim & Kettunen, 2014).

The transition from first to second stage provides opportunities for considering the effects of other policy decisions, which may or may not be addressed depending on political choices, including a willingness to critically assess both the intended and unintended effects of public policy (Keijzer & Lundsgaarde, 2017). At the second stage, policy tools and resources need to be clearly defined and mobilised. Theoretically, this stage should be relatively technocratic since the overarching political decisions have been taken, but the politics of bureaucratic decision-making is also likely to be influential. The third stage is the implementation phase when initiatives are set in motion and start working. At this stage, problems and setbacks are likely, and iterative adjustments are invariably required (Andrews, 2013). The fourth stage is about completing the cycle and preparing for the next round of an iterative process. While crises can emerge anytime, it is at this stage when longer-term changes are most likely to be made, with intervening factors including the electoral cycle and changing policy hierarchies.

This pragmatic approach to coherence has several implications not only for development policymaking, but also for research. At the strategic level, donor countries need to focus more on setting clear priorities, and outlining coherent policy frameworks defining the contributions expected from development, trade, migration, economic and humanitarian affairs policies in reaching specific SDGs in specific contexts, At the country level, donor countries and institutions such as the EU, UN agencies and the development banks need to set their objectives together with partner countries, coordinate their activities as a rule, and monitor and evaluate their activities effectively. At the conceptual level, there is a need to bring together the political, scientific and civil

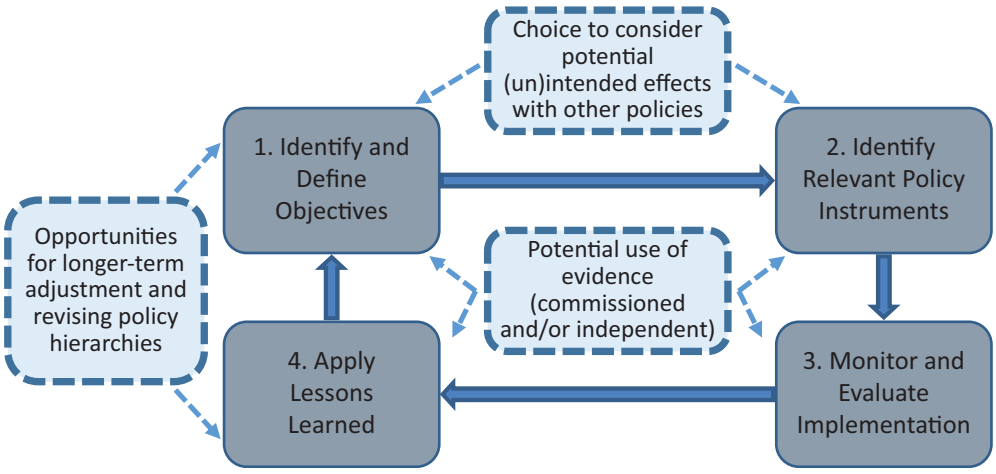

Figure 2. Coherence and the development policy cycle.

society communities who rarely talk to each other, to (re)conceptualise PCSD in the 2030 Agenda context.

4. Conceptual and Practical Implications

In order to judge the potential of our heuristic concept, it is important to note that other observers have used similar terminology, albeit with different meaning(s) attached. The language of externalities and trade-offs, for instance, has become ubiquitous in the debates about policy coherence and the SDGs (Barbier & Burgess, 2017; Glover & Hernandez, 2016; Miola, Borchardt, Neher, & Buscaglia, 2019). Nilsson and Weitz (2019) also propose a step-by-step model of policymaking, in order to identify, manage, and minimise trade-offs. They distinguish between an input-, a process- and an output-phase, thereby fusing decision-making and implementation into their second stage. At each stage, they describe what needs to be done in order to take advantage of existing policy synergies, as well as to mitigate any arising trade-offs and negative interactions. During the first stage, sufficient cross-sectoral debate is needed, in order for shared actionable understandings of the different interests involved to arise. In other words, a level of consensus between policy-makers needs be generated which presumes that a relatively high level of PCSD is attainable from the very beginning.

During the second stage, the main ambition is to overcome restrictions in the policy process resulting from decision-makers acting in their silos. Institutional reforms to enhance coherence between once discrete departments and extra-governmental stakeholders are recommended (Nilsson & Weitz, 2019, p. 259). While this is in principle a good idea, we nevertheless question whether political realities allow for such an uncontested redesign of decision-making. The third stage of their model, the output-stage—frames the remainder of policy execution as an exercise in assessing the results of policy implementation. Nilsson and Weitz (2019, p. 260) call for a "revamped impact assessment framework" based on an SDG scorecard, which attempts to contain trade-offs through ongoing assessment of policy outputs over time. As intriguing as this idea is, it implies that minimising trade-offs and realising a maximum from the SDG agenda via policy coherence ranks highly on the agenda of political decision-makers, rather than their (or their constituencies') preferred policy preferences.

Similarly, Miola et al. (2019, p. 15) make the interesting observation that, according to their comprehensive overview of the existing academic literature on policy interlinkages in SDG implementation, the bulk of the assessed linkages can be deemed positive and synergetic in nature. Only about a quarter of the interlinkages they discuss resemble trade-offs. This reading of the potentials and promises of the SDG agenda, with less attention given to challenges and contradictions, contributes to the highly optimistic mood regarding PCSD.

In contrast, we are much more sceptical about the chances of mitigating trade-offs, or minimising negative externalities, through better coordination and assessment procedures. The milk exports example outlined above suggests that the realities of politics, the position of development policy-making in relation to other policies, and the stubborn persistence of incoherencies despite the 2030 Agenda, are not temporary, or possible to resolve technically. Merely identifying potential trade-offs at the level of objectives, and providing good information about incoherencies that materialise throughout the policy-making process, will not make them disappear.

Another example where similar terminology has been deployed in the literature is the idea of 'prioritisation.' Weitz, Carlsen, Nilsson, and Skånberg (2018) devise a typology for scoring interactions, and they apply network analysis techniques in order to explore how a specific SDG target interacts with other targets in order to provide a more robust basis for SDG policy-making. While we agree that prioritisation must be an essential aspect of policy-making towards achieving at least some SDGs, we have our doubts about whether better knowledge about policy interactions will be one of the main determinants for setting policy priorities. Other aspects of the policy cycle, such as the overwhelming complexity of the issues at hand, time pressure and the political pressure of constituencies, are likely to significantly narrow the space for such smart prioritising. With regard to examples such as the EUTF process outlined above, evidence that measures to restrict migration takes resources away from development programmes and undermine progress towards specific SDGs is unlikely to sway decision-makers, who are responding to pressures to 'do something' in response to migration.

A panel of international experts on sustainable development and development policy has proposed a comprehensive re-think of how to conceptualise and eventually achieve the SDGs (Sachs et al., 2019). Their approach clusters SDG interventions into six domains, premised on the assumptions of "synergetic interventions" (positive interlinkages, with an attainable or already existing high degree of policy coherence) and "workable strategies to manage trade-offs" (Sachs et al., 2019, p. 805). With regard to trade-offs especially, their proposal follows the standard logic: identify and detail the trade-offs, communicate them, involve the stakeholders, prioritise wisely, and the impact of trade-offs will evaporate over time. This assumes that policymakers will be prepared to take the lead, set aside significant resources, overcome opposition through selling the SDGs as a buy-in (Sachs et al., 2019, p. 811), and make it a win-win for everyone involved and affected by the emerging policies.

Sachs et al. (2019, p. 806) argue that: "interventions…are synergistic with no major trade-offs, provided that the leave-no-one-behind principle is applied." Are they? When? Why would those less existentially affected agree to stop pushing their preferences? How do such noble ideas as 'leave-no-one-behind' fit within the

boundaries and limitations of the policy cycle? Such holistic conceptions are nice on paper, and yet are unworkable in most policy-making settings. They may even help foster a myth of 'yes we can,' while political will is not nearly as uniform and unidirectional as implied. It is time for the 'SDG community' to face up to the political realities inherent in their own Agenda, as well as the many conflicts of interests which persist and cannot be rationalised away through diagnosing, re-designing and repackaging technocratic solutions.

5. Conclusions

The 2030 Agenda is too complex, and above all too political, for technocratic solutions to resolve its in-built incoherencies, externalities and trade-offs with other policy areas. The number of potential interactions between the 17 goals and their respective targets is staggering and just understanding the potential scope of interactions is likely to defeat the cognitive capacities of most policymakers, and many researchers as well. Given this level of complexity, it is no shame to admit that a coherent policy framework for achieving the SDGs it is difficult to envisage in conceptual terms, and a virtual impossibility in practical terms.

In contrast to the prevailing narrative in international development institutions and much of the development research field, we consider the PCSD agenda to be illusionary. PCSD has been depicted and sold as a matter of elaborate social engineering (addressing trade-offs and capitalising on synergies etc.), and the many exercises in diagnosing, modelling, mapping, network analysis, sequencing, or transformative clustering convey an optimistic and unifying spirit. Such optimism comes with a price tag, however. The gaps between the rhetoric of the 2030 Agenda and the realities of development policymaking are widening. The continuation of this trend risks caricaturing the SDG process as a pipedream and thereby rendering the 2030 Agenda irrelevant. This has the potential to invite attacks through failures, and fatally undermining the integrity of the whole global development agenda.

In the real world of international development policy—or any other public policy area for that matter—coherence is usually conspicuous by its absence. This does not prevent successes. Often lost in the drive for the efficiency and streamlining inherent in coherence is the important point that positive results can emerge from the messy process of muddling through. The heuristic development policy cycle approach we have outlined suggests that there is certainly room for improvement in this regard, particularly in terms of focusing on specific problems and addressing them using comprehensive, targeted and iterative policy design.

There are multiple externalities resulting from interaction within and between policy domains that do not primarily derive from the SDGs themselves. In such constellations, it seems unlikely that core developmental concerns will be prioritised ahead of issues such as market access, external security or migration management, because all of these have much stronger political constituencies than development does. This implies that achieving the SDGs requires powerful constituencies to accept that their priorities may have to be secondary, which is not something that can happen without political pressure.

In our view, future research on policy coherence needs to engage with these political dimensions in a much more serious way. The 2030 Agenda was difficult to negotiate, and it is proving even more difficult to implement. It is a transformative agenda, and the losers it creates are among the most wealthy and powerful actors on the planet. If it is to make a meaningful contribution to this global transformation, research on policy coherence and the relationships between the SDGs must systematically unpack the constellations of power and interests around these interactions.

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The authors declare no conflict of interests.

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Article

Assessing African Energy Transitions: Renewable Energy Policies, Energy Justice, and SDG 7

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Abstract
Renewable energy has made significant inroads in addressing growing energy demands on the African continent. However, progress towards SDG 7 is still limited and difficult to trace. Furthermore, the results-oriented rationale of the SDGs means that both policy change and the dimension of environmental justice are not covered properly. We argue that the energy justice concept may provide a powerful tool to offset looming trade-offs and enhance the co-benefits of SDG 7 within broader transition endeavours. In doing so, we assess African energy transition processes based on a comparative mapping of African renewable energy policies in 34 countries. We investigate the scope of policy frameworks in order to analyse their contribution to greater energy justice along different justice dimensions. We then identify four transition scenarios, which reflect the challenges of integrating the justice dimension into renewable energy policies. In comparing these scenarios, we argue that SDG 7 tracking needs to consider the justice dimension to arrive at a more holistic implementation that is in line with socio-ecological justice and takes account of people's energy needs.

Keywords
Africa; energy governance; energy justice; energy transition; policy analysis; renewable energy; Sustainable Development Goals

Issue
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1. Introduction

Renewable Energy (RE) has gained traction on the African continent. In the past 15 years, many African states have embarked on ambitious transition strategies and adopted RE legislation. Between 2006 and 2017, RE investments in Africa and the Middle East have multiplied from $1,2 billion to $19 billion (Climate Policy Initiative, 2019; Frankfurt School of Finance, 2017; Sovacool, Burke, Baker, Kotikalapudi, & Wlokas, 2017, p. 19). Simultaneously, RE capacity on the African continent has nearly doubled from 22.93 GW in 2007 to 38.28 GW in 2016 (Quitzow et al., 2016). Still, this pace does not seem to be sufficient, given sustained population growth, changing consumer habits as well as economic growth. Indeed, energy demand is projected to triple between 2015 and 2030, which underscores the need to combat energy poverty (Otieno, Taylor, Schroth, & Franz, 2016). However, Africa's transition processes have largely gone unnoticed by social science, and this is demonstrated by a lack of comparative studies (cf., as two exceptions, Otieno et al., 2016; Quitzow et al., 2016)

and by an epistemic and institutional mismatch with respect to the political sphere of energy transitions. This manifests specifically in SDG 7. While it measures energy access respectively energy poverty (affecting 53% of Africa's population, according to United Nations, 2020a, p. 10), documented by indicators which centre in on access to electricity (7.1.1) or access to renewables (7.2.1), it does not sufficiently pay attention to energy justice and misses out on promising RE policies and policy change. Indeed, a recent piece (Gellers & Cheatham, 2019, pp. 291–292) points out that just over 50% of the SDG's 169 targets relate to environmental justice concerns, with 38% focusing solely on the capabilities dimension, which in essence translates to a narrowing down of justice concerns to the individual level. Energy justice could only be traced in 3% of the SDG targets.

This echoes a broader critique of indicator-based development, culminating in a substantial criticism of the SDGs depoliticizing transformative change (Lepennies, 2015; Ziai, 2015, pp. 195–196) and corresponds with debates that advocate for integrating environmental justice to arrive at more substantial policy change (Sovacool, 2016; Sovacool & Dworkin, 2015). More specifically though, this points to specific trade-offs between SDG 7 and SDG 13, and also uncertainties regarding SDG 7's interaction with labour markets (Kroll, Warchold, & Pradhan, 2019; Nilsson et al., 2018). Integrating the policy dimension and a clear focus on energy justice for instance into electrification schemes would lead to more impactful results by targeting development needs more directly, and by carving out transition scenarios that reflect people's energy needs (Tarekegne, 2020), rather than giving way to financialized RE projects centred on a 'return-on-investment.' Furthermore, this would allow addressing injustices that were caused particularly by large-scale RE projects, which, during their planning and implementation stages failed to tackle participatory, recognitional and distributive needs (Calzadilla & Mauger, 2017). We, therefore, argue that linking SDG 7 and energy justice provides evidence on how political stability, good governance and energy transitions may correspond. More so, adding the justice dimension allows addressing co-benefits, trade-offs, and synergies between SDG 7 and other SDGs more systematically. Against this backdrop, our research seeks to broaden the understanding of green policy change that pays heed to energy justice criteria. Based on our findings, we will argue, that the energy justice concept may provide a powerful tool to offset looming trade-offs and enhance co-benefits of SDG 7 within broader transition endeavours.

To close this research gap, this article assesses African energy transition processes in light of the debates on a 'just transition' and on 'energy justice' (Jenkins, McCauley, Heffron, Stephan, & Rehner, 2016; Kern & Markard, 2016; Newell & Mulvaney, 2013; Swilling & Annecke, 2012). Based on a previous comparative mapping of African RE policies in 34 countries (see, also for the full list of countries covered, Müller, Claar, Neumann, & Elsner, 2020) we investigate the scope of policy frameworks and their contribution to greater energy justice. Our findings zoom in on a group of states, which have developed outstanding policy frameworks that may contribute to greater energy justice and thereby also to SDG 7: South Africa, Rwanda, and Mauritius. A nine-field matrix gives account of the various transition scenarios African states are currently charting out. Overall, we identified four transition scenarios which reflect the challenges for integrating the justice dimension into RE policies. Comparing these scenarios, we argue that SDG 7 tracking needs to consider the justice dimension to arrive at a more holistic implementation that is in line with socio-ecological justice and considers the political dimension of energy transition processes, rather than focusing on depoliticized indicators.

2. Energy Justice in the Global South: Localizing the Justice Dimension in Energy Transition Policies

Whether in industrialised or developing countries, energy transitions have become part of a universalized agenda towards sustainable development. Still, challenges such as technology transfer, job creation, grid integration or centre/periphery divides need to be addressed to develop viable scenarios also in the global South. Recently, the debate on 'energy justice' has concentrated on precisely these aspects. Drawing on earlier debates on environmental justice and environmental racism (Bullard, 2005; Bullard, Johnson, & Wright, 1997), energy justice underscores the need to consider social questions referring for instance to access, affordability, distribution or people's needs. These are inherent to energy politics, particularly when combatting energy poverty. Based on liberal justice theory, namely the works of Sen (2009), Rawls (1971/1991), and Fraser (1999), we follow in the route of Jenkins and her co-authors in understanding energy justice as a threefold concept that combines distributive, recognitional, and procedural justice (Jenkins et al., 2016; Sovacool & Dworkin, 2015). Distributive justice refers to the distributional effects of transition processes, that is, affordability of RE and access to RE. Recognitional justice asks whether transition strategies pay sufficient attention to energy poverty by addressing the needs of vulnerable groups. Procedural justice considers the democratic dimension, especially questions of participation and political articulation. Paying particular respect to social justice concerns, the concept provides a valuable analytical framework for assessing the course and content of energy transitions and has, consequently, found broad reception in the social sciences, including energy transitions in the Global South (Newell & Mulvaney, 2013; Swilling & Annecke, 2012).

Besides these applications, the concept has witnessed certain conceptual evolution, including a more nuanced understanding of justice. Heffron and McCauley

(2017) expand the energy justice concept with restorative justice. With regards to energy, the concept forces decision-makers to engage with injustices caused by energy projects and rectify them. The cost of rectification may even prohibit the energy activity from being proposed in the first place, thus adding an essential element to the lifecycle of energy project implementation.

Brato, Baptista, Kirshner, Smith, and Alves (2018) and Barthel (2019) point out that the energy justice concept needs to pay additional attention to postcolonial realities, that is, the extent to which recent transition processes mirror colonial power structures in epistemological (access to transformation knowledge) or material terms (access to technology; Brato et al., 2018, p. 646). Sovacool et al. (2017) assess the liberal-cosmopolitan norm set which builds the ontological basis for most energy justice concepts, and detect Eurocentric notions, when referring to agency, political participation, and individual justice. They seek to pluralize, localize, and provincialize energy justice by linking the concept to norms stemming from Southern cosmovisions, such as *ubuntu*. Also, Sovacool et al. (2017) underscore the need to discuss co-benefits, but also trade-offs that go hand in hand with integrating energy justice into policy frameworks. This last point is of immense importance especially with reference to SDG 7, the design of RE policies, and to the co-benefits a more systemic mainstreaming of energy justice would entail.

While we can witness the expansion of energy justice as a conceptual framework, comparative perspectives have been a major missing piece in the puzzle, as demonstrated by a bibliometric analysis on energy justice scholarship in developing countries (Lacey-Barnacle, Robison, & Foulds, 2020, pp. 125–130). This, however, is needed to gain stronger evidence on the course of transitions and their awareness for the justice dimension in relation to SDG 7. We particularly see the need to deepen the debate on co-benefits and trade-offs between SDG 7 and other SDGs, such as SDG 8 and SDG 13, and argue that a greater focus on energy justice and justice-related RE policies will significantly support these entanglements. First evidence by Calzadilla and Mauger (2017) explored the connection between energy justice and RE policies for four RE projects. They call for more holistic approaches towards fair and equitable energy access (see also Samarakoon, 2019). While we have already provided a mapping of RE policy frameworks and actors' coalitions in 34 African states elsewhere (Müller et al., 2020), we see the need to sharpen this view by coining certain transition scenarios and assess their potentials for greater energy justice and for realizing SDG 7. Only by leaving room for re-politicization, through the concept of energy justice, can transition endeavours create the necessary domestic buy-in and reach the envisioned impact of equitably improving access to energy. Based on our previous findings, a meta-analysis of our data identifies pertinent clusters of states undergoing RE transitions and provides several best practice examples.

3. Mapping African Energy Transition Policies: Methodological Considerations

Environmental policy analysis explores how policies address environmental concerns and govern political change. Typically, this subfield of political science and environmental governance explores certain policy networks and advocacy coalitions (Hermans, 2008; Weible & Sabatier, 2005), political articulations (Fischer & Forester, 1993; Hajer & Veersteg, 2005; Hajer & Wagenaar, 2003) or centres on policy impact assessments (Loomis & Helfand, 2001). In a similar fashion, energy policy analysis assesses modes of energy governance, stakeholder activities, as well as content and impact of RE policies belonging to a wider policy mix (Rogge & Reichardt, 2016). Analysing RE policies requires a methodology that allows mapping several features such as the political process leading to the adoption of certain policies, the objectives of a policy, a policy's comprehensiveness or coherence, and not least the wider field of external factors such as time scale or mode of governance (Rogge & Reichardt, 2016, p. 1629).

Our sample encompasses all African countries that have adopted at least some RE legislation during the past two decades, which eventually resulted in 34 states. Our data was retrieved from publicly accessible databases on RE, namely the IEA/IRENA Joint Policies and Measures database (IEA & IRENA, 2018), Global-Climatescope (2017), and the Regulatory Indicators for Sustainable Energy RISE (The World Bank Group, 2017). This was complemented by the REN 21's (2020, 2018) *Renewables Global Status Report*, the World Energy Outlooks, and IRENA's Renewables Readiness Assessments, as well as the individual RE legislation (AFRO_ENERGYPOL, 2020). For each country we summarized the RE policies in relation to their goals and content. Deductive coding of the respective policies allowed assessing the transformative potential and the normative quality. As our research interest is explicitly devoted to the policy content and the intended impact, we concentrated on two coding criteria: the transformative potential along a time scale and the normative quality of a given policy (Müller et al., 2020, pp. 2–4).

The transformative potential addresses the policy objectives and the interaction of various policy instruments within a policy framework. This dimension is defined by the scope of a policy as well as its scalability. It explores how a given policy contributes to policy change, drawing on a heuristic suggested by IRENA, IEA, and REN 21 (2018, pp. 15, 101–103), which is related to the Multi-Level Perspective framework of transformative change as initiated by Geels (2002), who differentiates between changes occurring on a niche level, on a regime level, and on a landscape level. Accordingly, and in line with IRENA's heuristics, we discern between three types of policies that operate on different levels within a transition process: direct policies, integrative policies, and enabling policies. Direct policies focus on concrete,

yet less scalable interventions, such as tax reductions for solar cells. Integrative policies promote the integration of renewables by adapting or widening grid infrastructures, or by regulating heating standards, or biofuel blending standards. Enabling policies strive for transformative change, demonstrated by systemic strategies to raise awareness, promote education and training, nationwide energy access programmes, or green industrial policies (IRENA et al., 2018, p. 15).

The normative quality investigates whether policy frameworks contribute to greater energy justice, i.e., procedural, distributive, and recognitional dimensions of the energy justice framework (Jenkins et al., 2016). When assessing the normative quality, we reflected whether a given policy framework contributes to procedural justice, i.e., democratic and legitimate policy processes. To assess the degree of distributive justice, we analysed whether a nation's policy framework enhances energy access and its fair distribution, indicated by specific policies for energy access in rural areas or grid integration. Lastly, to assess the degree of recognitional energy justice, we evaluated whether a policy framework took into account the energy needs of particularly vulnerable groups (for instance people in remote regions, people affected by disabilities or chronic diseases, and not least mothers or children). This last aspect also reflects aims of the SDG 7 (access to affordable and clean energy; Müller et al., 2020, pp. 2–4). For coding the transformative potential, we referred to IRENA's heuristic and coded each RE policy as either direct, integrative, or enabling, in each case depending on the policy content and the intended objectives. Likewise, we coded each policy according to its contribution to distributive, recognitional, or procedural justice (see Supplementary File for details). Inter-coder reliability was guaranteed during the coding process, as each country coding was reviewed by another team member.

The mapping results provided first empirical insights into the roll-out of RE policies across the African continent (cf. Müller et al., 2020) and served as a basis for a meta-analysis of our data that builds on our previous findings, but further elaborates on the scope of policies and their contributions to different justice dimensions. This analytical step allowed identifying certain transition scenarios (Section 4.3) and yields more in-depth insights into the ways in which the form of government is related to the greater goal of energy justice and policy change. This is particularly important as the SDGs' understanding of sustainable development highlights a transformation of state, economy, and society.

4. Results: African Energy Transition Scenarios

While our mapping seconds general evidence that RE policies are on the rise, it also indicates that their dynamics and directions vary considerably. Overall, RE transitions in Africa lean towards comprehensive policy mixes that combine direct, enabling, and integrative policies (IRENA et al., 2018, p. 15; Müller et al., 2020). Referring to the justice dimension, our findings highlight that several policy frameworks pay attention to distributive and recognitional justice. However, our previous findings have not yet painted a clear picture of possible relations between the scope of RE policies, their contribution to greater energy justice, and the wider SDG context. We expect different entanglements, such as positive impacts, based on a tentative integration of justice into policy frameworks, but also negative effects, characterized by far-reaching policies that do not consider justice as relevant for green transformation. Both scenarios provide better insights into the current transition dynamics and their contribution for realizing SDG 7. Before presenting the results of our meta-analysis (Section 4.3), we briefly summarize the overall findings in Sections 4.1 and 4.2. For an in-depth discussion, Müller et al. (2020) give a detailed account of the policy mapping and our previous results.

4.1. Steps towards Decarbonisation: Africa's Comprehensive RE Policy Frameworks

Regarding the scope and direction of transition policies, we identified several states that introduced enabling policies promoting a systemic RE transition, often considering RE's cross-pollinating qualities as well as their socio-ecological and even educational dimension. This pattern was discernible in Algeria, Cabo Verde, Egypt, Ethiopia, Mauritius, Morocco, Rwanda, and South Africa (AFRO_ENERGYPOL, 2020). In comparing their different policy frameworks, we found that there was tendency towards adopting policies that aim at foreign direct investments, such as feed-in tariffs, de-risking, and auction instruments. Feed-in tariffs have been put into place in Egypt, Ghana, Kenya, Mauritius, Namibia, Nigeria, Rwanda, Senegal, South Africa, Tanzania, Uganda, Zambia, Zimbabwe (AFRO_ENERGYPOL, 2020; Climate Policy Initiative, 2019; Quitzow et al., 2016; REN 21, 2020, pp. 231). De-risking refers to policies and consultancy activities that seek to render 'risky' markets attractive to foreign investors. Countries with de-risking programmes for the energy sector include Ghana, Namibia, Uganda, Ethiopia, and Zambia (Haag & Müller, 2019; Müller & Claar, in press; Waissbein, Glemarec, Bayraktar, & Schmidt, 2013). Auction instruments, in turn, are based on a tendering process with competitive bidding and a scoring based on least-cost pricing. Additional scoring criteria such as local content requirements, employment of local personnel, and local shareholding may apply. So far, 25 countries on the African have adopted auction instruments, namely Zambia, Madagascar, Ethiopia, Rwanda, South Africa, Burkina Faso, Senegal, Kenya, Algeria, Mauritius, Cape Verde, Côte d'Ivoire, Egypt, Lesotho, Uganda, Malawi, Nigeria, the Gambia, Tunisia, Zimbabwe, Seychelles, Mali, Togo, Guinea Bissau and Morocco (AFRO_ENERGYPOL, 2020; Otieno et al., 2016; Quitzow et al., 2016; REN 21, 2018, pp. 19, 65–67, 2020, p. 72).

The turn towards market-based instruments corresponds with a trend to adopt policy frameworks, which trust in the forces of the market. These policies aim at creating promising markets for RE investors by unbundling energy monopolies, enhancing transparency, and privatizing infrastructures (Müller et al., 2020, p. 5).

4.2. Different Shades of Justice: Africa's Green Contributions to Energy Justice

The justice dimension provides evidence whether a policy corresponds with distributive, procedural, and recognitional justice. Overall, we found that most policy frameworks in our sample showed at least some interest in distributive justice, i.e., considering access to and affordability of RE, evident, for instance, in rural electrification or cross-cutting issues such as educational and capacity-building programmes. Furthermore, many countries have adopted energy policies that consider the needs of particularly vulnerable populations, thus accounting for the dimension of recognitional justice. While combatting energy poverty is the overall goal of recognitional energy justice, this manifests in a broad range of policies which reach out to women, chronically ill and disabled people, and people affected by poverty. Examples include rural electrification, women's empowerment or tariff schemes geared towards the needs of vulnerable groups. However, some countries, such as Morocco and Tunisia, have strongly prioritized market-based solutions without adopting any justice-related RE legislation. This may be an early indicator of financialization, which prioritises 'bankability' of (renewable) energy projects (Baker, 2015; Gabor, 2019, 2020), ignores local industry needs and domestic participation in favour of de-risking transnational investment (Elsner, Neumann, Müller, & Claar, in press), and downplays justice-related aspects (Müller et al., 2020, p. 6).

4.3. Transition Dynamics: Best Practice and Challenges for a Just Transition towards SDG 7

Do comprehensive policy frameworks also contribute to greater energy justice? Does attention for energy justice mean that a nation has equally progressed in adopting comprehensive policies? Both criteria do not necessarily correspond but may be intertwined in more complex ways. To provide evidence on the ongoing transition dynamics many states are facing, a nine-field matrix (Figure 1) displays the variance of the sample countries in relation to both their policy frameworks and their contribution to greater energy justice.

In our sample, several states stand out due to their highly detailed policy frameworks and the ways in which their policies consider energy justice criteria. Three states (1a) provide evidence of energy policies incorporating distributive and recognitional justice criteria. They foster a far-reaching energy transition, which is fully aware of RE's cross-cutting nature and

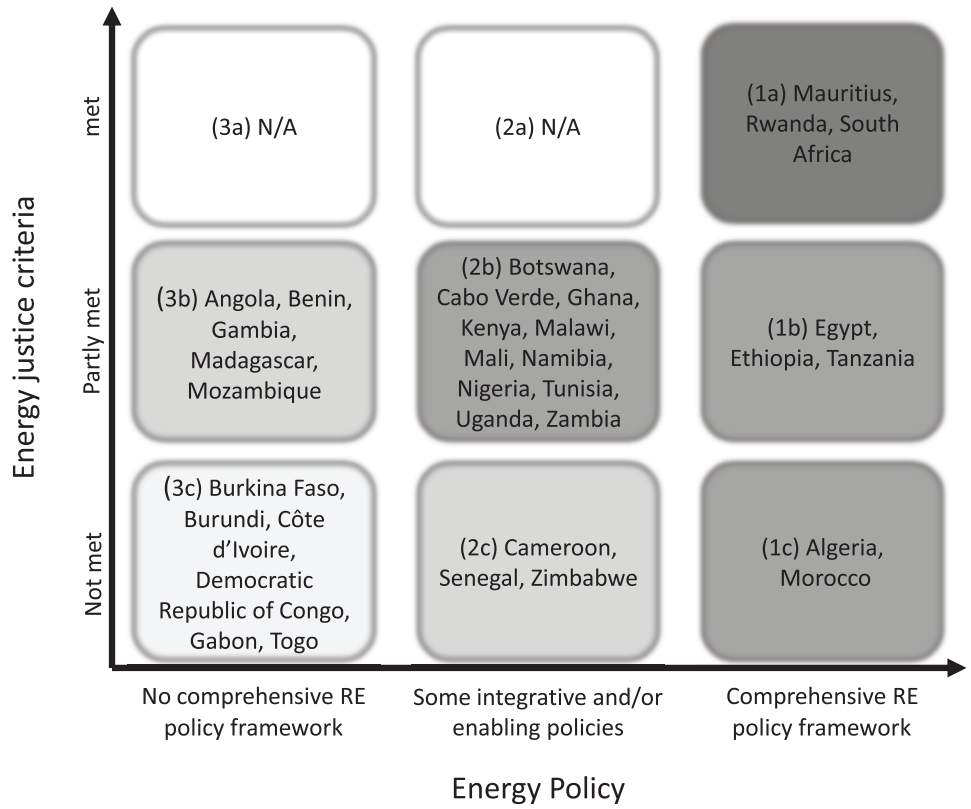

Figure 1. Energy transition frameworks. Source: Authors' compilation based on AFRO_ENERGYPOL (2020).

its potentials for socio-ecological change. Mauritius' policy framework, namely its *Long-Term Energy Strategy 2009–2025* (Republic of Mauritius, 2009), illustrates how this may be achieved in a country, dependent on fossil fuel imports on the one hand, but with huge potentials for expanding biomass from their sugarcane-based production regime that dates back to French and British colonial legacies on the other hand. The policy framework aims at a share of 35% RE, achieved by a feed-in tariff and the development of the biomass sector, complemented by energy efficiency programmes and consumer incentives. The strategy underscores energy's justice dimension and affirms its cross-cutting qualities, indicated for instance by integrating gender-sensitive energy policies. These encompass capacity-building programmes, which seek to enhance energy access for women through microcredit systems and grassroots partnerships. Also, electronic payment systems consider the needs of women whose income flows are irregular. This kind of awareness for distributive and recognitional energy justice stands out among several policy frameworks and may serve as a significant cornerstone, especially for countering tendencies of promoting RE as an elite technology for African middle-classes (Boamah & Rothfuß, 2018). Another example is Rwanda's national energy strategy (Ministry of Infrastructure of Republic of Rwanda, 2009), a policy framework that encompasses several integrative and enabling policies that aim at increasing RE energy access and overcoming load shedding, which is now Rwanda's most pressing challenge due to a lack of investment in its outdated hydropower infrastructure. The strategy aims to tap both, geothermal energy and small hydro, and promotes energy efficiency schemes for the public and private sector. Green industrial policies are expressed in terms of energy audits for industries and information campaigns on good energy management practices. Furthermore, the extension of the transmission and distribution network is envisaged. The policy framework combines several small-scale and large-scale instruments, such as microfinance options, green funds, clean cooking programs and biofuel blending in the transport sector. Furthermore, the strategy recognizes RE's cross-cutting qualities through initiating capacity-building programs for increasing the proportion of women in RE technology.

Lastly, South Africa's energy policy mix combines direct, integrative, and enabling instruments that foster a green transition against the backdrop of a strong path dependency on fossil fuels inherited from the extractivist production regimes during British colonialism and the Apartheid regime (AFRO_ENERGYPOL, 2020). The Integrated Resource Plan aims at reducing fossils fuels to 30% and replacing them by renewables and a small amount of nuclear energy, thereby advocating for downgrading ESKOM, the nation's aging energy monopolist. Attention for recognitional justice is reflected by programmes for solar heating and basic energy support, such as the Free Basic Electricity programme. South Africa's auction instrument REI4P added 6.3 GW of RE to the national grid, with another 17.8 GW to be projected up until 2030 (Baker, 2015; Müller & Claar, in press). The program generated an estimated 42,300 job years. REI4P projects reflect distributional and recognitional justice in their socio-economic indicators. The individual projects have fostered education programmes and on-the-job training, and one third of the projects has a level of community ownership ranging between 20% and 40%, despite the strong role of transnational capital (Claar, 2020, pp. 119–121; Müller & Claar, in press).

In contrast to this group, we also find several least developed countries in (3c) which have neither been capable of adopting more than a few direct policies, nor included the justice dimension. In these cases, more advanced RE policies have not been put into place so far, due to weak state capacities, a lack of political agency, and, not least, insufficient donor activities driving RE policy innovation. Here, the Togolese case provides an account of the difficulties particularly least developed countries face when initiating a transition towards renewables. Togo has promising solar potential. But it heavily relies on traditional biomass and petroleum imports and 50% of the country's population are affected by energy poverty. The state has been incapable of developing a comprehensive energy policy framework (AFRO_ENERGYPOL, 2020). The existing policies only aim at implementing global commitments, such as the United Nations Framework Convention's on Climate Change intended nationally determined contributions. Promising initiatives have only recently started to tackle energy poverty through direct policies such as subsidies that cover solar off-grid electricity supply.

The quadrants (3b) and (2c) both refer to states still in the initial stages of a RE transition. Considering RE merely a welcome addition to their national energy mixes, they either lack proper attention to the justice dimension, or only adopted few direct policies, thus only partially reflecting the need to combat energy poverty. These states seem particularly at risk of not realizing SDG 7. Mozambique's National Energy Strategy (2014–2023) illustrates this issue. Although RE and energy efficiency are mentioned, the focus lies on diversifying the hitherto hydropower-dependent energy mix through the exploitation of recently discovered gas and coal resources. Here, the main objective is the recovery of Mozambique's position as a regional energy exporter, whose electrification rate however only covers one quarter of the population (Mokveld & Von Eije, 2018). While the strategy aims to reach an energy access of 50% by 2023 through the expansion of grid connections and solar appliances (IEA, 2018), the transformative potential of the current energy policy remains low given the heavy attention towards gas exploration and the negligence of off-grid systems, which are promoted largely by multilateral donor initiatives.

In contrast, quadrant (1c) refers to a small but significant group of states, which have already adopted

far-reaching policy frameworks that foster investment in the solar sector. Though far-reaching, we find that Morocco's and Algeria's policy frameworks do not address questions of energy justice but reflect a strong market orientation that downplays the need for integrating social aspects into the policy portfolio. These countries maintain trust in the markets' trickle-down effects and foster a political economy of RE that is largely privatized.

A large group of states in quadrant (2b) share some of these features and find themselves at a crossroads between market-based and justice-oriented solutions, aiming at a co-beneficial combination of both. De-risking programmes in Uganda, Zambia, Namibia, Ghana, or Ethiopia give an example of how market-creating policies labelled as 'cornerstone policies' foster deregulation of energy markets (Haag & Müller, 2019; Waissbein et al., 2013) and may leave development-oriented RE policies at the wayside. In Uganda and Zambia (Elsner et al., in press), the GETFiT programme illustrates this: In both countries, RE projects are assigned to private investors through auctions with financial regulations leaving little space for domestic competitors. This undermines industrialization and job creation efforts as well as the opportunity for technology transfer—all aspects that are necessities for a substantial integration of RE into a nation's energy mix. Furthermore, unclear property rights may lead to the assignment of land to RE projects against the will of local farmers. However, expansion of energy access remains a pressing issue in both countries, reflected in the Zambia Vision 2030 to increase electricity access to 51% (currently 31%) by 2030, and the Energy for Rural Transformation III project in Uganda. Nevertheless, both countries currently lack an energy master plan for putting renewables at the forefront. With both countries increasing efforts to develop such plans, the picture here may shift shades in the future. In this regard, we get a mixed picture on both the transformative potential and the normative quality of the transition dynamics in those countries.

Finally, quadrant (1b) refers to a group of states which already have a comprehensive RE policy framework but lack the energy justice effort present in South Africa, Rwanda, and Mauritius. Tanzania provides an illustrative case in this regard, with an outstanding effort in the promotion of renewables and a fast-growing solar sector. Energy access and energy diversification are pressing issues, with a grid access rate covering 78% of the population and an energy mix based on large hydropower, gas, and coal. Tanzania deals with these challenges by applying a mix of direct, enabling, and integrative policies. Direct policies cover VAT exemptions and scaling-up RE programmes, while integrative policies include research and development and energy access programmes. Finally, enabling policies such as RE targets set clear signals to independent power producers and financers. Several policies pay respect to distributive and recognitional justice by addressing energy poverty, rural access to energy, gender-sensitive education and training on energy issues. Still, the lack of a comprehensive policy framework means that the policy interplay is not yet well balanced (AFRO_ENERGYPOL, 2020; Energypedia, 2020).

Lastly, two quadrants remain empty. Given that only states with at least a few direct RE policies were included in our sample, it is evident that we were not able to identify a fossil-based energy regime that would correspond to energy justice criteria. Equally, we could not find a country case with modest transformative quality but high energy justice concerns.

5. Energy Transition Scenarios: Role Models and Transition Dynamics

Overall, our matrix yields a diverse snapshot of the transition dynamics we find amongst African countries progressing towards a RE policy regime. Several countries demonstrated how comprehensive RE policy frameworks address distributive and recognitional energy justice. Mauritius, Rwanda, and South Africa are three countries cases which seem very diverse. Yet, they share the common denominator, that their energy policies are geared towards a far-reaching energy transition, whilst simultaneously contributing to greater energy justice. For realizing SDG 7 specifically, their concern for distributional and recognitional justice seems crucial. Relating their progress to SDG 7 indicators gives some evidence of how their policy goals match with SDG 7 (United Nations, 2020b). This also reveals ambivalences and inconsistencies associated with the way in which the SDG progress tracking works. SDG indicator 7.1.1 'access to electricity' shows that South Africa (84%) and Mauritius (98%) score high, whereas the access rate in Rwanda (29%) is much lower. However, the change over time reveals an exponential growth in energy access also in Rwanda. SDG indicator 7.2.1, 'renewable energy,' is benchmarked in a particularly misleading way, as it does not differentiate between traditional use of biofuels and modern clean energy. This means that countries such as the Democratic Republic of the Congo score high, despite problematic practices such as artisanal charcoal production. Also, a lag in data results in low RE figures for South Africa, despite a rapid rise in RE due to the REI4P auction instrument that has already added 6.3 GW of RE to the national grid (Baker, 2015; Müller & Claar, in press). In terms of energy governance, all three countries maintain a high level of policy ownership, though this ownership is intermediated by strong stakeholder arrangements that align governments, donors, public, and transnational actors (AFRO_ENERGYPOL, 2020). In these cases, political interventions support the rise of RE production through market means, as visible in the proliferation of auction instruments and green funds. Still, the support of justice-related policies is reflected in the aim to combat energy poverty and to increase energy access for broad parts of the population, especially in

rural areas. Donors contribute to these processes with capital and political expertise, thereby facilitating market entry for independent power producers and green investment. This results in an alignment of state, donor, and private sector activities.

Besides labelling these countries as positive examples, the high variability of African transition regimes and, equivocally, the broad variance in SDG implementation suggests that a scenario-based approach would allow for more leeway in terms of adequate transition governance and possible support by regional organizations and development partners. Based on our sample, we distinguish between four transition scenarios, which differ in relation to state capacities, role of development and regional partners, and political strategies.

The first scenario 'fostering transition dynamics' are captured in (1a), our three positive examples. For them, it seems necessary to further solidify their productive course towards greening their energy mixes and combatting energy poverty. This refers for instance to tapping synergies between SDG 7 and SDG 8, i.e., green industrial policies that unlock the potential of domestic RE transitions in creating green jobs. This is all the more important, as the danger of a 'jobless growth' looms in any transition that heavily relies on private actors and FDI. The connection between energy justice and possible economic co-benefits, thus, needs to be addressed, e.g., by considering social investments of Independent Power Producers, community ownership and a just transition rationale (IASS, UfU, IET, & CSIR, 2020). Also, to ensure that their green transitions remain on a stable course, these countries need to tackle the policy/implementation gap with regard to energy access and population growth, energy education, and technology transfer. While a new 'green geopolitics' is forming along the RE technology chain and its new resource needs, new path dependencies need to be systemically considered in light of African import substitution potentials.

The second scenario, 'governing transition dynamics,' refers to those states, which are progressing towards a clean energy transition, yet need to integrate justice issues more thoroughly (1b) and (2b), or, at the very least, develop more comprehensive policy frameworks (2b). Several of them, such as Ghana, Zambia, Kenya, or Namibia have made good progress in implementing SDG 7. They opened up to independent power producers and have attracted large amounts of green funds or even initiated their own green funds. However, several states in this group find themselves at a crossroads of market-oriented policies and state interventions. Zambia and Uganda's policy mixes strongly indicated this predicament (AFRO_ENERGYPOL, 2020). To resolve this and to create a mutually conducive policy mix, assessing the co-benefits of justice-related energy policies may again be a fruitful endeavour to both better understand the political economy of RE and the cross-cutting nature of renewables also for realizing developmental goals. As energy poverty still is a major issue in these countries, justice-related policies should specifically tackle trade-offs between SDG 7 and SDG 8. This also underscores the need to clearly define the use of renewables within the respective political economy, that is, a differentiation between energy for development, productive use, and economic opportunity. Consequently, policy learning from the three role models and their transformation processes should be encouraged. Support through IRENA's Renewables Readiness Assessments and the Sustainable Energy for All Project (SE4All) would also seem promising to foster policy change and address the policy/implementation gap.

The third scenario, 'putting justice into green economy,' addresses quadrant (1c) and refers to states whose energy transition heavily relies on market forces but does not pay sufficient attention to the justice dimension. In those states, the understanding of what a transition implies is mostly limited to the mere greening of a nation's energy mix. Simultaneously, the political dimension associated with every energy transition is downplayed. Accordingly, in states such as Algeria or Morocco, the current course of transition and the norms that inform the process are inherently subject to political debate. Interventions by development partners should focus on discursive interventions and generally emphasize the need to integrate the justice dimension. This can be achieved by highlighting its co-benefits, especially in relation to SDG 8 and SDG 13. Also, the involvement of civil society organisations and trade unions may open new opportunities to promote the need for a 'just transition.' This may take the form of transition scenarios that highlight co-benefits of energy justice by drawing on green industrial policies and promoting job creation in the RE sector. On a more normative level this means ensuring that whatever happens at the 'energy/development nexus' (Müller, 2017, p. 306) still is in line with genuine developmental norms and the normative concepts associated with SDG 7. This requires a shift from understanding RE as a new technology to understanding RE as a cross-cutting issue with the potential to foster far-reaching societal change (World Future Council, 2013).

Lastly, the fourth and final scenario, 'supporting newcomers to RE,' targets those countries, whose RE transitions are still in an early stage: (2c), (3b) and (3c). This category also applies to countries like Sudan or Niger, which were not even included in our sample due to a lack of RE policies in the first place. Here, we detect an alarming and widening gap between developing/lower middle-income countries and least developed/low-income countries, whose energy situation has even worsened (The World Bank Group, 2020, p. 21). The failure to cover clean cooking within the SDG implementation is a particularly pressing issue in these countries, even more so given its significant gender relevance. Here, justice-related energy policies should reflect the connection between SDG 7 and SDG 3 on health (Nilsson et al., 2018). Regarding rural access to

RE, the rise of rural energy funds, off-grid solutions, and solar home system as in the Zambian case (Elsner et al., in press), as well as in the examples from Tanzania or Uganda may present a viable option to address peripheral energy poverty. However, careful risk mitigation needs to be put in place to ensure that these countries can access green finance (Elsner et al., in press; The World Bank Group, 2020, p. 32).

6. Conclusion

Overall, our meta-analysis demonstrates that Africa's energy transition dynamics have resulted in several RE policy frameworks that consider the justice dimension. They may serve as role models due to their effective combination of market-oriented policies and state interventions into the political economy of energy. The four transition scenarios further underscore the (co-)benefits of justice related RE policies at different stages of a green transition process, such as job creation, technology and knowledge transfer, and educational opportunities. In accordance with debates on SDG synergies and the need for more holistic understandings of energy transitions, we were able to give examples for policy frameworks that may contribute to 'energy wellbeing' (Samarakoon, 2019). We, also, pointed out the dangers of solely relying on market solutions. In a wider sense, our analysis underscores that justice-related RE policies can make a difference for realizing the goals of SDG 7, both, at a higher level of policy ownership and in a way that better corresponds to people's energy needs and vulnerabilities. Justice-related RE policies will allow for the creation of a policy framework that pays attention to the social change rationale, which forms the basis of SDG 7, yet is oftentimes addressed rather implicitly. In essence, we emphasize the need to adjust SDG 7's tracking procedures by also assessing the effects of promising policies instead of merely relying on single indicators.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

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Article

The Great Discrepancy: Political Action, Sustainable Development and Ecological Communication

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Abstract
The term ‘sustainable development’ was coined to denote a political goal some 40 years ago; debates about sustainability date back considerably further. These debates reflect the growing awareness of the destructive effects of human activities on the natural foundations of life. Numerous initiatives have been launched to trigger a turnaround, with the 2030 Agenda and the SDGs being the latest attempt. However, substantial progress has been rather limited thus far. This discrepancy is the subject of the article. Starting from a historical overview of sustainability politics, the argument develops in three steps. First, it is shown that conventional conceptions to promote environmental change fall short in depicting the broader societal context. To provide a comprehensive picture of the challenges related to transformation processes, a theory of the functional differentiation of societies is presented in a second step. A systems theory perspective offers a convincing theoretical explication of the problem. Third, this approach is scrutinized with regard to the political system and the politics of sustainability. The key finding is that the specific functional logics of the different social subsystems must be taken into account when analysing sustainable development and the discrepancy between the aims and ambitions of (global) environmental policy and the visible consequences. On the one hand, the functional differentiation of modern society guarantees its high degree of effectiveness and flexibility. On the other hand, implementing fundamental change, such as a transition towards sustainability, is not simply a question of strategy or of political willingness and steering. Rather, there is a need for more elaborate explanatory instruments. As a result, we argue for a linking of theories of sustainable development and advanced social theory.

Keywords
environmental policy; functional differentiation; global governance; Niklas Luhmann; sustainability politics; Sustainable Development Goals; systems theory

Issue
This article is part of the issue “The 2030 Agenda for Sustainable Development: Transformative Change through Sustainable Development Goals?” edited by Thomas Hickmann (University of Utrecht, The Netherlands), Markus Lederer (Technical University of Darmstadt, Germany), Jens Marquardt (Technical University of Darmstadt, Germany), Sandra Schwindenhammer (Justus Liebig University Giessen, Germany) and Sabine Weiland (Catholic University of Lille, France).

1. Introduction

Compared to almost any previous international political initiative related to sustainable development, the 17 Sustainable Development Goals (SDGs; United Nations, 2015) have been a tremendous success—at least in terms of sustained communication. Doubtlessly, the colourful and easily recognizable SDG logo contributes in no small part to this success. Viewed from a social sciences perspective, a cursory bibliometric analysis underlines the penetration of the SDG concept in comparison to its predecessors. A search in the Social Sciences Citation Index for the 1987 Brundtland Report *Our Common Future* (United Nations, 1987) produces less

than ten hits annually since its publication. Searching for the 'Earth Summit' or 'Rio Summit' of 1992 shows 37 titles in 1992 and up to 23 hits per year in the years afterwards. The search for 'Millennium Development Goals' results in up to 214 hits per year, with an annual average of 104. In contrast to these rather limited numbers, the search for 'Transforming Our World' and 'Sustainable Development Goals' produced up to 1,156 hits in 2019, with an annual average of 615 since 2015. However, does this increased communication mean that the SDGs lead to more tangible consequences in terms of sustainable development than earlier declarations and strategies? Do they contribute in a more effective and lasting way to shaping practical policies than previous debates, programmes and headwords did?

In retrospect, the former secretary general of the Brundtland Report's commission, Jim MacNeill, was stunned by the "new growth industry…of seminars and conferences around the world"—inevitably this article is a part of this—but stated that, if any progress towards more sustainable development had actually been made at all, it were only rather tiny steps forward (MacNeill, 2013). Part of MacNeill's sobering account is a plea for more courageous political action and constant pressure by civil society. Both are typical and widespread appeals for 'what has to be done' and by whom. The SDGs are an emphatic new attempt to push such action forward. But are they, from a social science perspective, a sufficient approach?

The tentative observations outlined above lead right to the subject of this article. Looking back at the history and even prehistory of (political) debates on sustainable development (Section 2), we point to the discrepancy between the ongoing and, since the 1970s, greatly expanding debate on sustainability and the merely isolated and fragile advances—if there have been advances at all—towards sustainable development (Section 3). While there is a large amount of debate on what needs to be done, the question rarely asked is: Why has hardly any effective progress been made? We refer to the ambitious systems theory of Niklas Luhmann (1984, 1997, 2002, 2013) and his studies (1986/1989, 1992) addressing the preconditions of ecological communication (Section 4) as an analytical tool to get a grip on this puzzle, without referring to political failure, egoism or other explanations derived from everyday world experiences. We then return to our initial question of why promoting sustainability is so challenging and discuss possible advantages and limits of a systems theory perspective (Section 5). We conclude by arguing that a clear conception of what a system is, and how different systems interact, is a prerequisite for the frequently demanded 'systemic' approaches in sustainability research.

2. A Brief Look Back: Sustainability as a Governmental Task

Historically, there are several prominent starting points for the increasing awareness of environmental, ecological and sustainability issues. From a global perspective, they differ depending on cultural and societal contexts. If one wants to highlight a starting signal for Western industrialized countries, 1972 would be a plausible candidate to date the beginning of a broader public debate. The United Nations Conference on the Human Environment took place in Stockholm in June 1972, and the Club of Rome published its first report *The Limits to Growth* in the same year (Meadows, Meadows, Randers, & Behrens, 1972). Of course, there had been voices articulating the need for nature conservation and demanding substantial action against environmental pollution much earlier. Policy measures against air pollution were initiated beginning in the late 1940s. Around that time 'smog' became a popular term to describe a health-threatening phenomenon emerging in cities around the world, for example, Los Angeles and London, mainly related to the rapidly growing number of vehicles with combustion engines. California began to establish 'air pollution control districts' in 1947, and a nation-wide Air Pollution Control Act was issued in the United States in 1955 (Air Pollution Control Act, 1955). The destructive effects of the industrial lifestyle had been put on the global agenda.

This development was reflected by a growing number of publications dealing with ecological topics that gained huge public attention, particularly from the 1960s onwards. Probably the most important, certainly one of the most influential books in this context was *Silent Spring* by Rachel Carson (1962). Another example of an early warning about environmental problems caused by humankind that spurred debates both within science and the political sphere was a lecture by Lynn White with the programmatic title "The Historical Roots of our Ecological Crisis" (White, 1967). Contemporary concerns over sustainability are based on an increasing awareness of the negative consequences accompanying population growth in combination with rapid economic growth, and the constantly rising level of consumption in the post-war period. Political attempts to react to these problems through regulation and the creation of new environmental authorities are another aspect of these origins. A third aspect was the emergence of 'ecology' as an independent scientific discipline analysing the relationships between organisms and their environment (for a brief critical review, see Biermann, 2020).

The term 'sustainability' has its roots even further back in history. Usually, at least in the German context, its first use is ascribed to Hans Carl von Carlowitz (2013) and his 1713 book *Sylvicultura Oeconomica* on the problems of de- and afforestation. Even though it may be disputed whether Carlowitz really 'invented' the notion, and whether his understanding of the concept was as comprehensive as was later credited to him (Kaden, 2012), sustainability became a well-known principle in central European forest management in the 18th and 19th centuries (Grober, 2010). Interestingly, environmental historians point out that regulating the use of scarce

resources like wood and water was a decisive impetus for the emergence of early state authority in different parts of the world (Radkau, 2000, pp. 107–182; see also Du Pisani, 2006). From this perspective, statehood was a response to environmental challenges that required collective action. In other words, the necessity to have binding rules to deal with issues of sustainability provided the legitimacy for state authority. This finding is all the more remarkable as the modern state seems to have lost exactly this core competence.

3. The Underlying Problem: Sustainability and Responsibility

The question whether or not humankind is—or ever was—able to act in a sustainable way and to conserve its environment is the subject of ongoing discussions in many disciplines of science. Those who tend towards a negative answer often refer to 'the tragedy of the commons' (Hardin, 1968) as the reason why human action usually goes hand in hand with an overexploitation of natural resources. The insight that the quest for individual prosperity does not at all lead to optimal societal solutions through an 'invisible hand' or some other mechanism—as famously depicted by Adam Smith—became a very powerful explanation for the non-sustainable behaviour of human beings, notably in economics, although its author was a biologist. Thanks to the oeuvre of Elinor Ostrom (e.g., Ostrom, 1990), we know that there is no such automatism and that lots of cases show how actors in very different settings manage to establish institutions, and in doing so overcome the alleged tragedy. However, we also know that the efficiency of such institutions depends on the circumstances. The more people, interests and ideas are affected, the harder it is to establish and to implement rules that constrain individual behaviour. While in small entities and communities, like households, cooperatives or villages, some kind of social control—traditions, mutually agreed rules over fair sharing, etc.—can quite easily ensure that everybody abides by the rules, larger societal structures are more likely to face free rider problems. The size of social units is one important factor with regard to the prospect of success for sustainability. The economic system is a second important factor. Large societies must rely on different and more abstract structuring mechanisms, and the feedback between the physical environment and society is much less immediate. Furthermore, at the risk of oversimplification, the more the economic system is geared towards profit or production, the lower the value placed on goods that are not priced, such as fresh air or clean water. In his seminal analysis, Karl Polanyi (1944/1957) describes the 'great transformation' that took place over the course of the industrial revolution and resulted in a new type of economy. This market economy was no longer embedded in social institutions that had grown over centuries: "The transformation implies a change in the motive of action on the part of the members of society: for the motive of subsistence that of gain must be substituted" (Polanyi, 1944/1957, p. 41). We share Polanyi's view that the importance of this social change can hardly be overestimated. In the following section, we offer a systems theory approach to show how fundamentally the differentiation of the economic system altered the rules of the game with respect to society and sustainability.

Coming back to our initial argument, there are good reasons to adhere to the year 1972 as a starting point for our investigation as it marks the beginning of genuine sustainability politics. In the 1970s, previously isolated problems like air pollution, polluted rivers or nature conservation were brought together and discussed as part of the problematic Western model of economic and industrial development, and of mass consumption as a whole (Meadows et al., 1972; White, 1967). A new characteristic of this debate was its broad and well-founded basis. While earlier observations about ecological problems often lacked clear empirical evidence, by the 1970s the scale of environmental degradation had become obvious. Science produced more and more data and knowledge about the impacts of human conduct. Erhard Eppler, until 1974 Minister for Economic Cooperation and Development in Germany, lamented in 1975—44 years before the Fridays for Future movement formed—that never before had there been such a discrepancy between what science said and what politics did (Eppler, 1975). However, the 1970s saw the rise of international environmental diplomacy. Following the 1972 United Nations Conference on the Human Environment, the United Nations Environment Programme was founded. The United Nations Environment Programme played a crucial role in preparing the 'World Conservation Strategy' that was published in 1980 and for the first time used the term 'sustainable development,' seven years before it became famous in the Brundtland Report (United Nations, 1987).

Almost half of a century has passed since 1972. Irritatingly, at the end of these five decades we have arrived at little more than a recognition of the existence of 'planetary boundaries' (Steffen, Rockström, & Costanza, 2011), which sounds nearly unchanged since the 1972 diagnosis of 'limits to growth.' From the viewpoint of practical politics, this disillusioning conclusion seems inescapable. However, viewed from a broader historical perspective, it is doubtful whether 50 years are really a sufficient amount of time for a fundamental shift in the economic base of modern societies to occur. If sustainability refers to a substantial reorientation—and not merely a little less consumption, a little more efficiency in the use of energy and material resources and slightly cleaner production—the task ahead requires no less than a profound change in social patterns that have developed over centuries.

The last 50 years have seen the rise of civil movements, new fields of research, numerous publications, guidelines, regulations and bills. In particular, they have

seen constant efforts by the United Nations to push forward a global sustainability agenda and to agree on goals, criteria and indicators of sustainable development. From a self-critical perspective, one could describe this development as the institutionalization of sustainability. New national and international organizations, research institutes, political parties and specialized ministries have been set up. These in turn constantly produce communications and outputs in the form of large conferences, strategies and international agreements (which eventually become ratified decades later, or not). However, it is quite evident that this has not led to a tangible and lasting shift towards sustainable development. Therefore, the pivotal question is: Why is it so difficult to steer societal development in a sustainable direction? In the following section, we will suggest a theoretical explanation as to why sustainability has constantly been on the agenda for several decades and has become a well-established field of politics, while, at the same time, the per capita use of energy and material resources steadily increases, climate change and the loss of biodiversity continue unabated and the oceans turn into a great rubbish dump.

The ongoing and worsening ecological crisis has led to a shift in some parts of the debate away from the quest for sustainable development and towards a more radical perspective. The issue no longer seems to be how we avoid transgressing planetary boundaries or 'tipping points' but when we will do so and what sort of crisis this will set off (Franzen, 2019). For some observers, we have already reached an irreversible dynamic towards a global disaster. Whether this is the case or not, the question of why all efforts of science and of the political sphere have been in vain remains. In the following section, we will discuss possible answers and explanations.

4. An Attempt to Explain: Functional Differentiation of Modern Societies

Compared to the large number of suggestions for how to attain sustainable development, and the even larger amount of criticism of existing policies, there are relatively few substantial analyses of why we see such little progress. Everyday explanations, like a lack of interest (by those who do not yet suffer from the effects of rising sea levels or temperatures and extreme weather events), the incompetence of politicians and their advisors (blamed for having too narrow and short-sighted a focus), or hesitancy (preventing people from taking action before others do), are rather pre-theoretical and ad hoc interpretations. The mutual weighing up of ecology and economy is a widespread occupation for commentators and politicians, but does not in reality shed any light upon the problem.

More promising could be a historical perspective of the rise of industrialized, capitalist societies and the origin of their urge to constantly produce and gain more and more as an end in itself. It is probably the most prominent issue of classical social sciences from Adam Fergusson through Karl Marx to Max Weber and Karl Polanyi: Why and how did modern, rationalized, capitalist societies evolve? Despite all of the differences in their explanations, they agree in one point. The origin of this type of society, with all its contradictions and ambivalences, is a historical puzzle and by no means a self-explanatory and inevitable historical process. In order to explain this unique development, social sciences refer to factors ranging from technology through religion to climate change (Blom, 2019). They all have in common that they describe a process spanning several centuries. If sustainable development means a fundamental transformation of this type of societies that have emerged over the course of history, and of their focus on economic growth as a means in and of itself, the temporal horizon has to be widened. Looked at from this historical perspective, five decades of discussion appear a rather brief period of time and certainly too short a phase to revise a historical process.

A contemporary theory, which may be used to explain the discrepancy between effort and success in the field of sustainability, is the theory of functional differentiation (Schimank, 2005; Schimank & Volkmann, 2015). What is probably its most elaborate version—the combination of the theory of functional differentiation with general systems theory by Niklas Luhmann—may be an appropriate tool to provide an answer to our question (Luhmann, 1985, 1987). Bringing together a range of theoretical components, it describes modern societies as an interplay of self-referring and even self-organizing societal subsystems (Luhmann, 1984, 1997, 2013). For Luhmann, these systems are—in a sharp contrast to the older theory of structural functionalism by Talcott Parsons (1951, 1971)—not defined by a function they fulfil for society at large, but based on some sort of monopoly of communication. Each system organizes itself around a 'medium' and a 'code.' Whenever this binary code is used in a communication to describe any part of reality, this can be regarded as an operation of the respective system by which the system itself is reproduced. Societal systems are 'closed' systems because their manner of operation is self-referring. The code guarantees that each communication is unambiguous and can be answered only by referring to the same code. The economic system, for example, is based on the guiding difference between 'paying' and 'not paying' as its code (Luhmann, 1988). Whenever one applies this difference to communicate about whatever aspect of reality, this communication becomes part of the economic system. The other way around, the economic system, like any other societal subsystem, can 'observe' or handle reality only by means of its particular code. Social systems organize and constitute themselves by this mode of communication, not by formal institutions like companies, government bureaus, political parties or parliaments.

The 'operational closure' of each subsystem is the result of a historical process, an interplay of social struc-

ture and historical semantics (Luhmann, 1980, 1981, 1989, 1995). The historical account of the semantic and structural basis of the operational closure of social systems is the empirical fundament of Luhmann's theory (Schwietring, 2006). It explains which sort of semantics became a binary code and a crystallization point of the operational closure of a social subsystem. The number of such subsystems is neither limited nor unlimited. Luhmann's analysis does not claim to have described all of them, nor does it rule out that further subsystems may evolve in future. For the present, he analysed the subsystems of economy, politics, science, law, art, education, and religion. Functional differentiation, as a mode of societal order by means of communication, is no longer limited to societies defined by national borders. It has a tendency to spread globally and to include all sorts of communities and territories. The differentiation of societal subsystems tends to shape an all-encompassing world society (Heintz, Münch, & Tyrell, 2005; Luhmann, 1975; Stichweh, 2000; for a critical review, see Holzinger, 2018). This, by the way, is another aspect rendering the theory relevant for questions of sustainable development in terms of planetary boundaries (Engels, 2003).

Turning back to our question, this variant of differentiation theory can explain the dynamic, efficiency, and, at the same time, the stability of modern societies. Whatever may happen, the respective systems can only observe it by means of their constituting code. This is the limitation and, at the same time, the strength of each system. To stay with the example of the economic system, it is unable to handle questions of social justice or environmental pollution except in terms of its constitutive code 'paying/not paying' (Luhmann, 1986/1989, pp. 6–7, 15–21, 51–62, 1988). Exactly because it is closed and self-referring, it is highly flexible and independent from other societal subsystems or ecological crisis, for example. For each system, all other systems are merely a part of its diffuse 'environment.' Each system conceives the operations of other systems only as some sort of noise. Of course, this noise can irritate the system, but its only way to respond to an irritation caused by its environment is an internal operation based on its own code or guiding difference. The internal 'resonance' an external event—be it a change in government or an environmental issue—can set off within a system depends entirely on its internal code (Luhmann, 1986/1989, pp. 44–50, 2013, pp. 28–39). This is, in the terms of this variant of functional differentiation theory, the reason why there is no hierarchy between the systems and why there is no way one system can determine or steer the operations of another system.

To put it in a simple but illustrative example: Growing public concerns over plastic waste together with political pressure led to a self-commitment undertaken by companies in the retail sector in Germany to ban plastic bags from their stores. What seemed to be a step forward was not a sign of substantial change but merely a reaction in terms of paying/not paying due to the fear of losing customers. At the same time, retailers started to paste plastic stickers on fruits and vegetables to give them some sort of 'label.' Obviously, a demand for sustainability does not provoke a re-orientation within the economic system but only causes some kind of selective operation following its internal code. Forcing economic actors to reduce carbon dioxide emissions must by no means lead to sustainable alternatives. Based on the theoretical perspective applied, this comes as neither surprise nor disappointment but is exactly what was to be expected.

The argument of the absence of hierarchy between systems is important to answer our question. Described by means of the theory of functional differentiation, there is no steering centre and no privileged lever that can be used to turn the dynamic of functionally differentiated societies in a certain direction (Luhmann, 1986/1989, pp. 106–114, 2013, pp. 40–48). Any attempt to restructure the dynamics of social systems, for example, towards less resource use, less pollution or less consumption, will be answered by the different social subsystems in the only way each system can operate. The economic system, for example, will turn it into a question of paying/not paying.

Functional differentiation accounts for the historically unique dynamic and effectiveness of modern societies, for example, in terms of material wealth, technological innovation and personal self-determination. At the same time, functional differentiation makes it extremely difficult, if not unlikely, to act in an anticipatory and to some degree self-restraining way that is synonymous with sustainable development. The crucial point for the study of sustainability politics is that changing the functional logic of differentiated subsystems is simply beyond the scope of political action.

5. A Systems Theory Perspective: Promises and Constraints

Luhmann's theory of social systems offers a valuable explanation for the functionality of modern societies. It helps us understand why incidents, changes and even life-threatening devastation in the physical environment—that is, outside of society in terms of social systems—do not automatically cause any societal reaction. In fact, as long as there is no communication about these matters, they literally do not exist as a societal question (Luhmann, 1986/1989, pp. 34–35). In the introduction we demonstrated that communication regarding ecological problems is not a new phenomenon but that, due to the specific logics of the different subsystems of society, communication does not necessarily evoke resonance (i.e., a specific reaction), nor does it inevitably cause the reaction that is expected or wanted. Rather, each system will react according to its respective coding. What is more, resonance in one subsystem does not have immediate consequences for the rest of society. Against this background, it is not surprising that transformations, particularly when affecting

society as a whole, do not occur easily and quickly. The widely shared view that sustainability goals, once they are politically adopted, only have to be implemented is, therefore, rather naïve.

Despite its explanatory power, Luhmann's model has rarely been applied to issues of environmental and sustainability policy. One reason for this is that this theoretical framework is not suitable to offer recipes for what should be done. Rather, it provides sound explanations for why there has been—despite all political efforts and technological and economic developments—so little, if any, substantial progress. Furthermore, his work is not very well-known beyond the German-speaking sociology community, not least because only parts of his monumental opus have been translated and his highly theoretical reasoning may become even harder to follow upon translation into English (see also Blühdorn, 2000; Mathur, 2005). Another reason why Luhmann is not very popular in political science might be his obvious reluctance to acknowledge the research and findings of the discipline. While he was legendary for evaluating and commenting on vast amounts of literature from nearly all fields of science in his famous 'card index,' Luhmann made no effort to link his theory to existing and potentially compatible approaches in political science. This is regrettable, as there would have been numerous interfaces at which to connect his systems theory with theories on political decision-making, institutional varieties, agenda-setting or different modes of governance.

In political science, attention focuses on Luhmann's concept of the political subsystem of society. For him, the political system, like any other subsystem, functions according to a binary code which guides every form of political communication. In the case of the political system, this is the question of having or lacking political power. Considering the manifold factors that are relevant for political action, this assumption seems to be rather simplistic. Reducing complexity is an important function of theories but in using such a narrow concept there is a danger that central aspects of politics are ignored. It is questionable whether the struggle for power and influence—whatever that may mean—is the decisive driving force of 'classical' politics. However, doing politics has changed and become even more diverse in recent decades. Different actors are involved in very different ways in decision-making processes. The term 'governance' has become popular to describe these interactions and interdependencies (Kooiman, 2003; Mayntz, 2006; Rosenau & Czempiel, 1992). Lobby groups, expert networks, advisory bodies, non-governmental organizations and other non-state actors all pursue their respective interests, but it seems doubtful whether all of these activities, which (for a political scientist) uncontroversially form part of the political system, can be captured by a mere focus on power. Luhmann's coding, therefore, is a fine example of parsimony in theory construction but it might be inadequate to cover the full range of politics and political communication.

Luhmann applied his systems theory approach to analyse the conditions under which modern societies can respond to ecological threats. This study dates from the mid-1980s (Luhmann, 1986/1989). He opened up a seminal theoretical perspective on the systemic barriers to sustainable development, even though in retrospect some of his judgements—for example, on the lack of credibility of the green parties—have proven to be rather short-sighted. Only a few years after the environmental movement had started to institutionalize itself in formal organizations and non-profit research institutes, Luhmann remained sceptical as to whether ecological problems had the capacity to irritate social systems with far-reaching effects (Luhmann, 1986/1989, p. 32).

When we talk about ecological threats today, it is clear that we do not refer primarily to ecological disasters like oil tanker collisions or core meltdowns in nuclear power plants. Ecological risks arise from normal industrial processing and everyday consumption. Contrary to Luhmann's intention, one could argue that due merely to functional differentiation the economic system cannot deny its responsibility (Bendel, 1993, p. 276). Notwithstanding these points of criticism, we believe the theoretical perspective remains valuable when considering the discrepancy between the widespread sustainability rhetoric and the lack of substantial results. Following Luhmann, the obstinacy of functionally differentiated systems may contribute considerably to the lack of success. The high degree of decoupling from their environment, which renders functionally differentiated systems effective, also accounts for their inability to grasp the consequences of their operations in terms of sustainability. First attempts have been made to apply Luhmann's perspective in this context (Büscher & Japp, 2010), and we think this could be a promising starting point for further research.

Luhmann's theory of ecological communication might offer a very useful framework to assess the state of and developments in the quest for sustainability. This framework might serve as a kind of meta-theory to reveal the basic structure of modern societies and the fundamental challenges to be overcome when profound transformations are intended. Within this overall concept, specific issues might require further refinement. Above all, this concerns the questions of why and how resonance and reaction in the different subsystems of society are generated. It would go far beyond the scope of this article to develop such theoretical synergies in detail but possible enhancements are obvious. The analysis of political stability and change, of transitions and policy shifts, of factors that trigger and conditions that foster or hamper such developments are at the core of political science (e.g., Baumgartner & Jones, 1993, 2002; Capano & Howlett, 2009; Kingdon, 1984; with regard to sustainability, see Meadowcroft, 1999). Combining a systems theory perspective with approaches to deal with change and dynamics could, therefore, serve to launch a fruitful debate about sustainability politics. While the concep-

tion of differentiated systems with specific constitutive codes that inhibit direct communication between these systems can explain the basic functioning principles of society, the theory is rather blind to new social developments and changes. While Luhmann scrutinized the historical genesis of functional differentiation, the corresponding semantic codes and the operational closure of societal systems, he considered substantial future changes to the basic structure of differentiated systems unlikely. From this perspective, all kinds of events like news about ecological catastrophes, public protests, and political reactions appear as a succession of communications relying on the foundational coding of the respective systems, whereas the overall state of society is—or seems to be—stable. Such a view might tend to underestimate the dynamics of novel phenomena. With regard to the political system, this could be the reason why Luhmann was highly sceptical of the system's ability to react to ecological problems within the time frame set by elections. In his opinion, the political weighing of interests would almost by necessity disadvantage ecological concerns. As indicated above, at this point systems theory might benefit from theoretical and empirical findings derived from political science research to explore conditions under which paradigm and policy shifts do happen.

Research on this topic would be even more desirable as new environmental movements are on the rise globally and ecological matters are gaining in importance. It is probably not a particularly bold statement to say that the irritation of the political system with regard to sustainability will increase considerably in the coming years. Applied in this manner, the theory of functional differentiation may offer insights less pessimistic than Luhmann's own conclusion. However, this does not alter the fact that political decisions such as adopting the SDGs are operations of the political system that have no direct effects on other systems unless another system observes the political operations applying its own code.

In Luhmann's theory, a complementary element to the self-referring closure of social systems is their mutual 'structural coupling.' Operationally closed systems are constantly irritated by their 'environment,' especially by the impenetrable complexity of other systems. It is important to keep in mind that Luhmann uses the term 'environment' not to refer to the natural surroundings of society but to any sort of communication which takes place outside of a specific system, that is, communications that follow a separate coding (Luhmann, 1986/1989, p. 22, 1997, pp. 66–67). The political system, for instance, may react nervously to a decreasing growth rate. As throughout his work, in *Ecological Communication*, Luhmann (1986/1989) dedicates much more attention to the operational closure of functionally differentiated systems than to their structural coupling. Usually, he only gives some hints. He states that, for example, the economic system reacts immediately and inevitably to the scientific system (Luhmann, 1986/1989, p. 117). What Luhmann has in mind are technical inventions. A potentially disruptive invention emerging from the scientific system will trigger the economic system to adopt it as quickly as possible. Unfortunately, Luhmann does not elaborate on this coupling any further. Scientific knowledge about excessive emissions, unsustainable resource use or the potentially hazardous side-effects of industrial production do not stimulate the economic system to the same extent as technical inventions. Obviously, scientific findings only become an issue for the economic system insofar as its 'paying/not paying' code is affected.

While the debate on sustainability might profit from sound theoretical perspectives derived from the social sciences, the social sciences have to theorize about the relationship between social and ecological systems. Recent approaches tackle the classical dichotomy of humans and the environment by framing interconnections as issues of the 'Anthropocene' or an 'earth system' (Biermann, 2020). Such concepts considerably widen our understanding of the fundamental difficulties in deliberating the roles and positions of academic disciplines. Nevertheless, we doubt that these notions can be conceived theoretically as systems and that the systems' borders can be dissolved terminologically. Rather, from a systems theory perspective one pivotal question is whether there could be some sort of structural coupling of social and ecological systems that triggers evolutionary dynamics towards sustainability. We are aware of the theoretical challenges this may involve. Ecological and social systems do not have much in common apart from the term 'system.' Social systems are closed systems, and they operate by 'communication' and 'sense.' Ecological systems, in contrast, are systems of an entirely different type. They are open systems and operate in different ways with different media. The closure of social systems means that their evolution decoupled itself from immediate dependence on any sort of environment. Nowadays, as the limits of our planet come into sight, a new type of mutual dependency becomes obvious. Integrating advanced social systems theory into the debate on sustainability may prove fruitful for a theoretically informed analysis of where we are going. The task is to find a way to theorize about the coupling or interdependency of ecological and social systems without reducing one of these system levels to a diffuse or negligible 'environment' of the other.

6. Conclusions

We have tried to show that the theory of functional differentiation explains convincingly the discrepancy between sustainability rhetoric and practical outcomes. In contrast to widespread notions of 'systemic' or 'system as a whole' approaches, it offers a theoretically sound basis for the use of the concept 'system.' The difference between systems and their environment is conceptualized in a—still provocative—way that clarifies why a system may rely on some sort of environment but is

unable to access or control this environment in a planned manner. To comprehend systems as closed, self-referring operational entities is not a sign of a lack of holistic or 'systemic' thinking. Quite the reverse, it is the result of a thorough application of systems theory. Unfortunately, the findings this dedicated systems theory approach suggest are not very encouraging.

So where do we go from here? What do these theoretical considerations mean for far-sighted sustainability politics and the attainability of political targets like the SDGs? Integrating Luhmann's theory of social systems into the debate on the SDGs, and sustainable transformation in general, forces us to reformulate frequently asked questions in a slightly different manner. Instead of asking: 'How do we overcome national egoism in politics?,' we should ask: 'Under what circumstances are decisions in favour of sustainability rewarded politically, that is, in terms of power?' Instead of engaging in ever more political arguments, scientists should ask, for instance: 'Under which conditions does scientific knowledge provoke resonance in other systems?' Probably the most crucial question concerns the economic system: 'How might the conservation and restoration of ecosystems pay off in terms of the 'paying/not paying' code of the system?'

In order to deal with these questions, we have to abandon the idea of society as a centred, organized, steerable totality. Consequently, we have to conceptualize the relations of human activities, ecosystems and even planetary geophysical cycles in a much more differentiated manner, adopting more complex notions of systems and the interplay of systems. Appeals to 'common efforts' in the political realm or calls for an integrated analysis of 'socio-ecological systems may sound convincing at a first glance. However, they not only ignore fundamentally opposed interests on a global scale, they also tend to conceal the complexity of the interplay between different systems within society, and the even greater intricacy of separate system levels like ecological and social systems.

Such an understanding of society will help us to assess the attainability of the SDGs. The idea behind the SDGs is that sustainability is a means to pursue a multitude of targets simultaneously. Even more, the preamble to the 2030 Agenda stresses a holistic view of 'humanity and the planet' based on people, planet, prosperity, peace and partnership (United Nations, 2015). It is an impressive declaration of humanity. The political system may be able to convert the pleasing sound of these alliterative components into the system's currency of gaining power. However, it is only the system's internal currency. As with many terms, power has a distinct meaning in Luhmann's systems theory and does not necessarily comprise the ability to force other social systems to obey political guidelines. The SDGs are a piece of communication of the political system, written in political language. In order to make them function and implementable, they must be translated and made compatible with the currencies—or ruling codes—of the other affected subsystems, above all the economic system. Only if this succeeds will there be a sustained impact of the 2030 Agenda.

Functional differentiation of societies is not simply an obstacle to sustainability. It is the historical process that led to the independence of science, rule of law, personal freedom and democratic mechanisms to distribute and control power. To argue in favour of an elaborate theory of functional differentiation as an alternative to moral appeals or theoretically rather weak claims for holistic perspectives does not imply the abandonment of the goal of transformation towards sustainability. We merely suggest a theoretical approach that is as intricate as its subject.

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Conflict of Interests

The authors declare no conflicts of interest.

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Article

Aligned Sustainability Understandings? Global Inter-Institutional Arrangements and the Implementation of SDG 2

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Abstract
This article asks whether inter-institutional arrangements (IIAs) can facilitate norm understandings of sustainability in the global food regime complex to ensure the implementation of SDG 2. It refers to theories of norm implementation and regime complexes and focuses on two explanatory factors: non-material resources (authority and knowledge) and interplay management (participation and interaction). The article deals with three case studies: The Codex Alimentarius Commission, the Sustainable Food Systems Programme, and the Standards and Trade Development Facility. Qualitative empirical analysis is based on documents and expert interviews. The article assumes that both explanatory factors are beneficial for the development of an aligned sustainability understanding. The findings indicate that IIAs serve as discursive fora for institutional exchange and can, thus, facilitate the development of aligned sustainability understandings in the global food regime complex. However, the article also identifies some structural factors that provide more scope for certain actors to enforce their normative views and interests, which ultimately hampers the implementation of SDG2.

Keywords
authority; food regime complex; inter-institutional arrangements; interplay management; SDG implementation; sustainability understandings

Issue
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1. Introduction

In 2015, the United Nations General Assembly adopted 17 Sustainable Development Goals (SDGs) as part of the global 2030 Agenda for Sustainable Development, which have since served as the global normative reference framework for sustainability. SDG 2 stipulates to "[e]nd hunger, achieve food security and improved nutrition and promote sustainable agriculture" (United Nations, 2015, p. 14). Yet, sustainability is a vague norm that is "subject to continuous argument over its true meaning and practical implications" (Meadowcroft et al., 2019, p. 2). As revealed by studies on global agri-food governance, the norm's flexibility can facilitate the development of different norm understandings and cause "disjointed" political discourses, "in which advocates of different [sustainability] models talk past one another and fail to fully engage in productive dialogue on pathways forward" (Clapp & Scott, 2018, p. 4). Referring to studies on policy implementation (Jager, Newig, Challies, & Kochskämper, 2020), this article argues that different norm understandings of sustainability

impede SDG 2 implementation. The article builds on research in international relations (IR) theory on the impact of different norm understandings in global goal implementation (Alger & Dauvergne, 2020; Breitmeier, Schwindenhammer, Checa, Manderbach, & Tanzer, 2020) and the role of inter-institutional cooperation in ensuring the effectiveness of global regime complexes (Biedenkopf, 2017; Gehring & Faude, 2013). It does not examine how SDG 2 is implemented but analyzes the potential of global inter-institutional interaction to achieve more aligned sustainability norm understandings, which we consider a crucial prerequisite for SDG 2 implementation. To this end, the analysis focuses on inter-institutional arrangements (IIAs) which provide discursive exchange fora and "facilitate cooperation between social actors when they do not share common views and interests" (Compagnon & Bernstein, 2017, p. 815). The article asks: Can IIAs in the global food regime complex facilitate more aligned norm understandings of sustainability to ensure the implementation of SDG 2? In doing so, the article contributes to ongoing debates on factors that promote and sustain inter-institutional interaction (e.g., Biermann & Koops, 2017).

The article conducts a qualitative comparative case study analysis of three IIAs concerned with sustainability issues related to global agri-food governance—the Codex Alimentarius Commission (CAC), the Sustainable Food Systems Programme (SFSP), and the Standards and Trade Development Facility (STDF). The analysis focuses on two explanatory factors—non-material resources (authority and knowledge) and interplay management (participation and interaction)—which can be considered crucial for inter-institutional interactions and sustainability discourses and which IIAs seek to mobilize to ensure more aligned norm understandings.

First, the article illustrates the theoretical framework that draws on norm implementation theory and regime complex theory (Section 2). After describing the data and methods applied (Section 3), the article presents and discusses empirical findings from a qualitative comparative case study analysis of CAC, SFSP, and STDF (Section 4). Finally, we draw conclusions and outline future areas of research (Section 5).

2. Theoretical Framework

According to Margulis (2013), the current global food system constitutes a global regime complex, which is defined as a non-hierarchical "loosely coupled set of specific regimes" (Keohane & Victor, 2011, p. 7). Each specific regime is organized around "sets of implicit or explicit principles, norms, rules, and decision-making procedures, around which actors' expectations converge in a given area of international relations" (Krasner, 1982, p. 186). Breitmeier, Young, and Zürn (2006, p. 4) expand this definition by stressing that principles, norms, and rules "give rise to social practices." Although regime complexes can become embedded in overarching norms (Zelli, Gupta, & van Asselt, 2013), they leave room for different norm understandings. Accordingly, these different norm understandings might collide and cause problems and negative spillovers such as policy incoherence (Biedenkopf, 2017). Regime complex theory allows focusing on the intricate and interdependent interactions and analyzing a regime complex' problem-solving capacity (Breitmeier, 2018).

The global food regime complex is weak and fragmented and incorporates regimes from different issue areas, such as agriculture and food, international trade, or global human rights (Margulis, 2013). It involves various actors, such as states, non-governmental organizations (NGOs), transnational corporations (TNCs), and international organizations (IOs). Actors in the global food regime complex follow different sustainability understandings (Breitmeier et al., 2020), which leads to diverging food policies and impedes the fight against hunger (Margulis, 2013) and, thus, the implementation of SDG 2. In addition, the weak and fragmented character of the global food regime complex strengthens the asymmetric power structure (Drezner, 2009) in global agri-food governance that enables powerful states, international institutions, and TNCs to shape the global food agenda according to their interests and sustainability understandings. Conversely, less powerful actors such as NGOs or people's movements are widely disadvantaged (Clapp, 2018; Margulis, 2018; McKeon, 2018). This became particularly evident in the debates on global food policy in the context of the 2007/2008 food crisis, in which TNCs successfully re-legitimized the productionist agenda despite its negative environmental and social impacts (Fouilleux, Bricas, & Alpha, 2017).

Norms entail a dual quality since "they are both structuring and socially constructed through interaction in a context" (Wiener, 2007, p. 49). Consequently, norms are not stable, and their content can be subject to different interpretations. However, IR norm researchers convincingly argue that the existence of different understandings of international norms does not per se have a negative impact on norms. Different norm understandings increase the potential of norm contestation, which is "the condition for a shared understanding over meanings of norms" and "can generate norm legitimacy" (Deitelhoff, 2020, p. 3; see also Deitelhoff & Zimmermann, 2020; Wiener, 2014). As Jager et al. (2020) show, shared norms and norm understandings have a positive effect on the implementation of policy outputs. They can accelerate a "shared sense of purpose and provide favorable conditions for effective problem solving" (Jager et al., 2020, p. 387). At best, shared norms and norm understandings can also support cooperative actions among different stakeholders (Ostrom, 1990). Therefore, we argue that despite the fact that regime complexes will "always exhibit a degree of divergence regarding the principles, norms, rules, or procedures of their elemental regimes" (Orsini, Morin, & Young, 2013, p. 29), an aligned sustainability understanding within the

food regime complex is a crucial prerequisite for SDG 2 implementation.

Schwindenhammer, Breitmeier, and Kirf (2017) observe an increasing number of IIAs engaged in sustainability issues in the global food regime complex. We define IIAs as formalized and discursive exchange fora in which at least two actors of the global food regime complex participate. IIAs can foster cooperation among these actors even if they pursue different interests and (sustainability) understandings (Compagnon & Bernstein, 2017; Stokke & Oberthür, 2011). Consequently, we consider IIAs as an institutionalized form of a regime complex' problem-solving capacity and as potential fora for facilitating aligned sustainability understandings. Although most IIAs do not make legally binding decisions, they serve as important discursive fora that bring together different types of actors. Moreover, many IIAs in the global food regime complex follow a multi-stakeholder approach and are open to governmental agencies, IOs, NGOs, TNCs, and scientific institutions. In this way, IIAs can enable actors who are disadvantaged by the asymmetric power structure of the global food regime complex (Margulis, 2013) to raise their voices and can strengthen vertical cooperation (Hickmann et al., 2020). While some IIAs explicitly aim to develop a common sustainability understanding, others intend to develop at least a minimum consensus. However, to date, there is no clear model of how IIAs work, nor do we know which factors determine the outcome of an IIA. According to Biermann and Koops (2017, p. 22), there is a general research gap in "identifying and isolating the key factors influencing the formation and maintenance of cooperative relations."

This article assumes that factors at IIA-level impact the development of aligned sustainability norm understandings. The analysis focuses on two explanatory factors at the structural level of an IIA: non-material resources (authority and knowledge) and interplay management (participation and interaction). Based on research on authority pooling and the co-production of sustainability knowledge, the first assumption is that an IIA is more likely to develop an aligned sustainability understanding when different authority sources and knowledge systems are represented. The second assumption is that an IIA is particularly suitable to foster processes of norm alignment when it involves interplay management. We are aware that the conceptual focus on IIAs can only shed light on a small part of inter-institutional interaction in the food regime complex. In addition, it should be kept in mind that inter-organizational relations are not a panacea for the management of potential norm conflicts. It is also possible that IIAs maintain or facilitate the formation of rivalries and conflicts (Biermann & Koops, 2017).

2.1. Explanatory Factor I: Non-Material Resources

Authority and knowledge are important non-material resources for (sustainability) discourses. On an individual level, they can provide actors with discursive power and the ability to set and steer a discourse and persuade other actors of a certain sustainability understanding (Milkoreit, Bansard, & van der Hel, 2020). On a collective level, the representation and combination of different types of authority and knowledge systems can facilitate the development of an aligned and practically implementable sustainability understanding (Norström et al., 2020; Tengö, Brondizio, Elmqvist, Malmer, & Spierenburg, 2014).

Focusing on the latter, we differentiate between three types of *authority*: (1) moral authority; (2) technical authority; and (3) legal authority (see Schwindenhammer, 2016). Moral authority is based on the credibility with which actors pursue goals in the public interest (Lipschutz & Fogel, 2002, p. 125) and is attributed in particular to NGOs (Hall & Biersteker, 2002). Technical authority rests on the promise of more rational policy outcomes by providing knowledge-based expertise (Flohr, Rieth, Schwindenhammer, & Wolf, 2010) and can be exercised by each actor with knowledge and expertise in the given issue area. Legal authority "refers to the constitutionally institutionalized delegation of competencies by democratic procedures and is, thus, exclusively exercised by public actors" (Schwindenhammer, 2016, p. 106).

Regarding *knowledge*, we differentiate between three knowledge systems: (1) local knowledge; (2) scientific knowledge; and (3) expert knowledge. While local knowledge systems include traditional and indigenous knowledge based on informal and everyday interpretations, scientific knowledge refers to systematically recorded knowledge in an academic context (Raymond et al., 2010). NGOs are considered representatives of local knowledge at the international level (Sändig, Bernstorff, & Hasenclever, 2018), whereas academic institutions represent scientific knowledge. Expert knowledge refers to highly specialized knowledge in a given issue area. In particular IOs, NGOs, and (transnational) corporations are considered representatives of this knowledge system (Breitmeier & Hansel, 2015; Schwindenhammer, 2020).

We are aware that the different types of authority are analytical ideal types and, although they have to be analyzed separately, they might occur in mixed forms empirically. For instance, transnational biotechnology companies have successfully pooled moral and technical authority to influence the global rise and regulation of genetically modified insect technology in global agriculture (Schwindenhammer, 2020). Similarly, transnational NGOs simultaneously exercise moral authority by reference to the global right to food and technical authority through the provision of scientific expertise to influence agri-food governance (Schwindenhammer, 2016). In addition, Tortajada (2016) emphasizes that NGOs perform a wide range of functions in different policy areas and do not necessarily only pursue goals in the public interest. The same applies to the representation of

local knowledge. NGOs are professionalized organizations whose staff often have an academic background. They receive "their legitimacy from benevolence and effectiveness in improving other peoples' lives and in promoting 'common interests"' but, often located in the Global North, "remain too disconnected from the affected grassroots" and "have only weak ties with the populations on whose behalves they claim to act" (Sändig, Bernstorff, & Hasenclever, 2018, p. 590; see also Brühl, 2010). Consequently, our framework is open to other types of civil society organizations such as grassroots organizations, people's movements, or affected persons' organizations.

2.2. Explanatory Factor II: Interplay Management

Interplay management refers to "conscious efforts by any actor or group of actors, in whatever form or forum, to address and improve institutional interaction and its effects" (Stokke & Oberthür, 2011, p. 6). Since regime complexes are the result of a growing density and complexity of partly overlapping institutions (Raustiala & Victor, 2004), interplay management may also serve as an instrument to prevent and reduce conflicts. Interplay management can be regulatory, in the sense of determining standards of behavior, or enabling, by facilitating learning and capacity building (Oberthür, 2009). We consider two aspects of interplay management to be crucial for IIAs: (1) participation, and (2) interaction. Both aspects might also serve as mechanisms to reduce unequal distribution of material and non-material resources among different actor groups.

Regarding *participation*, Gehring and Faude (2013, p. 121) note that "regime complexes are usually not purposively established by a clearly determined membership." Therefore, questions of inclusion and exclusion are critical also for IIAs. Especially in the field of global food governance, McKeon (2015, p. 328) critically observes that "public responsibility has been progressively sold out to markets and corporations while the front-line actors of food provision—families, communities, and small-scale producers—have been disempowered." On the one hand, IIAs should, therefore, include members from various actor groups and scales, which would create "social representativeness" that could build "bridging ties with groups having different characteristics" (Morin, Louafi, Orsini, & Oubenal, 2017, p. 544). On the other hand, all actors must be in the position to equally contribute to the work of the IIA, for example by providing oral or written inputs during meetings of the highest decision-making body. The numerical and practical participation of different actor groups in IIAs enhances the potential to shift the discourse on sustainability towards an aligned understanding.

Biermann (2008, p. 161) lists four characteristics for inter-institutional *interaction*: "(1) regular, intense contacts; (2) formal and informal rules of behavior; (3) regular channels of cooperation of varying formalization; and (4) long-term orientation as opposed to ad hoc cooperation." While regular exchange between staff on the operational level is important to gain understanding of other actors' cultures and modi operandi, frequent interaction might also be an indicator for a vital and strong relation. Biermann (2008) also notes that the quality of interplay management stems from the quality of inter-institutional ties rather than their quantity. Other key aspects are the preparation and the strategic focus of meetings and their outputs (Biermann & Koops, 2017). Stokke (2020, p. 209) points to the important aspect that "interplay management does not necessarily imply harmonious orientation towards synergetic outcomes," which directs attention of research also to potentially diverging objectives and norm understandings. In order to develop an aligned sustainability understanding, an IIA needs to provide a high level of interaction between its members. This is ensured by regular and clearly focused meetings of the decision-making bodies as well as of the working groups.

3. Methods and Data

The comparative qualitative analysis builds on official documents and expert interviews (a list of documents and interviews is provided in the Supplementary File). The 38 analyzed documents published by the IIAs were selected for their strategic importance and reference to the issues of sustainability and food. The document data base includes terms of reference documents and strategic plans, annual reports, meeting reports, and work plans. Additionally, 19 expert interviews with representatives from the IIAs from different member groups—secretariats, IOs, national governments and public agencies, and the private sector—were conducted between February and September 2020. For each IIA, the interviews cover at least one representative per member group to obtain a comprehensive picture. The interviews were guided by a semi-structured questionnaire that included questions on the IIA's sustainability understanding as well as on the two explanatory factors non-material resources and interplay management. Further expert interviews with IO representatives conducted between May and October 2019 serve as empirical background information.

The resulting texts—documents and transcribed interviews—were deductively analyzed (1) to identify the IIAs' sustainability understandings and (2) to assess the explanatory factors non-material resources and interplay management. By means of a coding system that builds upon the theoretical framework, the analysis of sustainability understandings provides an insight into the IIA's reference to the SDGs and to the environmental, economic, and social dimensions of sustainability. For the assessment of non-material resources, references to moral, technical, and legal *authority* as well as to local, scientific, and expert *knowledge* systems are identified. Regarding interplay management, the

analysis explores comprehensive representations of participants and the equal opportunity to contribute (*participation*) as well as for regular, clearly focused meetings of the highest decision-making bodies and other working groups (*interaction*).

4. Results and Discussion

The three selected case studies—the CAC, the SFSP, and the STDF—represent central IIAs in the global food regime complex. They bring together key actors from different actor groups to work on issues related to food and sustainability.

4.1. IIA Sustainability Understandings

The CAC, which was established by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in 1963, follows the mission to "[p]rotect consumer health and promote fair practices in the food trade by setting international, science-based food safety and quality standards" (FAO & WHO, 2019, p. 7). The CAC is the responsible body for implementing the joint FAO/WHO Food Standards Programme. It embraces 188 member states, the European Union as member organization, and 236 observers from intergovernmental and non-governmental organizations. While observers are invited to participate in the standard-setting procedure, for example by providing discussion papers or written comments, the member states are the ones to decide. The resulting standards, codes of practice, and guidelines are collected in the Codex Alimentarius. Although the Codex texts adopted during the annual CAC meetings are not legally binding, they serve as reference for the World Trade Organization's (WTO) Sanitary and Phytosanitary Standards (SPS) Agreement and Technical Barriers to Trade Agreement to solve trade disputes (FAO & WHO, 2019, p. 2). Subsidiary bodies of CAC are the Codex secretariat, the executive committee, ten general subject committees, six commodity committees, and six FAO/WHO regional coordinating committees. While the Codex' mandate explicitly refers to food safety, sustainability has not yet been a key issue for the organization. The SDGs only made it onto the agenda in 2017, when the executive committee started developing the new strategic plan (CAC, 2017, p. 10). Eventually, SDGs 2, 3, 12, and 17 were included in the strategic plan 2020–2025. Currently, the Codex committee on general principles is considering the development of indicators for monitoring the results of the Codex' contribution to the SDGs. In this context, a discussion paper that will be considered in the next session in February 2021 recommends reaffirming the importance of the SDGs and further enhancing and communicating the Codex' contribution (CAC, 2020).

The SFSP is a multi-stakeholder partnership that was established in 2015. It is a sub-program of the UN One Planet Network which was formed to implement the 10 Year Framework on Sustainable Consumption and Production. The SFSP aims to "accelerate the shift towards more sustainable food systems" (SFSP, 2017a, p. 1). To this end, SFSP pursues five objectives at global, regional, and national levels: (1) Raising awareness; (2) building capacity; (3) access to and exchange of knowledge; and (4) strengthening synergies and cooperation among food system stakeholders. Up to 23 stakeholders from five clusters (government agencies—7 seats—IOs, NGOs, private sector, and scientific institutions—4 seats each) are represented in SFSP's Multi-Stakeholder Advisory Committee (MAC) and participate in its meetings on an equal footing. The MAC is responsible for the overall coordination, implementation, monitoring, and resource mobilization and is the place for strategic discussions and decision-making. The co-leads, elected from the MAC, guide the program's implementation, support the overall coordination, provide financial and/or in-kind contribution, and raise funds. Additionally, there is a task force for each SFSP objective. As SFSP was established in the context of the 2030 Agenda, it is closely linked to the SDGs and supports their implementation—especially SDGs 2 and 12. Furthermore, SFSP emphasizes a holistic sustainability understanding by taking all three dimensions of environmental, economic, and social sustainability into account (SFSP, 2019). In the seventh MAC meeting, SFSP members decided to develop a knowledge tool/lighthouse product to promote a "common understanding of central notions and concepts" (SFSP, 2017b, p. 4). The publication of a glossary of key terms on sustainable food systems was planned for February 2019. However, at the time of writing, the glossary has not yet been published.

The STDF is a global partnership established by WTO, FAO, WHO, World Bank, and World Organization for Animal Health during the fourth Doha Ministerial Conference in 2001. One of its principal goals is to support and finance the implementation of the WTO SPS Agreement in local agricultural projects, promoting food safety and food security in the Global South. Regarding international SPS requirements, STDF is mandated to increase "awareness, mobilize resources, strengthen collaboration, identify and disseminate good practice" (STDF, 2015, n.p.), acting as a knowledge sharing platform and bringing together stakeholders across the agriculture, health, trade, and development sectors. STDF is composed of five founding IOs, six selected developing country experts, several government agencies, and a large number of donors currently contributing funds for the implementation of STDF projects and initiatives. The STDF structure is divided into its secretariat, policy committees, and working groups. STDF also cooperates with a wide network of NGOs, private partners, and observers such as CAC. Since 2017, STDF's work has been increasingly aligned with the 2030 Agenda. Interview data indicate that this strategic step was initiated by an external evaluation. STDF does not only consider itself an active supporter and contributor to a large number

of SDGs—such as SDGs 2, 3, 5, 8, 10, 12, and 17—but has also adjusted its new medium-term strategy to the 2030 Agenda (STDF, 2020). However, the last STDF meta-evaluation, which analyzes the impact of STDF's food projects, states that the IIA still scores low on sustainability (STDF, 2018, p. 2). STDF addresses food by linking it to "safe trade" and access to international agricultural markets, based on the "vision of sustainable economic growth" (STDF, 2020, p. 8). Therefore, it strongly emphasizes the economic sustainability dimension.

4.2. Assessing the Explanatory Factors

Table 1 provides an overview of the empirical findings regarding the explanatory factors non-material resources and interplay management.

All types of *authority* are represented in the three IIAs since they include the respective actor types. However, interviews reveal that some actors do not fit into this typology in practice. In SFSP and STDF, for instance, NGOs do not consider themselves to exercise moral, but rather technical authority. Consequently, moral authority is underrepresented in the IIAs' discourse on sustainability. Although the institutional design of SFSP and STDF includes different types of authority exerted by different types of actors, technical authority dominates the discourses in both IIAs.

Similarly, some *knowledge* systems are more dominant than others. Contrary to SFSP's aim to heed local needs, e.g., of indigenous people, interview data show that local knowledge is de facto underrepresented in the MAC. In addition, interviewees state that discussions in the MAC tend to ignore important local developments such as the increasing activities of cities regarding sustainable urban food systems. CAC's risk assessment work is exclusively based on scientific knowledge. One interviewee pointed out that the expertise of Codex members representing the industry is hardly included in the standard-setting procedure, although it is crucial for implementing the adopted standards. Besides, particularly European CAC members call for the inclusion of factors other than science, such as cultural or moral, for the development of standards. The consideration of such factors could lead to a more balanced representation of knowledge systems in CAC, since they rather address local and expert knowledge. While STDF's agricultural projects may incorporate local knowledge depending on the context and through its developing country experts, IOs, and strategic partners, it is still underrepresented in the working groups and policy committees. In this regard, interview data reveals that the lack of permanent STDF members such as local actors from developing countries in the working groups and policy committees is an important inhibiting factor for more effective and direct inclusion of local knowledge from the Global South.

All three IIAs aim for comprehensive *representation* of different actor groups. In practice, factors such as high travel costs and the limited number of available seats in decision-making bodies (SFSP), or the need to offer nationally or even regionally pre-negotiated positions in the meetings (CAC) are obstacles for actors with limited material resources. Funding sources such as the Codex trust fund have increased the participation of developing countries. However, interviewees stress that countries from the Global North are still better represented and more active in CAC. Interview data also reveal that the level of *interaction* is generally high. Meetings of the decision-making bodies are very structured and well prepared. In SFSP, three out of four MAC meetings per year are held as teleconferences. While this enables all members to participate, interviewees report that these meetings are overly structured and leave only little room for

Table 1. Assessing IIAs' sustainability understandings.

	Sustainability Understanding	Non-Material Resources	Interplay Management
CAC	• Late incorporation of SDGs in strategic plan • References to economic and social sustainability dimensions	• All authority types represented • Predominance of scientific knowledge	• Formalized meetings, structured by pre-negotiations • Complex interaction needed to build alliances
SFSP	• Close institutional link to SDGs, especially 2 and 12 • Holistic view on sustainability	• All authority types represented • Predominance of scientific and expert knowledge	• Regular MAC meetings prepared by co-leads and regular task forces meetings • Interaction impeded by lack of face-to-face meetings
STDF	• Increasing alignment with SDGs • Emphasis on economic sustainability dimension	• All authority types represented • Predominance of scientific and expert knowledge	• Formalized meetings at irregular intervals, divided into policy committees and working groups • Limited interaction due to small number of meetings

open debate. In addition, some criticize that the wide range of topics hinders in-depth preparation, especially for those actors who can delegate fewer staff to represent their organization in the MAC. Similarly, the annual CAC meetings are not considered a place for discussion, which is why all positions should be settled in advance. Consequently, member states must develop a national position in agreement with the main national stakeholders and then build alliances with other countries. Smaller working groups are, thus, essential for IIAs to find consensus, which is why the interaction in such groups is even higher. However, STDF working groups and policy committees meet at irregular intervals and at most twice per year, which limits the possibility to talk about new issues.

Regarding the respective IIA *sustainability understandings*, only SFSP addresses all three sustainability dimensions. In contrast to the other IIAs, SFSP's foundation is closely linked to the 2030 Agenda and the SDGs. In CAC and STDF, the SDG framework was incorporated from outside and was subject to extensive internal debates, as interview data confirms. In CAC, for example, the rather reluctant position towards sustainability stems from diverging interpretations of the IIA's mandate. While some countries prefer sticking to a narrow interpretation that refers only to consumer health protection and fair trade, others are open for a broader perspective that includes environmental sustainability, sustainable consumption and protection, or sustainability as an additional base for standard development.

In addition, non-material resources give more scope to certain actors to influence the IIA's sustainability understandings. While states and their alliances are of special importance in CAC, FAO and UN Environment as founding organizations are the driving forces in SFSP. To strengthen their privileged role, FAO and UN Environment also cooperate intensively beyond official meetings. This helps them find common positions in the MAC, although they pursue gradually different approaches to sustainable food systems. Since STDF follows the WTO governance arrangements, especially the SPS Agreement, WTO is the central actor in this IIA. Consequently, a more active role of moral authority represented by civil society organizations would lead to a more comprehensive consideration of the sustainability norm regarding the environmental and social dimension in the IIAs. For instance, including NGOs that advocate alternative food systems could help IIAs put greater focus on local cultures, traditions, and specific environmental conditions.

The same effect might arise from a more comprehensive inclusion of local knowledge. Even though all three IIAs aim for comprehensive representation and rely on a high level of interaction to achieve their goals, structural hurdles for such comprehensive representation, rigid structures, and a small number of meetings hinder these ambitions. In case of STDF, the highest decision-making body is convened only at the request of one or more STDF members or by decision of the working groups. When the meetings take place, they are characterized by a strong focus on technical aspects concerning the implementation of the SPS Agreement. This institutional setting hampers the continuous development of a comprehensive STDF sustainability understanding.

Overall, the empirical analysis basically confirms findings from IR research on the relevance of IIAs as discursive exchange fora for social actors with different normative views and interests (Compagnon & Bernstein, 2017, p. 815). The three IIAs under analysis have started working on issues related to sustainability and food in the particular context of the SDGs. Interview data confirm a high willingness for cooperation as well as a high level of commitment among all actor groups represented. However, there are practical and structural limitations which ultimately counteract the development of aligned sustainability understandings in the global food regime complex. Discourses on sustainability mainly focus on technical aspects that can easily be agreed on. In contrast, moral and legal discussions with higher conflict potential seem to be avoided. This is particularly interesting since none of the IIAs provide binding rules for their members. The findings are in line with Stokke (2020, p. 219), who reports that, regarding regulatory governance, "there have been very few cases of coordination beyond exchange of information and joint knowledge building" in regime complexes when actors with partially competing objectives, e.g., of trade and environmental regimes, come together. Our results demonstrate that these impediments to a more ambitious form of interplay management also influence the development of aligned norm understandings.

5. Conclusions

The article asked whether IIAs can facilitate more aligned norm understandings of sustainability in the global food regime complex to ensure the implementation of SDG 2. Building on theories on norm implementation and regime complexes, it analyzed three IIAs: CAC, which promotes standards for safe food and fair food trade; SFSP, which aims at more sustainable food systems; and STDF, which supports the implementation of the WTO SPS Agreement in countries of the Global South. The qualitative empirical analysis demonstrated that IIAs have started working on issues related to sustainability and food in the particular context of the SDGs. In addition, it became clear that the two explanatory factors analyzed are, indeed, beneficial for the development of aligned sustainability understandings and are, thus, mobilized by the three IIAs under analysis. The focus on interplay management and non-material resources therefore constitutes a useful analytical lens to further develop IR research on norm implementation through inter-institutional cooperation (Gehring & Oberthür, 2009; Jager et al., 2020). Expanding regime complex theory by ideational factors, our approach enables us to look at the sustainability norm from a more

comprehensive perspective and to capture discourses that foster norm development.

However, the development of aligned sustainability understandings still faces some challenges. Even though the IIAs include the SDGs in their work, shared sustainability understandings are still missing. This seems to confirm the argument that international actors often experience difficulties and impediments in inter-institutional interaction when there are diverging interests at stake (Stokke, 2020). Especially in this weak and fragmented food regime complex (Margulis, 2013), the struggle for common norms seems to persist (Orsini et al., 2013) despite the global normative framework of the SDGs. The activities of the three IIAs do not necessarily lead to harmonization or coordination of norm understandings in the food regime complex. This finding underlines the need to analytically focus on a very early stage of the norm implementation process.

The empirical analysis also showed that the IIAs' discourses mainly focus on technical aspects and avoid moral or legal aspects. Further research is needed to address other factors that could explain this current lack of legal and moral authority in IIAs. For instance, future research could investigate whether IIAs avoiding moral aspects has led to a depoliticization of aligned sustainability understandings in the global food regime complex. The detected under-representation of local knowledge in IIAs points to the need for further analyses of how local knowledge and local developments might enter IIAs' discourses through the wider relationships of the actors in an IIA. Especially relations to local people's movements that promote alternative normative frames from the bottom-up, such as La Via Campesina, could provide opportunities for assessing the involvement of local cultural aspects and normative demands of small-scale farmers in IIA discourses. Further research could also investigate relations between IIAs and possible feedback loops from discourse within IIAs to the work of members outside the IIA. Finally, the empirical analysis also revealed that non-material resources give more scope to certain actors in the three IIAs. In this sense, further research could also consider internal power structures and the agency of specific actors and, thus, their ability to steer discourses and influence the aligned sustainability understanding of an IIA.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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Article

Transformation through 'Meaningful' Partnership? SDG 17 as Metagovernance Norm and Its Global Health Implementation

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Abstract
SDG 17 calls for the international community to "strengthen the means of implementation and revitalize the global partnership for sustainable development," emphasizing the role of multi-stakeholder partnerships for achieving the SDGs. Policy documents are replete with statements on the necessity of 'meaningful' engagement, especially with civil society—without clarifying what 'meaningful' stands for. In this article, we develop an analytical approach to partnership as a form and norm of metagovernance. Partnership as a metanorm is about the roles and relations of different sets of actors. We suggest operationalizing the concept of partnership according to different levels of accountability and participation, allowing for a gradual enhancement of the quality of partnership in terms of 'meaningfulness.' We apply our analytical model to the Global Action Plan for Healthy Lives and Well-Being for All (GAP), a fairly new initiative by health and development agencies to accelerate progress towards the health-related targets of the 2030 Agenda. By investigating the development and the early phase of implementing the GAP, we empirically assess if and how the notion of partnership envisioned in the GAP qualifies as 'meaningful' with respect to civil society engagement. From our empirical example, we infer lessons for attaining normative standards of 'meaningfulness' and highlight implications for future research on partnerships.

Keywords
accountability; civil society organizations; global health; metagovernance; participation; partnership; sustainable development goals

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1. Introduction

The Sustainable Development Goals (SDGs) stipulate how we should shape our future social and economic development and what kind of transformations this requires. The challenge, however, lies in the logic of the SDGs: Due to their interconnectedness, it will not suffice to tackle each Goal separately. Therefore, thinking and acting in silos must be overcome. For the transformation envisioned by the SDGs, a global partnership is needed. It is not sufficient to apply and combine various modes of governance. Instead, we also have to take the 'governance of governance,' i.e., metagovernance, into account (Christopoulos, Horvath, & Kull, 2012; Meuleman, 2019; Meuleman & Niestroy, 2015). SDG 17 asks the international community to "strengthen the means of implementation and revitalize the global partnership for sustainable development." Among the 17 SDGs adopted by the United Nations in 2015, SDG 17 is unique in that it does not address specific policy tasks. Instead, it is about the 'right' way of collaboration between different actors. We argue that partnership

can be conceptualized as metanorm associated with guidelines on how problems should be tackled and by whom. Thus, as a standard of appropriate behavior, also called metagovernance norm, it defines what good governance of governance should look like (Pantzerhielm, Holzscheiter, & Bahr, 2020).

The targets associated with SDG 17 relate to financing development, capacity building, the role of technology and trade, and raise several systemic issues. Amongst the latter are two targets (17.16, 17.17) that highlight the role of multi-stakeholder partnerships in achieving the SDGs. In this article, we focus on the role of CSOs, which are explicitly addressed as part of multi-stakeholder partnerships "that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries" (UN Department of Social and Economic Affairs, n.d.). Engagement of civil society is considered crucial both for the achievement of the SDGs and for the political transformation of global governance. However, its role remains unclear and its potential untapped (c.f. Buxton, 2019; Smith, Buse, & Gordon, 2016). Including CSOs in policy processes is also based on normative considerations that revolve around the concept of legitimacy (Nasiritousi, Hjerpe, & Bäckstrand, 2016): Incorporating different stakeholder interests and entering into a discursive exchange with civil society representatives enhances the democratic legitimacy of global governance. Their embeddedness in societies on the one hand, and their expertise and independence (or commercial disinterest) on the other, make CSOs guardians of societal interests and watchdogs over decisions taken. We suggest that these ideal-type roles allow for a conceptualization and operationalization of both the processual and the relational dimension of partnership as metanorm. From a normative and conceptual point of view, partnership only becomes 'meaningful,' then, if CSOs are able to perform these roles.

We analyze the role of civil society within one example of a recent metagovernance partnership, the fairly new Global Action Plan for Healthy Lives and Well-being for All, henceforth GAP (WHO, 2019d). This new partnership aims to accelerate country progress on the health-related SDGs by enhancing the collaboration among 12 global organizations engaged in health, development and humanitarian relief. For a more effective way of implementing their programs, however, the organizations seek closer engagement with other stakeholders as well, like communities, civil society, or the private sector. By analyzing the potential of the GAP to live up to the normative expectation of creating 'meaningful' partnerships between CSOs and GAP members, we are scrutinizing its 'partnershipability.' The contribution of this article is thus threefold: First, we take a prominent concept of global politics and specify it as form and norm of metagovernance with particular attention to the role of civil society. Second, drawing together existing literature on accountability and participation, we introduce an innovative operationalization of the metanorm 'partnership' which entails standards for empirically assessing civil society engagement against normative expectations with a focus on relational and processual dimensions. Third, we analyze an important and recent example of metagovernance in global health by tracing CSO engagement in the GAP.

Accordingly, we proceed as follows: Section 2 explores key assumptions and conceptualizes partnership as form and norm of metagovernance and the role of CSOs therein. Section 3 operationalizes 'meaningful' partnership as metanorm by introducing participation and accountability, and presents a framework to assess the quality of partnerships in terms of fulfilling the normative standard of 'meaningfulness.' Section 4 employs these theoretical considerations to empirically assess if and how the notion of partnership envisioned in the GAP qualifies as 'meaningful' with respect to civil society engagement. Section 5 discusses the lessons we draw from our empirical example for attaining the norm of 'meaningfulness' and highlights implications for future research on partnerships.

2. Partnership as Form and Norm of Metagovernance and the Role of Civil Society

Partnerships are everywhere. Amidst this ubiquity, the following section briefly spells out our understanding of partnership and civil society's role therein. At its core, partnership describes a relationship between different actors, be they individuals, collective actors, states, firms, or other entities. More specifically, partnership is different from other social relationships as it entails a sense of cooperation. It elicits positive connotations of two or more actors sharing responsibility to achieve something (positive) and suggests mutual obligations and the equality of 'partners' involved. Beyond its normative appeal, however, the lack of more precise understandings of the normativity of partnership starkly contrasts with the pervasive application and focal role it plays in global governance. To anchor the following discussion, we think of partnership as both form and norm of global governance extending across levels and modes of governance, from individual partnerships, e.g., public private partnerships, or bilateral aid relationships, to global collective endeavors.

As a form, partnerships in a minimal definition then describe relations between a multitude of diverse actors or stakeholders in a specific, namely cooperative manner. Partnerships are generally understood as innovative forms of governance that bring together different types of actors, from governments to business and civil society, with their respective resources and advantages. Their flexibility, financial resources and strategic approaches are thought to help close the implementation and governance gap and the diversity of participants as shrinking the participation gap in global governance (Bäckstrand,

2006, p. 293). It is beyond the scope of this article to delve into the emergence of partnerships in global governance at the end of the 20th century. Suffice to say that it was closely linked to the hope of meeting the aforementioned functional demands at a time of severe criticism of the effectiveness and legitimacy of international institutions (Bäckstrand, 2006). In this article, we zoom in on a hybrid form of global governance with partnership as a manifestation of metagovernance.

As a norm, partnership encompasses more or less specified and formalized principles for practicing cooperative interactions. To understand and scrutinize processes and standards of global governance is of increasing importance as transnational activities and partnerships expand (Scholte, 2011; Tallberg, Bäckstrand, & Scholte, 2018). There is broad agreement that governance beyond the state requires different mechanisms and yardsticks to ensure and assess legitimacy than national democratic institutions (Scholte, 2014). Traditional notions of formal delegation and direct and hierarchical lines of representation between 'we the people' and governments give way to thinking about pluralist governance forms (Goodhart, 2014; Macdonald, 2018). SDG 17's call to "strengthen the means of implementation and revitalize the global partnership" openly acknowledges partnership as an engagement of a wide range of stakeholders and different governance modes, i.e., as a form of metagovernance. Yet SDG 17 also highlights the intrinsic challenges for the notion of partnership in global governance: Global relations are characterized by unequal roles, power and voice as well as distant or indirect relationships (Rubenstein, 2007). Partnerships in the SDGs are aimed at accelerating progress towards the SDGs, thus addressing sustainability and the well-being of the global population. However, people's situations and vulnerabilities vary starkly, and their voices are unequally heard, depending on their resources and access to sites of decision-making. What, then, should and does the "governance of governance" (e.g., Kooiman & Jentoft, 2009, p. 818) for the SDGs look like? Due to its central role for the SDG agenda, we argue that it is critical to scrutinize the quality of partnerships beneath the vague but powerful positive associations the partnership concept evokes.

In the remainder of this article, the conceptual and empirical discussions focus on the role of civil society in partnerships. Their role in global governance has carried most of the hope attributed to a legitimization of global governance or 'good' partnerships in the 1990s and early 2000s (Nanz & Steffek, 2004). NGOs were regarded as addressing democratic deficits of global governance, mostly by giving voice to (underrepresented) societal and even marginalized interests of affected communities and individuals and by drawing attention to unaccounted power (Cutler, Haufler, & Porter, 1999). Civil society was key to increase pressure on global economic actors, and had an impact on changing the norms and context of debate (Cutler et al., 1999; Keck & Sikkink, 1998). The honeymoon period with new actors and modes of global governance has given way to a more critical engagement with multi-stakeholder approaches, and civil society's own influence and accountability have come under scrutiny (Keck & Sikkink, 1998; Rubenstein, 2007). Participation of CSOs has been criticized for being driven by large 'Northern' NGOs not representative of concerns of the Global South and marginalized interests. On a different level, the quality of participation and the ability to hold other relevant actors accountable have been considered weak and even further diminishing (Buxton, 2019). Among CSOs, on the other hand, there seems to be a growing concern that previous moderate successes in formalizing the partnership norm are not upheld (CPDE, 2020).

Individual regimes, transnational companies and international organizations have individual mechanisms at their disposal to ensure transparency and accountability to members or 'stakeholders.' Already, these are considered insufficient and problematic to satisfy more ambitious or 'democratic' conceptions of transparency and accountability (Goodhart, 2014; Macdonald, 2018; Papadopoulos, 2014). In the case of metagovernance, CSOs' impediments to fulfil their 'democratizing' role in global governance are exacerbated by the involvement of various actors and different types of actors. Overlapping authorities and complex lines of responsibility render visibility and information-gathering difficult. Scrutinizing "the opaque and dynamic forms of power exercised through networked and other non-hierarchical structures" (Macdonald, 2018, p. 456) poses a significant challenge. Against this background, the next section operationalizes the metanorm partnership in order to move beyond mere description towards a critical examination of normative standards for partnership practices.

3. Operationalizing Partnership through Participation and Accountability

What does good partnership look like? More precisely, when does a partnership qualify as such, and what is civil society's role? These questions guide the following section. CSOs' two-fold role as 'guardian' and 'watchdog' allows for an assessment of both the processual and the relational dimension of partnership as metanorm. From an ideal-type perspective, as guardians, CSOs' participation should ensure that the concerns of society, of underrepresented and marginalized groups are heard and considered in the process of decision-making. As watchdogs, they are supposed to assume a crucial role in accountability relationships as they transmit information, channel expertise and opinions on the matter at hand and allow for public scrutiny. It goes beyond the scope of this article to detail the theoretical literature on participation and accountability in global governance (e.g., Bovens, Goodin, & Schillemans, 2014; Haas, 2004; Macdonald, 2018; Scholte, 2011). Drawing on this literature, it is our aim to operationalize standards for practices of

cooperation in a manner that fits the character of global partnerships and allows for an empirical analysis.

Regarding metagovernance partnerships, members each have their own formal and informal procedures for participation and accountability. Vertical lines of participation and accountability (i.e., principal-agent relations of member states and international organizations) coexist with horizontal checks and balances between members within the partnership, i.e., mutual accountability mechanisms. This leads to a complex system of multipolar relationships and processes (Bruen, Brugha, Kageni, & Wafula, 2014). For partnerships themselves, as institutionalized forms of networked and multilayered metagovernance, scholars have discussed and called for pluralistic approaches to legitimacy and accountability. These encompass, for instance, courts or other oversight institutions, complaint mechanisms and monitoring systems (Macdonald, 2018), as well as peer-based and reputational mechanisms enhancing collective accountability (Benner, Reinicke, & Witte, 2004). Among core propositions are increased visibility and accessibility as well as better involvement and empowerment of stakeholders (Slaughter, 2004). It is here that we see civil society's functional role for enhancing partnerships' legitimacy. CSOs then act on behalf of others, namely affected people who lack the capacity to raise their voice and hold actors and institutions to account. CSOs serve as "surrogates" (Rubenstein, 2007, pp. 623–627) or "proxies" (Koenig-Archibugi & Macdonald, 2013, p. 499) during the cooperation process. These practices need to be assessed according to other normative criteria than more traditional vertical mechanisms of delegation and accountability and are always "second-best," as Rubenstein (2007, p. 623) cautions. This becomes clear when problematizing the relationship between proxies and those they are presumably acting on behalf of. Defining and distinguishing 'affected people' is not always possible. And even if it is, ensuring the accountability of proxies speaking in the interests of these affected people is problematic (Papadopoulos, 2014).

Bearing this in mind, we propose a simplistic model of two sets of actors: In this case between formal members of a partnership and those who are proclaimed to be indispensable for its success and legitimacy, i.e., civil society actors. We contend that in a pluralist understanding of legitimate global governance, CSOs as third parties can collect and provide information, thereby creating a public sphere that is necessary for accountability and is otherwise mostly absent from multi-level governance (Hirschmann, 2019, p. 24; Papadopoulos, 2014, pp. 277–278). This again creates a space for monitoring compliance and justification. We now take a closer look at the two interrelated processes of participation and accountability, which we use to operationalize partnership as metanorm.

Regarding participation (left field in Figure 1), we first envision attendance as unidirectional relationships encompassing physical attendance by civil society actors on the one hand and information sharing by formal participants on the other. When the role of CSOs becomes more active and involves a first level of consultation, submitting written or oral reports or opinions, we term this 'engagement' (or 'involvement'). If this is met with feedback, i.e., reflection and discussion, it constitutes a first instance of more active participation. Here, then, CSOs engage in processes of opinion-building and policy-making and we witness forms of interaction. In a next level of consultation, input is allowed for and reflected upon during agenda-setting. 'Meaningful' participation might then even extend to having influence on decision-making. This, however, is neither always possible nor desirable in all forms. The direct influence of non-state actors in decision-making poses other democratic-theoretical questions, which go beyond the scope of this discussion.

What we contend, however, for our topic of 'meaningful' participation is the core issue of responsiveness. While all of the above are labelled participation, we find that for participation to be 'meaningful,' a minimal threshold of responsiveness on the part of formal participants is required. It reflects the capacity of CSOs to bring attention to their opinions and issues, thereby (hopefully) integrating the demands of larger groups of stakeholders. Participation then entails a very different relationship and is more interactive and equal. CSOs are integrated into policy-making processes, giving them an active or possibly even influential role.

We define accountability as a social relationship between an agent who can be held accountable and face consequences, and another agent who holds the former accountable (Bovens, 2007, p. 450). Crucial for accountability (right field in Figure 1) are the questions who is holding whom to account for what and how (Hesselmann, 2011). We shorten the debate about 'who' and 'whom' for our conceptual model to CSOs as proxy accountability-holders and formal members as power-wielders and accountability-givers (Rubenstein, 2007). We suggest thinking of the 'how' as a gradual process: Often, the unilateral sharing of information, i.e., transparency, is termed accountability. We refrain from equating transparency and accountability. The former embodies a unidirectional relationship and remains at the discretion of the information-sharer. Only with the idea of answerability, i.e., the position and right to demand information (here by CSOs), do we begin to speak of accountability and of a two-way relationship. If information is then met with mechanisms of response, potentially even including reward or sanction, this signals a different form of relationship. And thirdly, if evaluations lead to an adaptation in policies or behavior, the role of CSOs as proxy accountability-taker can be deemed influential and the relationship more equal. Again, we view responsiveness as a core threshold for 'meaningful' partnership. Together with 'meaningful' participation, 'meaningful' accountability then forms 'meaningful' partnership.

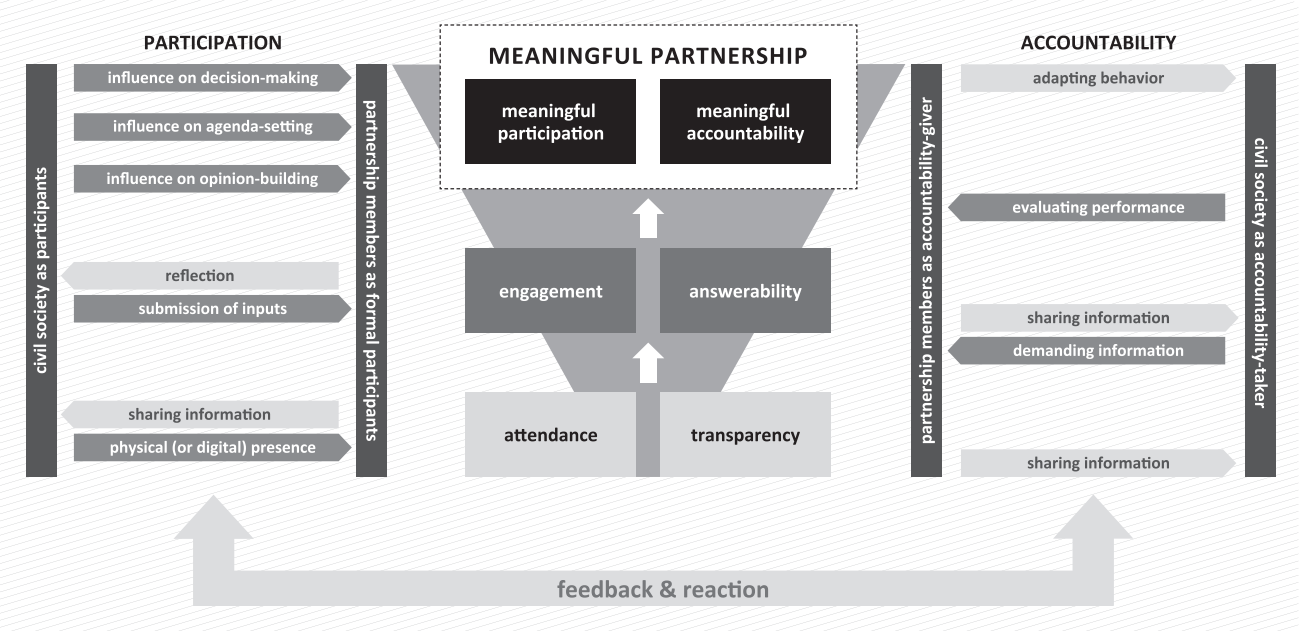

Figure 1. Operationalizing 'meaningful' partnership.

The question of 'for what' one is being held accountable is just as complex as 'how.' Simply put, accountability can refer to outputs and outcomes of discussions and even impacts of policies. Having a clear understanding of roles and responsibilities helps to define the 'for what' and is one core obstacle to accountability in complex governance situations. However, in this article we wish to draw attention to another aspect, i.e., the processual dimensions of accountability and participation and their interrelatedness. In a processual understanding of accountability (and participation), 'what' also encompasses the process itself. Thus, we add another layer to the process of partnership, which is concerned with addressing the context of the partnership, i.e., obstacles to participation and accountability. Are CSOs able to give feedback about a set of context variables, i.e., material constraints for participation, inclusion of core stakeholders, access to discussion and disregard of input, etc.? In relation to accountability, do they have the capacities to follow decision-making processes in a well-informed manner and are they acknowledged in their accountability-taking role? If not, are accountability-takers named at all? On the part of formal participants/accountability-givers: What is their reaction to feedback? Are obstacles addressed and overcome, or are they disregarded? The manner in which these obstacles to participation and accountability are raised and dealt with (feedback and reactions) needs to be included in a critical analysis of the realities of partnerships. They signal different levels of process participation and accountability and allow for an early assessment of the quality of partnership, i.e., its 'meaningfulness.' The example we have chosen to illustrate this is the GAP on SDG 3.

4. 'Meaningful' Partnership? Roles and Relations in the Global Action Plan for Health

The GAP on SDG 3 is a paradigmatic example of studying 'meaningful' partnership since the two concepts of participation and accountability are among its defining features and primary goals. For the collaborating agencies, attaining both contributes to the successful achievement of SDG 3 and other health-related targets. We traced the process of developing the GAP and the beginning of the implementation phase by analyzing the available primary (text and video) sources published by the participating organizations and civil society actors (e.g., documents, reports, records and recordings of meetings, correspondence, working papers, blogs, evaluations). The objective was to uncover how the process of engaging with civil society actors unfolded within our analytical framework, which roles the different actors were taking and what kind of relations were evolving between the participating agencies and CSOs. By analyzing the origin and implementation of the GAP, the intricacies of formal partnership members engaging with civil society become visible. In the following, we will briefly introduce the GAP and the relevance assigned to CSOs in its implementation, before we discuss if it meets the criteria that we spelled out above for 'meaningful' participation and accountability.

It was only in April 2018 that the heads of the governments of Germany, Ghana and Norway approached the WHO to accelerate the process towards achieving SDG 3. In a letter addressed to WHO Director-General Tedros Adhanom Ghebreyesus, they proposed the development of a joint Global Action Plan for Healthy Lives and Well-Being, thus uniting relevant actors in global health to "streamline

their efforts" (Merkel, Akufo-Addo, & Solberg, 2018). In September 2018, the WHO released an outline *Towards a Global Action Plan for Healthy Lives and Well-being for All: Uniting to Accelerate Progress towards the Health-Related SDGs* (WHO, 2018c), followed by the actual GAP document entitled *Stronger Collaboration, Better Health: Global Action Plan for Healthy Lives and Well-being for All: Strengthening Collaboration among Multilateral Organizations to Accelerate Country Progress on the Health-Related Sustainable Development Goals* in October 2019 (WHO, 2019d). In essence, the GAP is aimed at furthering the collaboration between 12 global organizations that work in the fields of health, development and humanitarian relief (GAVI, the Vaccine Alliance, Global Financing Facility, the Global Fund, UNAIDS, UNDP, UNFPA, UNICEF, Unitaid, UN Women, World Bank, World Food Programme, WHO). This collaboration rests on four commitments: engage, accelerate, align, account. The actual work revolves around seven 'accelerator themes': primary health care, sustainable financing for health, community and civil society engagement, determinants of health, innovative programming in fragile and vulnerable settings and for disease outbreak responses, research and development, innovation and access, and, lastly, data and digital health.

The history of the development of the GAP shows some of the obstacles CSOs face when participating in global policy processes—in this case at the metagovernance level. CSOs are usually defined as non-state, not-for-profit, voluntary organizations. This distinguishes them from philanthropic organizations or actors from the private sector. Although compared to the latter, CSOs usually have less financial and human resources at their disposal, the list of contributions they are expected to make in providing public goods and reaching the SDGs is quite long (e.g., Greer, Wismar, Pastorino, & Kosinska, 2017; Smith et al., 2016). Since they are seen as the group of actors closest to the needs of communities, CSOs are attributed the role of giving marginalized and vulnerable groups a voice, thereby ensuring that no one will be left behind (e.g., Greer et al., 2017). However, the WHO especially has a long-standing history of confrontation with civil society about its engagement with non-state actors. To ease civil society's concerns about undue influence of corporate actors and private foundations on the WHO's work, the organization adopted a *Framework of Engagement with Non-State Actors* in 2016 (WHO, 2016). Since then, it has continuously developed its regulatory framework (e.g., WHO, 2018a).

The task of devising a GAP was assigned to the WHO by the governments of three member states. The WHO, like other international organizations, is answerable to its principals, the member states. Formally, the accountability-takers are the members of the participating agencies, and because of scarce resources and lack of time, international organization secretariats prioritize with whom to interact extensively. This puts CSOs in a disadvantageous position, for two reasons. Firstly, they are not formal members and as such, they do not only have to lobby to be heard; they also have to work on establishing rules and procedures for being admitted, as the example of the *Framework of Engagement with Non-State Actors* (WHO, 2016) shows. Secondly, 'civil society' is an umbrella term. It consists of vastly different groups of actors that vary in size and resources. Usually, they also differ in opinion, which makes it hard for their counterparts to identify positions that can be taken up further and acted upon.

As far as the GAP is concerned, the group of 'formal participants' in this new partnership consists of very distinct multilateral organizations, which want to "deliver results" at country level by a "more purposeful, systematic, transparent and accountable collaboration" (WHO, 2019d, p. ix). However, in order to achieve this, the GAP "recognizes that other stakeholders, including communities, civil society and the private sector, make vital contributions to achieving the SDGs and promotes closer engagement with these key partners" (WHO, 2019d, p. xiv). In accordance with the WHO's *Thirteenth General Programme of Work 2019–2023: Promote Health, Keep the World Safe, Serve the Vulnerable* (WHO, 2019e) the organization has proclaimed "a new era of partnership between WHO and civil society" (WHO, 2018b). The importance of tapping into the resources of CSOs is also acknowledged in accelerator theme three of the GAP, which focuses on community and civil society engagement. There, the GAP explicitly refers to SDG 17 and SDG target 16.7 (inclusive, participatory decision-making; WHO, 2019d, p. 62).

In the GAP document, the signatories commit to "meaningful engagement" with communities and civil society, which exists "when participants manage to influence decisions on issues that affect their lives" (WHO, 2019d, p. 62). In our conceptual discussion above, we defined participation as 'meaningful' when civil society succeeds in exerting influence on opinion-building, agenda-setting and decision-making. Similarly, accountability relationships become 'meaningful' when an accountability-giver adapts its behavior after the accountability-taker has evaluated its performance. For our empirical analysis of the 'partnershipability' of the GAP, we have translated our operationalization into observable indicators. To assess the level of CSO engagement, we first looked at the formal arrangements for CSO participation as specified in the published documents. In a second step, we took into account processes of interaction, mainly in the form of oral and written speeches, inputs and background information. We evaluated CSOs' inputs and consultation and their reflection in later official documents and tried to establish what kind of 'influence' they had on the process and to assess the quality of their participation.

As far as the question of 'meaningful' participation is concerned, for the period between the release of GAP phase one in October 2018 and the launch of the GAP at the UN General Assembly in September 2019, we can

witness activities on all three levels we distinguished for analytical reasons (see upper field of Figure 2). With respect to attendance, on both occasions, civil society actors were present at the events linked to the publication of both documents and entered into discussions about the GAP. However, it was up to the CSOs to offer their coordinated engagement and expertise in a joint letter to WHO-DG Tedros (Civil Society Engagement Mechanism, 2018). Moreover, time constraints were a factor to consider. Originally, the three heads of governments had asked for the release of a GAP back in October 2018, which turned out to be unrealistic. Therefore, the final document was scheduled for the September 2019 meeting of the UN General Assembly, hence setting the timeframe for developing the GAP. For CSOs, this meant that they had to act quickly if they wanted to engage in opinion-building. Organizing such a disparate group of actors, however, requires resources and above all a coordinating body with the ability to engage, assess and lead. Since the GAP appeared as an item on the agenda for the January 2019 meeting of the WHO's Executive Board, civil society held a strategic meeting in New York in December 2018, organized and supported by the Civil Society Engagement Mechanism of the International Health Partnership for UHC2030 and the Global Fund Advocates Network. Shortly afterwards, in February 2019, the Civil Society Engagement Mechanism established an advisory group of civil society and community representatives to focus the work of civil society on the GAP. The advisory group had the two-fold mission of collecting input and offering itself as a leading voice of civil society, which worked quite effectively, at least for building and voicing the opinions of CSOs.

On the level of formal engagement, with respect to the very tight timeframe, it seems that the WHO and the other GAP organizations had not planned a consultation process. However, especially when CSOs advocated for a public consultation, the WHO consented to hold it—albeit at very short notice and only for an extremely limited period (WHO, 2019b). Nevertheless, civil society was able to influence the agenda-setting process and submit its input subsequently. But did CSO participation also meet the 'gold standard' of influencing decision-making? Here, the picture is unclear. The WHO published a compilation of all submissions in the consultation (WHO, 2019c), highlighting which feedback "was taken into account in the development" of the GAP (WHO, 2019a, p. 11), including issues raised by CSOs. However, this was done only in September 2019, when the GAP had already been scheduled for release. Therefore, it is unclear if and to what extent the input of CSOs had an impact while the GAP was being finalized.

Nevertheless, on paper, the frequency of interaction on all levels of participation in the 'constitution phase' of the GAP seems remarkable (see third column of Figure 2). Still, there are CSO representatives who are critical of the process and their relationship to the WHO as the organization leading the process (Haase & Eger, 2019; Schwarz, 2019). This criticism does not seem to be unfounded, since it was only due to the CSOs' perseverance that they were able to participate in this process at all. One could argue that it is quite indicative that the GAP document for the first phase only spelled out three commitments, i.e., align, accelerate, account; whereas after the somewhat enforced engagement with civil society, the final document also lists a fourth commitment: engage.

With respect to the quality of CSO participation, a one-day consultation which GAP organizations held in New York in April 2019 is informative. This consultation with non-state actors was limited to three out of seven accelerator themes with a focus on community and civil society engagement. The organizations that were able to attend were the 'usual' NGOs, like World Vision International, the International Planned Parenthood Federation or Save the Children, which are active in New York or able to travel there. In other words: The GAP organizations not only decided to limit the agenda. In addition, access to the event was based on available resources, which also narrowed the number of CSOs present. One could argue that although CSOs were able to participate, their participation was still not truly 'meaningful' since there was no reaction from the GAP organizations to the feedback from CSOs in the public consultation. Another indicator of this is the fact that while the Accelerator Discussion Paper 3 on Community and Civil Society Engagement lists 'contributions' from civil society representatives (UNAIDS & WHO, 2019) "civil society came on board only *after* the development of the accelerators and the discussion papers" (Koutsoumpa, Nsbirwa, Schwarz, Ssemakula, & Musoke, 2020, p. 16, emphasis added).

The second factor contributing to 'meaningful' partnership relates to accountability. In this early phase of implementation, one year after the release of the GAP, there are almost no mechanisms in place to make the GAP organizations accountable in a 'meaningful' way (compare lower field of Figure 2). The GAP organizations commissioned a Joint Evaluability Assessment, which was finalized in July 2020. Besides the need to agree on how to operationalize the GAP and "make it concrete" (York, Hofer, & Watkins, 2020, p. 13), the evaluators highlight the "distinct lack of clear accountabilities (and incentives) in the GAP partnership to ensure timely follow-up and actions once decisions are taken" (York et al., 2020, p. 14). Thus, it remains open who is in a formal position to demand information, i.e., to whom the GAP organizations are answerable. Therefore, CSOs do not know who to address even in their role as 'surrogates' or 'proxy' accountability-takers.

In May 2020, the WHO published an overview of the operating model of the GAP (GAP, 2020) in an attempt to specify how the GAP signatories should align to collaborate more closely at country level. The operating model defines various groups at different levels and assigns specific roles and responsibilities to them (cf. also WHO, 2020b, pp. 34–35). However, no information is available

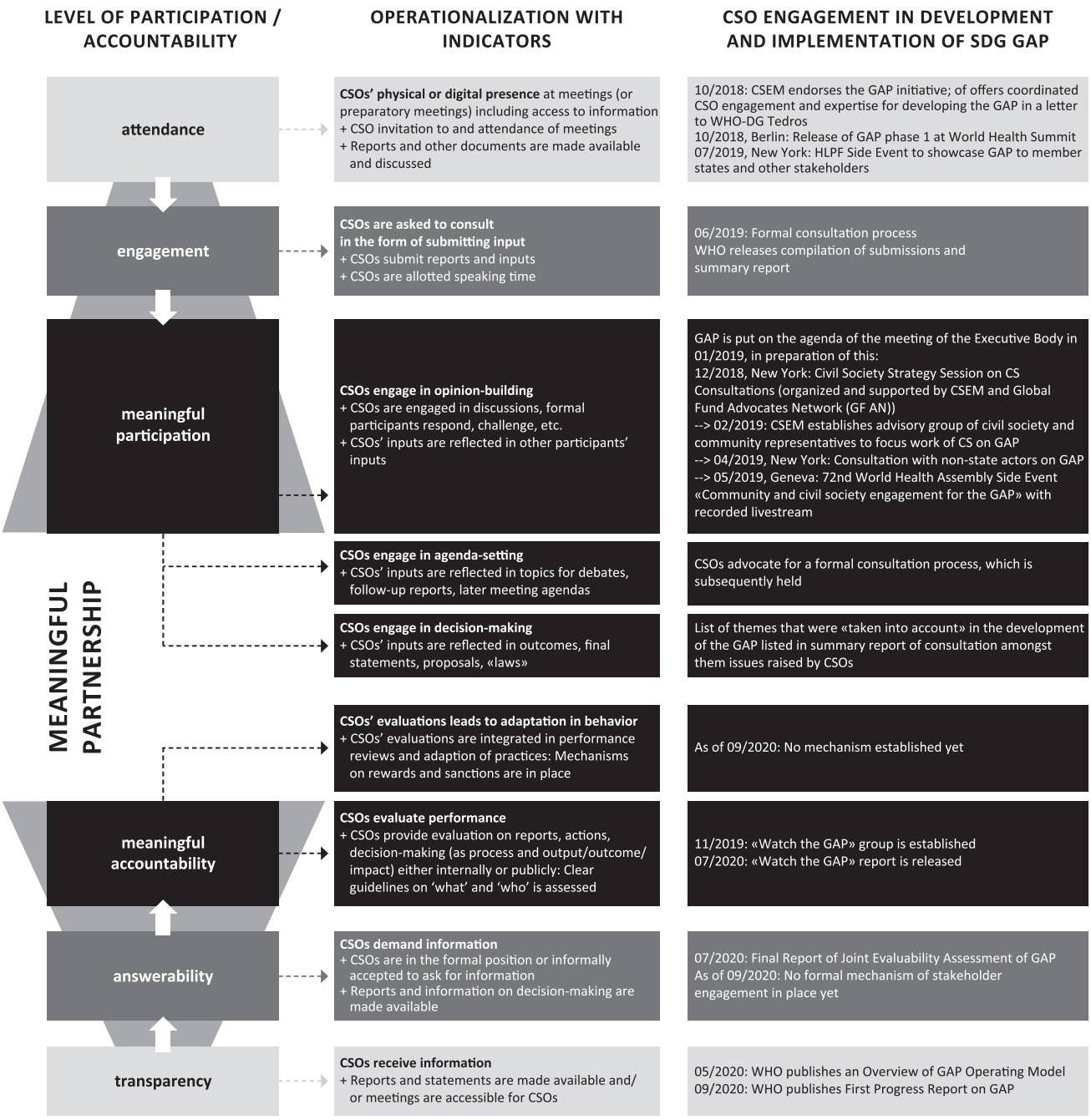

Figure 2. Assessing the 'partnershipability' of the GAP.

or accessible to civil society on the actual workings and proceedings of these groups. In September 2020, the WHO released a first progress report on implementation of the GAP over the year since its adoption (WHO, 2020b). In it, the GAP is characterized as an ambitious joint commitment that "promotes a cultural shift within the existing health architecture towards more purposeful and systematic collaboration among the 12 agencies and with countries" (WHO, 2020b, p. 1). This indicates that more internal barriers have to be overcome by the GAP signatories to achieve closer alignment of each organization's operations in selected countries. Increasing the incentives for stronger collaboration among the agencies is one of the challenges to implementing the GAP mentioned in the progress report. Engaging civil society and increasing transparency and accountability are others (WHO, 2020b, p. 45).

To enhance civil society engagement, the GAP agencies intend to collaborate with the Civil Society Engagement Mechanism (WHO, 2020b, p. 24), which acted as a successful mechanism for participation in developing the GAP. However, in November 2019, other sections of civil society established a Watch the GAP group, which published a first critical evaluation of the GAP in July 2020 (Koutsoumpa et al., 2020). Even without a formal mandate, civil society actors are already

scrutinizing the GAP. What is missing again, however, is GAP organizations' feedback on the civil society report.

In sum, there were several entry-points for CSOs during the process of developing the GAP, which allowed for interaction with the GAP organizations. Superficially, it seems that civil society was able to participate in a 'meaningful' way. However, from the perspective of civil society actors, the story reads somewhat differently: CSO participation created the appearance of legitimacy while inclusion of their voice was neither actively sought nor formalized. Civil society, as a group of actors that are under-resourced and overstretched in many ways, had to struggle to make itself heard. As far as accountability is concerned many important questions are still unanswered. If the inclusion of stakeholders is seen as critical for success, who then should be included and how? The GAP organizations are committed to reporting and monitoring. But to whom, and how can it be enforced? Are there any consequences for non-delivery? Furthermore, a broader discussion on roles and responsibilities of the GAP partners is lacking. To deliver results, the GAP organizations themselves see the need to enhance their ability to engage with stakeholders. As far as the standard of 'meaningfulness' is concerned, this relates particularly to reacting to CSO feedback in the process.

As the discussion of the GAP shows, there are opportunities and pitfalls associated with realizing the metanorm of 'meaningful' partnership. We will discuss these in our concluding section and sketch out some of the conditions for attaining 'meaningful' participation and accountability, as well as implications for future research on partnerships.

5. Conclusion

To better understand and assess the realities of multi-stakeholder engagement and CSOs' role therein, we proposed to think of 'partnership' not only as a form but also as a norm of metagovernance. This allowed us to focus on roles and relationships of actors in a partnership, understood as a process of governance. Therefore, we operationalized the concept of partnership according to different levels of accountability and participation, allowing for a gradual enhancement of the quality of partnership in terms of 'meaningfulness.' We applied our analytical model to the GAP, which is still in the making. This opens up the space to develop it further with a clearer notion of what might be necessary to make the partnership and engagement with civil society 'meaningful.' Even more so, since the GAP has gained traction as a role model for a crucial component of the current responses to the coronavirus pandemic, namely the *The Access to Covid-19 Tools (ACT) Accelerator* (WHO, 2020a).

The example of the GAP illustrates that with respect to participation, there is already a considerable amount of interaction between the formal members of a partnership and CSOs. However, since CSO participation remains informal, it was selective, in terms of permanence and spectrum of voices. The latter makes it very hard for formal members of partnerships to identify the 'right' CSOs to engage with. The current WHO process of engaging with civil society to develop a *Handbook on Social Participation for Universal Health Coverage* points in a promising direction of formalizing rules and procedures to make CSO engagement more transparent and less random (UHC2030, n.d.; WHO, 2018b). CSOs cannot act as 'proxy' accountability-takers if there are no mechanisms of accountability in place, and if no obligation for formal members to *react* to input provided by 'informal' participants exists.

Another observation worth emphasizing relates to the competition over resources and their allocation. Resources are scarce not only on the part of CSOs but also on the part of the GAP agencies. Making more resources available for all stakeholders in multi-stakeholder processes is somewhat illusionary. It seems more appropriate to identify stakeholders that have been 'left behind' so far. The question of defining who falls into the category of 'left behind' touches on a fundamental concern of global governance: What should just and fair governance look like, and who has the authority to set the normative standards for appropriate behavior? 'Leave no one behind' is a central principle of the 2030 Agenda and the SDGs. Therefore, in order to achieve the SDGs, it is essential to identify stakeholders and groups who are left behind. Within the multilateral framework of the United Nations, "'leaving no one behind' not only entails reaching the poorest of the poor, but also seeks to combat discrimination and rising inequalities within and among countries, and their root causes" (UN System Chief Executives Board for Coordination, 2017, p. 31). Subsequently, this framework was operationalized for UN country teams (UN Sustainable Development Group, 2019): However, identifying those who are 'left behind' in practice always takes place in a setting with political, socio-economic or cultural struggles over power and resources at country, regional or global levels of governance.

Finally, we would like to highlight another implication of our discussion: Conceptualizing partnership as metanorm, and assessing the GAP accordingly, opens up new possibilities to put partnership and the GAP's partnershipability into (historical) perspective and to draw lessons from other examples. Although the GAP is hailed as a new and innovative form of partnership, earlier attempts to formalize and institutionalize cooperative relationships in global governance are manifold. For instance, in the field of development cooperation and health cooperation, the 'aid effectiveness norm' was endorsed at summits and assessed through ensuing monitoring processes between 2005 and 2011, leading to the Global Partnership for Effective Development Cooperation (Abdel-Malek, 2015; Barnes & Brown, 2011). The goal was to establish a global partnership promoting recipient countries' ownership by

harmonizing and aligning donor practices and enhancing mutual accountability. Civil society was integrated only later in the process, due to CSO pressure. Subsequently, CSOs were successful in establishing a rather prominent position in the Global Partnership for Effective Development Cooperation. Even though the norm has "declined and potentially died" (Brown, 2020, p. 1230), the GAP terms and language are reminiscent of the aid effectiveness vocabulary in many ways. Further research on earlier and current alternative forms of 'global partnerships' and their level and quality of participation and accountability seems promising to identify obstacles to 'meaningful partnership' as a metagovernance norm in a comparative and more systematic way.

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Conflict of Interests

The authors declare no conflict of interests.

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Article

Scientific Knowledge Integration and the Implementation of the SDGs: Comparing Strategies of Sustainability Networks

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Abstract
Although there is a broad agreement on the importance of scientific knowledge for the implementation of the Sustainable Development Goals, high levels of uncertainty and debate about what counts as knowledge challenge the use of research for political decision-making. Hence, the question arises, which strategies of scientific knowledge integration are adopted by science-based actor-networks that seek to enhance evidence in sustainability governance. In this article, I study the Sustainable Development Solution Network (SDSN) engaged in different institutional settings and policy fields. With a qualitative document analysis, I compare the overall structure, objectives, thematic focus, formal knowledge processes, and outputs of 22 national sub-networks of the global SDSN in order to elucidate how these initiatives integrate contested sustainability knowledge underpinning the implementation of the 2030 Agenda. My findings suggest that most SDSNs adopt solution-oriented knowledge integration strategies but also that networks in countries with better overall SDG performance tend to adopt assessment-oriented and learning-oriented strategies. In reflecting on these results in the context of the current literature on knowledge integration in sustainability governance, I argue that science–policy interfaces are shaped by the intentional and dynamic interactions of actors within their institutional setting and policy environment, and propose pathways for further research.

Keywords
expertise; global actor networks; knowledge integration; knowledge networks; SDG; sustainable development; sustainability governance

Issue
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1. Introduction

Understanding how scientific knowledge integration can contribute to the implementation of the 17 Sustainable Development Goals (SDGs) has become increasingly important due to widespread uncertainty and ignorance in sustainability governance (Schneider et al., 2019; United Nations, 2019). 'Scientific knowledge integration' describes the reciprocal and dynamic processes by which scientific research is coupled with political interests and demands from stakeholders in a certain political environment generating outputs that may inform political decision-making (Böcher, 2016, pp. 66–67). One major related challenge is ensuring that all relevant research perspectives and legitimate political interests are represented as knowledge integration occurs in a context of power relations (Böcher & Krott, 2016; Turnhout, 2018) and deals with complex sustainability problems (Mielke, Vermaßen, & Ellenbeck, 2017; SAPEA, 2019). Furthermore, it is highly contested whether sustainability research only encompasses scientific knowledge, which is based on scientific theories and methods, or also transdisciplinary and non-scientific (e.g., indigenous) knowledge (Clark, Kerkhoff, Lebel, & Gallopin,

2016; Hirsch Hadorn, Bradley, Pohl, Rist, & Wiesmann, 2006; Jasanoff, 2016).

Against this background, new actors have emerged in order to tackle these challenges and improve scientific knowledge integration in sustainable development governance (Kalafatis, Lemos, Lo, & Frank, 2015; McGann & Whelan, 2020; Schmalzbauer & Visbeck, 2017). In particular, sustainability knowledge networks, such as the FutureEarth Network, the Global Environmental Outlook, or the United Nations Knowledge Platform, have the objective of fostering the exchange between science and political interests for more effective and informed sustainable development governance. Due to their transdisciplinary and transnational structure, they differ from international organizations and epistemic communities, which have traditionally been analysed regarding knowledge processes in global sustainability governance (Sending, 2019). These complex actors are determined by prevailing power structures and therefore adopt different strategies in different regional contexts. However, through their strategic interaction to improve scientific knowledge integration, sustainability knowledge networks inevitably contribute to new power relations which may inadvertently lead to new challenges for informed sustainability governance.

Taking these dynamics as a starting point, this article seeks to contribute to critical reflection on scientific knowledge integration in sustainable development governance by examining how new sustainability networks understand and organize scientific knowledge integration processes. For that purpose, I am operationalizing 'scientific knowledge' in a broad sense that encompasses diverse forms of sustainability research. Although initial studies have analysed how global networks interact at the science–policy interface to translate scientific knowledge for tackling 'wicked problems' in general (e.g., Weber & Khademian, 2008) and SDG governance challenges in particular (e.g., Van der Hel & Biermann, 2017), the following question remains unanswered: Which strategies to scientific knowledge integration are adopted in different contexts characterized by diverse institutional settings and sustainability challenges?

In this study, I explore scientific knowledge integration processes focusing on the global Sustainable Development Solution Network (SDSN) and its subnetworks. The global SDSN comprises 36 national and regional sub-networks working on diverse SDG issues (as of November 2020). It was established in 2012 under the auspices of the United Nations Secretary-General to promote integrated approaches to implement the SDGs and the Paris Agreement through education, research, policy analysis, and global cooperation. Although its approach to 'actionable scientific knowledge' and problem solving is gaining increasing prominence with growing numbers of sub-networks and members, "The type and form of solutions coming from science are generally not specified [and] science institutions differ substantially with respect to actor groups that they claim to represent'' (Van der Hel & Biermann, 2017, p. 217). Hence, examining the strategies of SDSN sub-networks in different institutional and political contexts can shed light on how sustainability knowledge networks are dealing with preexisting power relations as well as how they are defining new norms for controversial issues in scientific knowledge integration, i.e., regarding the sustainability focus of science-based policy advice, the definition and selection of sustainability science through their interaction orientation and stakeholder involvement in integration processes.

Based on a qualitative content analysis and manual coding of textual material published by national subnetworks of the global SDSN, I compare their structure, objectives, thematic focus, activities, and outputs in order to elucidate their strategies for scientific knowledge integration. In a second step, I examine the political environments and institutional settings defining the science–policy interface in which those national networks are based and compare that information with the strategies adopted by the networks. My findings suggest that most SDSNs adopt solution-oriented knowledge integration strategies but also that networks in countries with a better overall SDG performance adopt further assessment-oriented and learning-oriented strategies. Hereby, I explain the ways in which political contexts and the strategic interactions of knowledge networks are linked.

2. Analysing Scientific Knowledge Integration in Sustainability Governance

To operationalize the aim of this study, I draw on knowledge transfer theory explaining the production, translation, diffusion, and circulation of diverse forms of knowledge, including science, across different political actors, levels, fields, or institutional settings. Hence, it allows one to define scientific knowledge integration strategies in sustainability governance (Section 2.1) and the role of institutional structures (Section 2.2).

2.1. Strategies for Scientific Knowledge Integration for Sustainable Development

As the 17 SDGs of the Agenda 2030 intend to bring together different political positions regarding the contested concept of sustainable development, it is not surprising that various conflicts and incoherence exist across the SDGs (Breuer, Janetschek, & Malerba, 2019; McGowan, Stewart, Long, & Grainger, 2019) and, as a consequence, that actors in sustainability governance focus on different thematic priorities and social, environmental and economic objectives. At the same time, there is a broad consensus that the implementation of the SDGs and sustainable development more broadly require scientific knowledge to inform sustainability policies (United Nations, 2019).

Literature suggests that there are different 'frames' or 'cultures of evidence' for different thematic priorities (Lorenc et al., 2014; Sjöstedt & Kleinschmit, 2015). Accordingly, institutional structures and activities in one thematic area, such as energy, create specific opportunities and challenges for the integration of scientific and other forms of knowledge into policies, which might differ from those in other thematic areas. Against this backdrop, actors at the science–policy interface may focus on: (a) the implementation gap by assessing deficit requirements regarding specific sustainability goals; (b) SDG incoherences and priority-setting for sustainable development by analysing processes and instruments for the coordination of competing political interests; (c) independent sustainability research to inform policymaking; or (d) deliberation of the values underlying sustainable development (Zeigermann, 2020). This is categorized as sustainability focus in the present study and reflected in 'utilisation products' (Böcher & Krott, 2016, p. 34), that political actors may use for political decision-making. These 'utilization products' or outputs address different stakeholders, including (a) those actors related to a specific problem with recommendations and policy advice, (b) a more general political discourse through the communication and translation of science-based solutions for sustainable development, (c) an academic audience with independent analysis and interdisciplinary assessments, or (d) a general public with learning tools and deliberation approaches (Arnott, Neuenfeldt, & Lemos, 2020; Nederhand, Steen, & Twist, 2019). The orientation towards specific stakeholders is categorized as target groups of scientific knowledge integration processes in this study.

By 'scientific knowledge integration' I mean the reciprocal and dynamic processes by which 'bricks of knowledge' from scientific research are chosen because both researchers and practitioners consider them politically relevant (Böcher & Krott, 2016, p. 34). Evidence from scientific research is hereby translated and transferred as it is applied to different institutional and political contexts (Clark et al., 2016; Rawluk, Ford, Little, Draper, & Williams, 2020). At the same time, local experiences and interests of stakeholders for evidence-based solutions are selected and reformulated into new questions for academic research (Hirsch Hadorn et al., 2006; Mielke et al., 2017). This requires compromise and trade-offs regarding the impact of scientific research and practical demands for solutions to problems (Mielke, Vermaßen, Ellenbeck, Fernandez Milan, & Jaeger, 2016; Reed et al., 2009). Hence, at the centre of these scientific knowledge integration processes in sustainability governance are interactions of diverse actors from the research sphere and the political sphere. They seek to increase their authority through salience, legitimacy, and credibility (Cash et al., 2003, p. 8086). Accordingly, the interactions of actors are oriented towards specific stakeholders, which lead to different forms of cooperation with diverse 'allies' (Böcher & Krott, 2016, pp. 45–46), different forms of stakeholder engagement (Meadow et al., 2015, p. 183) and different approaches to authority in political processes (Cash et al., 2003, p. 8086). We can thereby distinguish activities that are: (a) oriented towards internal allies legitimizing integration outputs through recognized expertise, credibility and salience in a specific field; (b) oriented towards external allies in politics that contribute to timely problem-solutions through their participation; (c) oriented towards wise allies who are open to comprehensive scientific assessments, prognoses and (peer) review; and (d) learning allies who represent very diverse interests, participate in deliberation processes and can develop alternatives to current approaches to sustainable development (Böcher & Krott, 2016, pp. 50–52). This is operationalized as interaction orientation in the present study.

Summing up, we identify three main categories that provide us with the first part of a conceptual basis to examine the strategies of sustainability knowledge networks: (a) sustainability focus; (b) target-groups; and (c) interaction orientation. These elements are reflected in the objectives, thematic priorities, activities, structures, and outputs of actors at the science–policy interface. This framework is grounded in the RIU model for scientific knowledge transfer (Böcher & Krott, 2016) merging the attributes 'orientation towards public goals' and 'relevance in regard to political processes' of scientific knowledge integration (Böcher & Krott, 2016, pp. 50–52) into the category 'sustainability focus' of sustainability knowledge networks according to my research interest.

2.2. Scientific Knowledge Integration Processes Embedded in Institutional Structures

Given the multiple strategies for scientific knowledge integration, the objective of this study is not only to identify dominant strategies in different sustainability knowledge networks but also to examine the role of the institutional setting and policy environment. Although all countries agreed to the 17 SDGs in the United Nations General Assembly in 2015, they defined different priorities in their national sustainability strategies. They also vary in their efforts and performance in implementing these goals at the regional and local levels (Sachs et al., 2020). Furthermore, there is variation in the state of a country's democracy and governance, including, in particular, the extent to which citizens are able to participate in the selection of their government and express their interests in political decision-making through guaranteed rights and freedoms.

Considering that rational interactions of actors may influence institutional settings, while institutions and political environments also influence actor interactions (Scharpf, 1997), these prerequisites determine actor constellations and decision-making processes, including stakeholders and allies in sustainable development governance as well as the role that science plays in society

and politics. In other words, drawing on the concept of 'bounded rationality,' actors are assumed to act rationally within the boundaries of their capabilities (structural limitations) and available information (cognitive limitations; Scharpf, 1997). They seek to maximize the impact of their interaction at the science–policy interface and contribute to sustainable development through enhanced interaction between science and politics. Their political environment determines the boundaries of their interaction and can therefore be seen as a factor contributing to specific strategies to scientific knowledge integration processes across different countries (Ladd & Ward, 2002). Actors are likely to not only place different emphasis on disciplinary and interdisciplinary scientific knowledge that is based on recognized academic standards and methods (in contrast to or in combination with experiential knowledge and transdisciplinary research) but they may also face different challenges for scientific knowledge integration. Institutional settings and the policy environment may therefore both promote and hamper the ways in which scientific knowledge is transferred and used in political decision-making processes.

Taken together, these theoretical considerations highlight the importance of studying strategies of actors for scientific knowledge integration in relation to their political environment. This is an important gap in the literature as studies have—to my knowledge—focused so far either on strategies for scientific knowledge integration in sustainability governance (Cash et al., 2003) or on scientific knowledge integration processes more generally in different institutional and political contexts (Do, Krott, & Böcher, 2020). The objective of this article is to add to the literature on scientific knowledge integration by combining these two perspectives with an empirical study.

3. Research Data and Methods

This article undertook a structured comparison of 22 national knowledge networks engaged in governance processes for sustainable development in diverse political environments, with data collected from March 2019 until August 2020. As defined in the introduction, these networks are understood as complex actors at the science–policy interface, which adopt different strategies for scientific knowledge integration (cf. assumption of bounded rationality) in different political contexts (cf. assumption of interrelationship between actors and institutions).

3.1. Case Selection

While research has traditionally assessed scientific knowledge integration processes in global sustainability governance of international organizations (Siebenhüner, 2008; Zeigermann & Böcher, 2019) and epistemic communities (Carayannis, Pirzadeh, & Popescu, 2011; Haas, 2015), sustainability knowledge networks are particularly relevant for empirical analysis as they represent new actors at the science–policy interface. They can be understood as complex actors with a formal and institutionalized structure. Their main objective is to increase the exchange between scientific research and political interests and to promote science-based political decision-making for sustainable development. For that purpose, they interact with a diverse range of sustainability researchers and political actors in different political contexts (Van der Hel & Biermann, 2017; Zeigermann, 2020), which makes them a relevant research object for the study of strategies at diverse science–policy interfaces.

In order to add to existing research on global sustainability knowledge networks (Lahsen et al., 2013; Sending, 2019), this study focuses on the SDSN, which epitomize the new networks seeking to mobilize sustainability research for developing solutions for the implementation of the SDGs through their cooperation with political actors (Van der Hel & Biermann, 2017; Zeigermann, 2020). It is characterized by a formal global structure comprising 25 national sub-networks, working in different political environments. The formally independent and yet closely connected sub-chapters of the global SDSN represent a great variety of socio-economic environments, in which the political commitment to and realisation of the SDGs is very different. In particular, the varying SDG performance provides for a different political environment in which the national SDSNs interact at the science–policy interface. Among these 25 national networks, 22 were selected for this analysis. Three national SDSNs (SDSN Kenya, Thailand, and Cyprus) were excluded from the analysis as they were only founded in 2020 and the available information was not sufficient for a systematic comparative analysis. This case selection allows us to find out whether different strategies to scientific knowledge integration are adopted by the national sub-networks in their respective political environments to contribute to common overall objectives of the global SDSN.

The coloured countries in Figure 1 represent the 22 SDSN sub-networks and the SDG performance of their political environment in order to highlight their diverse contexts. Differences regarding the implementation of the SDGs can be determined by assessing the information provided in the 2020 Sustainable Development Report (Sachs et al., 2020), the *Sustainable Development Goals Report 2020* (United Nations, 2020), and SDG Country Profiles as presented in the United Nations Stats Hub. Those countries classified among the 'top 20' in the SDG ranking are generally considered to be those with a high SDG performance, although this ranking only reflects available information at a very high level of aggregation, which might obscure sectoral or regional differences. Similar limitations need to be taken into account and critically reflected in definitions of national governance systems. Yet, indicators, like the Human Development Index or Country Profiles and Governance Indicators from the World Bank and The Global State

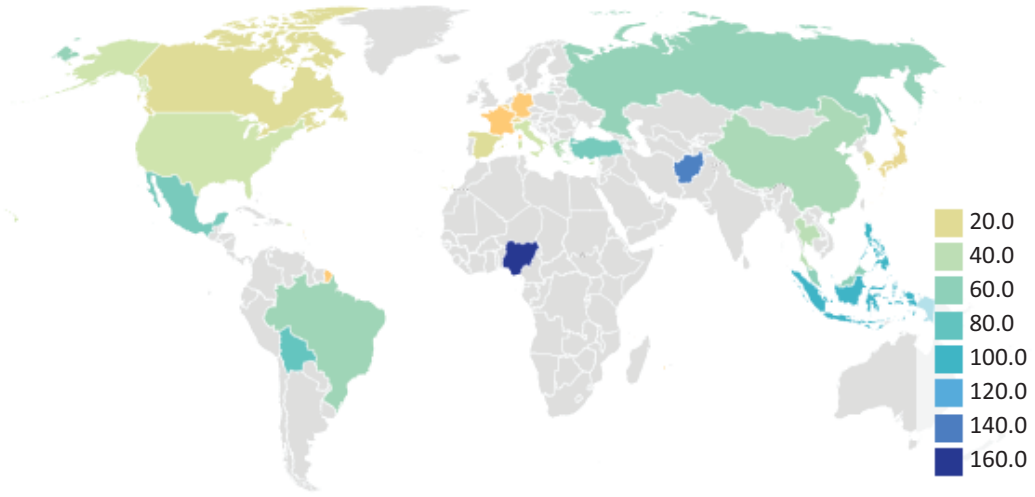

Figure 1. National SDSNs around the world coloured according to their SDG performance. Notes: SDG ranking as presented in Sachs et al. (2020). Colours represent SDG ranking of 193 states (1-20 being the best). Map: Created with Datawrapper based on information on national SDSNs from the global SDSN website, 2020.

of Democracy Indices provide valuable aggregated information based on quantitative data, that can be used to compare countries in terms of their level of democratic decision-making and also in regard to capabilities of actors to influence science–policy interaction.

3.2. Data Collection and Qualitative Content Analysis

For the empirical study of scientific knowledge integration strategies across 22 national SDSNs, a structured qualitative analysis of documents was undertaken using the software MAXQDA in order to identify the perception the SDSN has of their own strategy (by studying objectives and structures as presented by the networks). This approach allows one to understand the thematic priorities and orientation of activities (i.e., by studying the outputs and action reports of the networks). Accordingly, I analysed documents produced by the 22 national SDSNs, such as SDSN Networks in Action Reports (2017–2019), audited financial statements (2016–2019), and formal information on the global SDSN Association, as well as 54 monthly newsletters from the global SDSN and 37 websites from SDSNs and their host institutions. Published outputs since 2012, including reports, issue briefs, or policy papers on SDG issues, such as agriculture (10), cities (12), climate and energy (8), education (2), extractive and land resources (5), food and biodiversity (4), happiness (6), health (7), the SDG Academy (2), SDG financing (14), SDG Indices and Dashboards (25, overlaps), SDSN Youth (2), TReNDS in data and statistics (10) and the world in 2050 (3), provided an understanding of the activities of the different networks.

In order to examine which approach to scientific knowledge integration is adopted in a national SDSN network, I segmented the documents into relevant categories by making use of a systematic coding process (inspired by Kuckartz, 2010). According to my theoretical considerations, textual fragments were grouped into categories dealing with structure, objectives, thematic priorities and (intended) outputs (inspired by Sarkki et al., 2015). This factual information was then used to define the overall characteristics of a network in regard to its sustainability focus, target-groups and interaction orientation in regard to allies as defined in Section 2.1. I compared the similarities and differences across these 22 networks in order to identify groups of countries with similar strategies to scientific knowledge integration. This analysis served to identify the different strategies that are presented in Section 4.1. While such classification of overall groups necessarily requires abstraction and simplification from a more complex reality, it also allowed me to identify commonalities and differences across the different cases regarding their political context.

In order to analyse which strategies for scientific knowledge integration are adopted in different socio-economic and environmental environments, I compared the 22 cases by putting the findings regarding their chosen knowledge integration strategy alongside the cases' respective political context. More precisely, I compared the SDG performance and governance systems of the cases with similar scientific knowledge integration strategies. Although governance structures and SDG performance may differ across regions within a country or in regard to specific policy areas, quantitative indicators (such as the Human Development Index and Governance Indicators from the World Bank or the Sustainable Development Report) provide a valuable characterisation of national political contexts, which is suitable for the objective of this study. It allows us to identify similarities and differences across networks that are embedded in diverse national political contexts, and it may also serve as a starting point for other in-depth analyses.

4. Comparing the Science: Policy Interface across SDSNs

With my empirical analysis, I can identify the strategies adopted in 22 sustainability knowledge networks to promote scientific knowledge integration in sustainable development governance: solution-oriented, assessment-oriented, and learning-oriented strategies (Section 4.1). In a second step, I will link the identified strategies of scientific knowledge integration to the political environment of the networks (Section 4.2).

4.1. Dealing with Contested Knowledge through Different Knowledge Integration Processes

National SDSNs generally emphasize that they seek to "translate the latest expertise in sustainable development into action" (United Nations SDSN, 2020). For that purpose, most hosting SDSN research institutes address external partners from public or private agencies, civil society or youth groups through participatory events and publications (e.g., workshops, forums, policy briefs, webinars). Such events allow them to collaborate, launch solution initiatives and localize support for the SDGs (cf. interaction orientation oriented towards external allies in politics that contribute to timely problem-solutions through their participation). However, while some networks primarily focus on external allies, other networks set other priorities and can therefore be classified as another approach to scientific knowledge integration.

The comparison shows that the networks in Afghanistan, Brazil, China, Russia, Malaysia, Mexico, Turkey, Bolivia, Philippines, Nigeria, and Indonesia target a more general political discourse through the communication and translation of science-based solutions for sustainable development to external partners. For instance, SDSN Malaysia stresses that it "aims to mobilize a community of experts and influencers to translate ideas and expertise into practical action towards the sustainable development for the country" (SDSN Malaysia, 2020). It works together with various stakeholders from all regions in Malaysia representing a variety of relevant sectors and has included nine of them in their Leadership Council to take on SDG responsibility and guide its work. While SDSN Brazil cooperates for that purpose notably with local partners from the Rio de Janeiro region, SDSN Mexico collaborates, among others, with the Mexican Government and the German Development Agency, and SDSN Turkey with the G20. Hereby, stakeholder communication through social media, formal and informal communicative channels play an important role. It serves to link SDG evidence in a timely and adequate manner with political processes, political priorities, and issues discussed in the national and international discourse. In that regard, SDSN Turkey has, for instance, contributed to the Istanbul Climate Action Plan; most SDSN networks have Twitter accounts to disseminate their output and to react to current political debates, and SDSN Russia has organized roundtables and workshops as well as academic papers to "translate the SDGs to the Russian context by providing top-notch research, boosting youth leadership, and engaging in a wide array of projects and partnerships to prepare the country for the achievement of the 2030 Agenda" (SDSN Russia, 2020). By engaging in those knowledge processes, the SDSN networks implicitly acknowledge that different stakeholders have different—often even conflicting—interests regarding SDGs. Hence, they propose SDG information and evidence-based solutions with a clear sustainability orientation that are discussed in relation to current political problems. More generally, they focus on SDG incoherences and priority-setting for sustainable development by analysing processes and instruments for the coordination of competing political interests. SDSN Bolivia states, for instance, that "the overarching objective of SDSN-Bolivia is to promote sustainable visions and solutions for long-term development in Bolivia" (SDSN Bolivia, 2020). It seeks to actively produce and share innovations on the SDGs across the different municipalities in Bolivia by providing data in an atlas, newsletters, a blog, tweets, and workshops on municipal SDG challenges, and with a strategic alliance with the Municipal Association of Bolivia. This approach to contested sustainability knowledge across different municipalities, sectors, and national contexts with practice-oriented innovations and strategic knowledge transfer with external allies can be seen as a solution-oriented approach to scientific knowledge integration.

While also supporting evidence-based solutions for sustainable development through activities that are oriented towards external allies and coordination of SDG incoherences, other national SDSN networks are pursuing different priority activities in order to develop science-based advice based on inter- and transdisciplinary assessments that systematically integrate scientific knowledge so as to represent a state-of-the-art in sustainability research. More precisely, their interaction is mainly aimed at *wise allies* who are open to comprehensive scientific assessments, prognoses and (peer) review. For instance, SDSN Greece adopts solution-oriented strategies as outlined above by establishing an SDSN EU Green Deal Senior Working Group for the Energy Transition which "will support the implementation of the European Green Deal and facilitate the participation of national stakeholders and local experts through SDSN's European networks to advise and provide support to the European Commission" (SDSN Greece, 2020) or by using its so-called 'systems innovation approach' to launch the Global Roundtable for Sustainable Shipping and Ports at the COP25 in December 2019 in Madrid. However, it has also established several assessment initiatives, such as the ReSEES which is made up of international research projects and publications produced by an interdisciplinary and international research team, diverse Horizon 2020 and other research projects

under the umbrella of Athena Research and Innovation Centre or the International Centre for Research on the Environment and the Economy (cf. sustainability focus on independent sustainability research to inform policy-making). Similarly, SDSN Spain, SDSN Italy, SDSN South Korea, and SDSN USA not only address the political discourse by translating scientific evidence into practical solutions, but they also offer scientific review and prognoses, including by producing Spanish, Italian, European, and USA City SDG Indices, and by participating in the Deep Decarbonization Pathways Project or, as for SDSN South Korea, by coordinating the Mid-Latitude Region Network, which promotes research activities particularly on Food-Water-Ecosystem resilience. Hence, their activities are mainly oriented towards an academic audience with independent analysis and interdisciplinary assessments. To summarize, these networks not only seek to foster sustainability solutions (solution-based approach) but they principally appeal to the academic discourse integrating different research perspectives and pursuing an assessment-oriented approach to contested scientific sustainability knowledge in politics.

Finally, there are those national SDSN that focus on learning processes through inclusive partnerships and deliberation of alternative sustainability solution pathways, norms, and interests for SDG governance in addition to promoting evidence-based sustainability solutions. They primarily focus on the deliberation of values underlying sustainable development. The open target-group orientation towards learning tools and processes can be illustrated in the transdisciplinary working group structure; the development and deployment of the Sustainability Literacy Test (Sulitext) in SDSN France; the emphasis on dialogue and cooperative formats by SDSN Germany which also contributes to the German Science Platform Sustainability 2030; or the fact that SDSN Switzerland noted in its objectives that it seeks to "shape multistakeholder dialogue [by accelerating] continuous exchange of ideas and experiences and create thinking spaces for the scientific community, government, business and civil society to foster systemic solutions, build commitment and mobilize action" (SDSN Switzerland, 2020), with its Circular Resources Lab. In order to promote learning among diverse stakeholders for SDG implementation, SDSN Japan has, for instance, developed Guidelines for multi-stakeholder partnerships to implement the 2030 Agenda in Asia and the Pacific (SDSN Japan), and SDSN Canada has built a "pan-Canadian network of post-secondary institutions, civil society, and others, to facilitate *learning* and accelerate problem solving for sustainable development" (SDSN Canada, 2020). In other words, their interaction is primarily aimed at learning allies who represent very diverse interests, participate in deliberation processes and can develop alternatives to the current approaches to sustainable development. To summarize, while it is not surprising that all national SDSN networks seek to contribute to science-based sustainability solutions (Zeigermann, 2020), it is important to note differences in national priorities across the networks.

4.2. The Role of the Policy Environment for Knowledge Integration Processes in SDG Governance

Looking at the diversity of knowledge strategies chosen by the analysed country networks, the question now is: Which factors account for this diversity? Many SDSN networks note in their so-called 'vision' that one of their main knowledge-related areas of work consists of mainstreaming SDGs by addressing institutional awareness (e.g., SDSN Afghanistan, 2020). Without explicitly referring to the institutional and political setting, networks note that they want to increase 'SDG awareness' and for that purpose, they not only strive to bring multiple public and private stakeholders together, but also to "translate knowledge on the SDGs into organizational processes" (e.g., SDSN Belgium, 2020); link their activities to "official SDG processes" (e.g., SDSN Indonesia, 2020); and "assist governments in identifying local, national, and regional sustainability challenges" (e.g., SDSN Russia, 2020).

The comparison across the cases with similar knowledge integration strategies, as presented in the previous section, shows that SDSN networks in countries with relatively stable and democratic structures (as measured in the 2019 Worldwide Governance Indicators) and relatively good sustainable development performance (as measured by their performance in the realization of the SDGs) are those that primarily pursue assessment-oriented and learning-oriented strategies for scientific knowledge integration. For instance, SDSN Switzerland, Canada, Germany, France, Belgium, and Japan with their learning-oriented strategies to scientific knowledge integration interact in a political environment characterized by relatively high implementation of the SDGs and overall political support for sustainable development by political actors (Sachs et al., 2020; United Nations, 2020). These countries are ranked among the top 20 (out of 193 countries) in the 2020 Sustainable Development Report. Spain, Italy, Greece, the USA, and the Republic of Korea, in which SDSN networks adopt mostly assessment-oriented strategies, are ranked among the top 50 (out of 193 states). According to the regional groupings of the United Nations (United Nations, 2020), countries that focus on assessment-oriented and learning-oriented strategies are attributed to the group 'Europe and North America' (except for Japan and South Korea; United Nations, 2020, p. 63). Both, the 2020 United Nations SDG report and the 2020 Sustainable Development report found that this group of countries is performing relatively well in terms of most SDGs but that challenges persist particularly in terms of SDG 13 (climate action), which addresses the ecological dimension of sustainable development. This relative lack of sustainability politics to tackle climate change reveals a structural problem of those countries from high-resource and high-consumption contexts, which thus make the

issue very hard to address. The assessment-oriented and learning-oriented strategies of national SDSN networks in Europe and North America, Japan, and South Korea indicate that these networks seek to foster scientific knowledge integration in sustainability politics therefore by appealing to wise allies and learning allies in order to contribute to sustainable societal change through understanding and learning based on scientific evidence. This also means to deliberate fundamental questions pertaining to the concept of sustainable development and to mitigate across conflicting political interests in problematic preexisting power structures that hamper, for instance, effective climate action.

Hence, stable democratic institutional settings in countries (especially possibilities for political participation of multiple stakeholders and political accountability as assessed in Voice and Accountability Percentile Rank of the Worldwide Governance Indicators; economic prosperity, education and well-being as assessed in the Human Development Index) seem to enable assessment-oriented and learning-oriented strategies to scientific knowledge integration that may contribute to fundamental political change towards sustainable development. In contrast, SDSN network in other relatively less open, inclusive, accountable, and less democratic countries (according to the Human Development Index and the Worldwide Governance Indicators) that are performing less well in terms of sustainable development and the implementation of the SDGs (Sachs et al., 2020; United Nations, 2020), have mostly adopted solution-oriented strategies which promise immediate effects through the support of powerful external allies in politics rather than long-term societal and political transformation. Hence, their interaction is mainly oriented towards political decision-makers and powerful private and civil society stakeholders (cf. 'external allies'; Böcher & Krott, 2016, p. 36) which can directly influence political decision-making through policy entrepreneurship (Brouwer & Huitema, 2018). Figure 2 illustrates that link between the political environment and strategies of national SDSN networks drawing on information from the 2020 Sustainable Development Report and the 2019 World Governance indicators. Patterns across national SDSN networks indicate correlations of the political contexts and scientific knowledge integration strategies.

In these diverse political contexts, national SDSN networks are engaged in different thematic fields, thereby adopting either a more explicit thematic focus (e.g., SDSN Belgium, SDSN Brazil, SDSN Canada, SDSN France, SDSN Greece, SDSN Malaysia, SDSN Nigeria, SDSN Philippines, SDSN Spain, SDSN Switzerland) or more general, knowledge integration-related priorities (e.g., SDSN Afghanistan, SDSN Bolivia, SDSN Germany, SDSN Italy, SDSN Japan, SDSN Russia, SDSN Turkey, SDSN USA). Thematic priorities are generally linked to the following policy fields: education, energy and climate, land-use and water, biodiversity, and urban development. As research institutions lead SDSN activities in cooperation with other partners, it is not surprising that educational activities, including summer schools, seminars, online learning courses, contributions to the SDG Academy, webinars, and research projects are among the

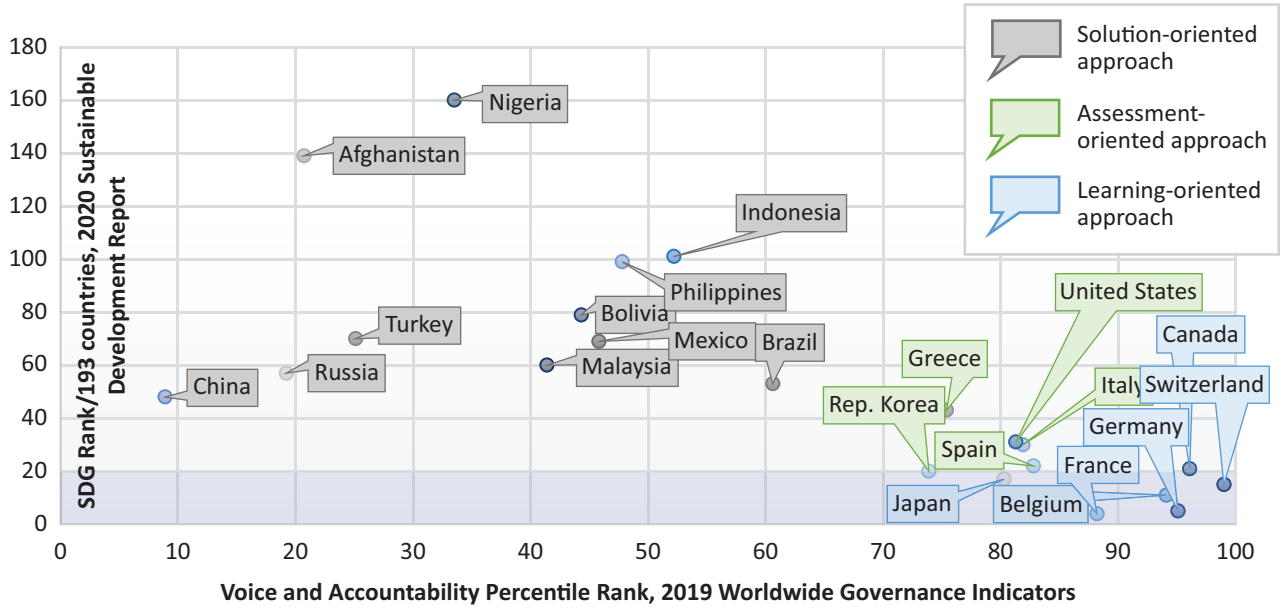

Figure 2. Knowledge processes of national SDSN networks in different policy environments. Notes: Country names represent SDSN networks. The SDSN networks marked in grey are those with a primarily solution-oriented approach to scientific knowledge integration. The SDSN networks marked in green stand out for their assessment-oriented approach and those SDSN networks marked in blue focus on a learning-oriented approach. Sources: 2019 Worldwide Governance Indicators (The World Bank, 2020), 2020 Sustainable Development Report (Sachs et al., 2020), findings from Section 3.1.

main activities through which national SDSNs seek to contribute to SDG knowledge production and transfer of sustainability evidence. As indicated before, other thematic priorities of a national SDSN network can often be linked to SDG challenges of a country (as identified in the annual Sustainable Development Report). For instance, SDSN Belgium explicitly focuses in its activities on climate change, energy, chemistry, and institutions, which can be related to the SDG challenges of the country (especially regarding SDGs 12, 13 and 14; Sachs et al., 2020).

5. Discussion of Findings

The comparison of 22 national SDSN networks has indicated that the 'solution-oriented' strategy to scientific knowledge integration, which was identified as the overall approach of the global SDSN (Van der Hel & Biermann, 2017; Zeigermann, 2020), varies across the sub-networks (see Table 1). This variation ranges from minor adaptation towards different strategies for knowledge integration in sustainable development governance. Hereby, my analysis adds to the literature on new actors at the science–policy interface (especially McGann & Whelan, 2020; Sending, 2019) showing that sustainability knowledge networks in countries with a better overall SDG performance and stable democracies tend to focus on assessment-oriented and learning-oriented strategies, whereas networks in other countries tend to adopt solution-oriented strategies (Table 1).

The typology of scientific knowledge integration strategies (Table 1) confirms previous studies on scientific initiatives in sustainability governance. At the same time, the 'advice-oriented' strategy as a more classical strategy for informing politics (Van der Hel & Biermann, 2017) could not be identified as a dominant approach of national SDSN networks. This indicates that the networks seek to advance new strategies that they consider to be more effective in regard to contested scientific knowledge integration in sustainability governance. At this point, it is important to note that this study does not assess the actual effects of strategic interactions of sustainability knowledge networks in national sustainability governance. However, in order to conduct such an analysis, which appears highly relevant regarding problematic and changing power relations at the science–policy interface in sustainability governance, it is necessary to identify and explicate dominant strategies in a first place. This was the purpose of my analysis.

Regarding the strategies presented in Table 1, it should also be emphasised that reality is certainly more complex than the three main strategies for scientific knowledge integration of the SDSN networks identified in my analysis. Developing a typology always requires a reduction in complexity and, while allowing one to gain a better overall understanding of the use of scientific knowledge in different political contexts for sustainability governance, there are also limitations to this study: First, the identification of an overall strategy of national SDSN networks was not always clear-cut, as their structure, objectives, thematic priorities, and outputs could sometimes be attributed to several thematic and analytical codes. Hence, additional information (e.g., from

Table 1. Scientific knowledge integration strategies in national SDSN networks.

Strategy	Solution-oriented strategy	Assessment-oriented strategy	Learning-oriented strategy
Sustainability focus	SDG incoherences and priority-setting for sustainable development by analysing processes and instruments for the coordination of competing political interests	Independent sustainability research to inform policymaking	Deliberation of the values underlying sustainable development
Target groups	A more general political discourse through the communication and translation of science-based solutions for sustainable development	An academic audience with independent analysis and interdisciplinary assessments	A general public with learning tools and deliberation approaches
Interaction orientation	Oriented towards external allies in politics that contribute to timely problem-solutions through their participation	Oriented towards wise allies who are open to scientific assessments, prognoses and (peer) review	Oriented towards learning allies representing very diverse interests and participate in deliberation processes
Examples	SDSN Brazil, Mexico, Malaysia, Bolivia, Philippines, Indonesia, Turkey, Russia, China, Afghanistan, Nigeria	SDSN Greece, South Korea, USA, Italy, Spain	SDSN Belgium, Canada, France, Germany, Japan, Switzerland

interviews) but also an adaptation of analytical concepts with a more nuanced analysis of the orientation of these networks towards political processes and intermediation might reveal useful information. Second, more scientific evidence from other sustainability knowledge networks engaged in different political contexts is needed to critically assess my findings in light of information derived from a broader database. Future research may, for instance, consider adopting a network approach to disentangle the extent to which cooperation at different political levels and across different sectors takes place via sustainability knowledge networks. Third, studying scientific knowledge integration processes also requires a thorough analysis of the 'knowledge' (i.e., scientific evidence from certain disciplines, using specific methods and dominant theoretical approaches) used by actors at the science–policy interface rather than other scientific or experiential knowledge.

By analysing scientific knowledge integration activities and outputs of national SDSN networks in light of their political context, my study elucidates the relationship between sustainability knowledge networks and their institutional setting. It adds to the analysis of science-based actors in sustainability governance by adopting a novel approach inspired by the 'actor-centred institutionalism,' according to which actors and institutions influence one-another (Scharpf, 1997). I argue that broad acceptance of the role of (sustainability) science in political decision-making, of political sustainability goals and of democratic decision-making standards contribute to more inclusive scientific knowledge integration strategies, i.e., targeting a broad (inter- and transdisciplinary) academic audience and the general public through assessment and learning. In light of existing power structures, which may hamper sustainability governance, assessment- and learning-oriented strategies of actors at the science–policy interface can potentially increase the salience and legitimacy of sustainability science, and of the implementation of the SDGs more broadly, by transparently tackling underlying conflicting values, norms, and interests. Solution-oriented strategies, on the other hand, can contribute to the timely resolution of problems which may increase the general awareness of and support for sustainability. Hence, different priorities regarding scientific knowledge integration in sustainability governance as well as different capabilities of the networks may explain why the political environment and democratic structure of a country correlates with the strategic interaction of actors at the science–policy interface.

6. Conclusions

Widespread uncertainty and contestation of scientific expertise in sustainable development governance underline the importance of studying scientific knowledge integration processes. These processes are shaped by the interaction of actors at the science–policy interface (Böcher & Krott, 2014, 2016). The emergence of new sustainability knowledge networks will therefore influence the implementation of the SDGs that relies on balancing diverse political interests and sustainability knowledge. They are defined as complex actors with a formal transdisciplinary and transnational structure seeking to improve scientific knowledge integration in sustainable development governance.

This article highlights that the strategies of sustainability knowledge networks differ according to their specific political context. Although the qualitative research design does not allow for systematic assessment of causation or impact, it provides support that science–policy interfaces in countries are influenced by the intentional and dynamic interactions of actors who adapt to their institutional setting and political environment in order to increase their effectiveness (Cash et al., 2003; Clark et al., 2016; Lux et al., 2019; Meadow et al., 2015; Van der Hel & Biermann, 2017). As such, this article sets the foundation for future research studying the potential effects of sustainability knowledge networks on actor constellations, processes, and power relations at the science–policy interface in sustainability governance and on the implementation of the SDGs.

Conflict of Interests

The author declares no conflict of interests.

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Article

SDG Implementation through Technology? Governing Food-Water-Technology Nexus Challenges in Urban Agriculture

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Abstract
The 2030 Agenda for Sustainable Development emphasizes the importance of technology as a pillar for the implementation of the Sustainable Development Goals (SDGs). Technology innovation promises benefits especially for the implementation of SDG 2 to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Contributing to current debates on SDG implementation, technology innovation, and cross-sectoral governance, we argue that technology innovation carries both the potential to contribute to global goal implementation and the risk of posing new governance challenges. Applying a food-water-technology nexus (FWTN) perspective, we conduct a case study on an emerging technology in urban agricultural production in Germany. The technology connects the wastewater treatment system and the agricultural production system and projects the transformation of a conventional sewage treatment plant into a 'NEWtrient®-Center,' which draws the essential resources for urban hydroponic plant cultivation from municipal wastewater. Building on qualitative and participatory research methods, the study provides deeper insights into the governance implications of FWTN issues stemming from the emerging technology. The analysis shows that this technology has the potential to facilitate SDG implementation, but simultaneously fuels new sector interlinkages between water and food and policy demands that substantiate the need for more integrated policymaking to ensure the smart use of technology to reach the SDGs.

Keywords
cross-sectoral governance; food-water-technology nexus; Germany; participatory research method; SDG implementation; technology innovation; urban agriculture; wastewater treatment

Issue
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1. Introduction

The 2030 Agenda for Sustainable Development emphasizes the importance of technology as a pillar for the implementation of the Sustainable Development Goals (SDGs; UN Interagency Task Team on Science, Technology and Innovation for the SDGs, 2018). Technology innovation contributes to more effective global goal implementation, especially regarding the implementation of SDG 2 to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture (UN, 2015). According to the UN Conference on Trade and Development (2017), agri-food technologies address the four dimensions of food security, namely, food availability, access, supply, and utilization. Irrigation technologies can, for instance, increase food availability, post-harvest and agri-processing technologies can improve food accessibility, bio-fortification can make

food more nutritious, and climate-smart solutions such as early warning systems can mitigate food instability (UN Conference on Trade and Development, 2017). Innovative agri-food technologies also promise more efficient use and reuse of natural resources (Pigford, Hickey, & Klerkx, 2018). The development of treatment technologies for the safe reuse of water in agriculture is a topical issue (Helmecke, Fries, & Schulte, 2020). In several European countries, e.g., Greece, France, Spain, Italy, Portugal, and Cyprus, the reuse of wastewater for irrigation is common practice (Federal Environment Agency [UBA], 2018). To tap the potential of wastewater for agricultural production, research groups around the world are developing advanced wastewater treatment technologies, such as membrane bioreactors, membrane filtration, advanced oxidation, and ultraviolet disinfection (e.g., Lazarova, Asano, Bahri, & Anderson, 2013), as well as wastewater nutrient recovery technologies (e.g., Xie, Kyong Shon, Gray, & Elimelech, 2016).

This article contributes to current debates on global goal implementation, technology innovation, and cross-sectoral governance (Liu et al., 2015; Pradhan, Costa, Rybski, Lucht, & Kropp, 2017; Sachs et al., 2019). We assume that innovative technologies can contribute to SDG implementation, but simultaneously fuel new sector interlinkages and governance challenges (Schwindenhammer, 2020). Applying a food-water-technology nexus (FWTN) perspective, we conduct a case study on an emerging technology in urban agricultural production in Germany. The technology connects the wastewater treatment system and the agricultural production system. It projects the transformation of a conventional sewage treatment plant into a 'NEWtrient®-Center' which draws the essential resources for urban hydroponic plant cultivation from municipal wastewater.

Following the growing body of nexus studies that directly involve stakeholders in the research process (e.g., Cairns & Krzywoszynska, 2016; White, Jones, Maciejewski, Aggarwal, & Mascaro, 2017; Yillia, 2016), we apply qualitative and participatory methods. We address the following questions: How do FWTN issues arising from the emerging technology relate to existing sectoral policies? How are these issues perceived by policy actors? What are the implications for governance regarding SDG implementation?

This article develops as follows: We start by discussing sector interlinkages between food, water, and technology and current approaches to SDG implementation (Section 2). Then we introduce the FWTN perspective as the theoretical lens for the analysis (Section 3) and highlight the research methods (Section 4). We present findings on the governance implications of FWTN issues and indicate new cross-sectoral governance challenges and demands that substantiate the need for more integrated governance to ensure the smart use of technology in SDG implementation (Section 5). Finally, we discuss the added value of the analysis for research on global goal implementation and cross-sectoral governance (Section 6).

2. Food, Water, and Technology Interlinkages and Current Approaches to SDG Implementation

The SDG framework reveals a complex web of sector interlinkages that cause negative (trade-offs) and positive impacts (co-benefits; Nilsson et al., 2018). To ensure SDG implementation, sectoral issues like food, water, and energy cannot be considered in isolation. Most of the food produced today is processed, packaged, and transported over long distances, thereby increasing its energy and water footprints (Yillia, 2016). Water availability and use influence the food and energy sectors and are influenced by them (Martinez, Blanco, & Castro-Campos, 2018). While irrigation in agriculture improves crop yields (SDG 2), increases in agricultural production exacerbate water scarcity and aridity (SDG 6).

Current debates on SDG implementation stress the importance of nexus-based and localized approaches to global goal attainment. While nexus governance is promoted as a way to ensure governance actions that meet multiple SDGs in a coherent way (High-level Political Forum on Sustainable Development [HLPF], 2018; UN Environment Management Group, 2019), localizing the SDGs is discussed as a precondition for achieving them (Carmona-Moreno, Dondeynaz, & Biedler, 2018). The President's summary of the HLPF (2018, p. 13) stresses that progress could be leveraged through addressing the many interlinkages among the SDGs by taking into account the "land-food-water-energy-climate nexus." The localized approach to SDG implementation identifies the local scale as the place where "positive interlinkages amongst the SDGs are boosted" (Siragusa, Vizcaino, Proietti, & Lavalle, 2020, p. 9). According to the United Cities and Local Governments (2019, p. 18), localizing the SDGs includes defining, implementing and monitoring strategies at the local level for achieving global, national, and sub-national sustainable development goals and targets. Cities are regarded as influential "living labs" that develop innovative technologies and promote transformative actions to reach the SDGs (Siragusa et al., 2020, p. 5). The HLPF (2018, p. 7) stresses the importance of technology innovation as part of "bottom-up solutions" and to translate local research findings into policy actions for attaining the SDGs.

This analysis focuses on an emerging technology in Germany that promises benefits for SDG implementation by means of nutrient recovery and reuse and by providing a resilient urban plant cultivation system that is widely independent from changing temperature, water scarcity, or extreme weather events. Extreme weather events and the problems of water scarcity and aridity increasingly pose challenges for agricultural production. The emerging technology is particularly oriented towards SDG target 6.4 to "substantially increase water-use efficiency across all sectors and ensure sustain-

able withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity" (UN, 2015, p. 23) and SDG target 2.4 to "ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production…for adaptation to climate change, extreme weather, drought, flooding and other disasters" (UN, 2015, p. 19). The emerging technology projects the transformation of a conventional sewage treatment plant into a 'NEWtrient®-Center' which draws the essential resources nitrogen, phosphorus, potassium, CO_2, and heat for urban hydroponic plant cultivation from municipal wastewater. The technology is the first of its kind and is going to be applied in a model plant with a production capacity of 40 tons of vegetables per year at the sewage treatment plant 'Emschermündung' in Dinslaken (North Rhine-Westphalia). The technology is currently being developed by 15 partner institutions in the joint research project 'SUSKULT,' coordinated by the Fraunhofer Institute for Environmental, Safety, and Energy Technology and funded by the German Federal Ministry of Education and Research.

3. Conceptualizing the Food-Water-Technology Nexus

This study focuses on the governance implications of the emerging technology through the theoretical lens of nexus research. We assume that connecting the wastewater treatment system and the urban agricultural production system does not only provide benefits for SDG implementation; it is also likely to raise new cross-sectoral governance challenges and demands.

Classical nexus research provides a valuable theoretical perspective for analyzing synergies and tradeoffs between sectors and how resource systems are managed (Weitz, Strambo, Kemp-Benedict, & Nilsson, 2017). It conceptualizes sector interlinkages as the result of wider transformational processes, such as climate change, urbanization, global trade, and context-specific conditions, such as governance frameworks and cultural beliefs and behaviors (FAO, 2014).

While classical nexus research provides added value for accessing and synthesizing large scale quantitative data on the intersection of various resource systems (Yillia, 2016), it neglects nexus governance implications (Weitz et al., 2017). Even though classical nexus research addresses enabling conditions for circular and restorative technical solutions across different sectors (e.g., wastewater to fertilizer; Carmona-Moreno et al., 2018) and related investments in research, development, infrastructure and planning (UN Environment Management Group, 2019), explaining barriers to achieving policy coherence and integrating different and sometimes competing demands into cross-sectoral governance remain research challenges (Endo, Tsurita, Burnett, & Orencio, 2017).

Building on recent nexus studies that heed the governance implications of sector interlinkages and the importance of stakeholder engagement (e.g., Weitz et al., 2017; White et al., 2017; Yillia, 2016), we apply a FWTN perspective. We seek not only to understand how resource systems are physically interconnected but also how and with what policy effects they are interlinked (White et al., 2017). Following Yillia (2016), we assume that the emerging technology creates a FWTN that interacts with existing food and water policies and contextually interconnects with issues such as people's values, habits and livelihoods.

The FWTN perspective has some merit: First, it broadens the empirical focus of classical nexus studies, which show unequal interest in different nexus dimensions. Due to their perceived importance for economic growth and sustainable development, energy and climate change are more in the spotlight than the dimensions water and food (Yillia, 2016).

Second, it allows conceptualizing technology innovation as a context-specific issue. Different policy systems entail specific environmental, socio-economic, and institutional conditions. Depending on such conditions, policy goals and strategies can vary (Yillia, 2016). While some contexts provide mandates or infrastructures to address FWTN issues in an integrated manner, others are still promoting sectoral policymaking.

Third, it sheds light on policy conflicts and debates over nexus issues (Weitz et al., 2017). Nexus issues result from the commitment of policy-entrepreneurs who strategically raise awareness of policy issues, tap institutional potential, and (re)define policies as issues of political concern (Schwindenhammer, 2017). Since different entrepreneurs perceive different FWTN issues as important and campaign for different solutions, nexus interactions can become conflictual.

Fourth, it allows discussing nexus governance implications. FWTN issues require policies that exceed sectoral boundaries and administrative silos. Balancing policy tradeoffs necessitates integrated cross-departmental decision-making and planning and institutional interplay across sectors, levels, and jurisdictions (Yillia, 2016).

4. Methods

For this study, we conduct a case study, building on qualitative and participatory research methods. We derive empirical data from document and website analysis and add background information from five semi-structured expert interviews conducted between October 2019 and March 2020 with representatives from public administration, the water sector and food business (coded as I1–I5). We sampled the interviews to reduce randomness as much as possible. The sample includes principal protagonists from the public and the private sector that participate in local food and water governance and have privileged access to expert information.

Following the growing body of participatory nexus research (Cairns & Krzywoszynska, 2016; White et al., 2017; Yillia, 2016), we also directly involve policymak-

ers, consumers, local wastewater associations, as well as food and agribusiness actors in the research process. We conducted an online survey among project partners (n = 29) in September 2019 and a stakeholder survey at Justus Liebig University Giessen (n = 75) in December 2019. The online survey included a set of open and closed questions about the project partners' perceptions of the overall SUSKULT vision, related risks, and regulatory implications. The stakeholder survey was conducted in the context of an open lecture focusing on food consumption and transparency issues. After introducing the emerging technology, the audience was invited to participate in a written survey including a set of open and closed questions about individual motivations for food consumption and demands for food transparency and sustainability. Data assessment was carried out using the statistical software SPSS.

The findings on stakeholders' perceptions of FWTN issues derived from the surveys were complemented by two focused stakeholder discussions in September and December 2019. The discussions brought together selected experts in charge of local wastewater governance, food business, and sustainability initiatives that shared and discussed expert appraisals and experiences. The findings allowed for further specifying and prioritizing the FWTN research items related to the emerging technology.

5. Results and Discussion

5.1. Food-Water-Technology Nexus Issues Linked to Water and Food Governance

The empirical findings reveal that FWTN issues address and challenge water and food governance. Critical issues in water governance are the regulatory focus on surface waters and groundwater (Section 5.1.1) and lacking limit values for contaminants of emerging concern in water reuse (Section 5.1.2). Relevant issues in food governance are food safety and hygiene regulations as well as maximum levels for certain contaminants in foodstuffs (Section 5.1.3).

5.1.1. Water Governance Focus

Even though water governance frameworks address the issue of wastewater reuse, neither EU water governance nor German federal law comprehensively regulate the reuse of water in agriculture (Becker et al., 2017). This applies particularly to broader effects associated with the life cycle of the wastewater system as a whole (Yillia, 2016).

In European water governance, the EU Water Framework Directive (EU, 2000) stipulates that the chemical and ecological status of surface waters and the chemical status of groundwater must not be adversely affected. This has also to be ensured when treated wastewater is used in agriculture. The EU Groundwater Directive (EU, 2006a) stipulates that the introduction of hazardous substances into groundwater must be avoided or minimized. The EU Urban Wastewater Directive (EU, 1991; amended by EU, 1998, Commission Directive 98/15/EC) states that wastewater should be reused where possible while keeping environmental pollution to a minimum.

In Germany, the German Water Resources Act translates the requirements of the EU Water Framework Directive into the German context (Federal Republic of Germany, 2009), while the German Waste Water Ordinance further specifies the implementation of the German Water Resources Act regarding the requirements for discharging wastewater into water bodies (Federal Republic of Germany, 2004). German water policy focuses on the protection of water bodies. It regulates sewage treatment plants to limit their impact on the environment, focusing particularly on eliminating or reducing chemical concentrations in water bodies. Sewage treatment plants have to meet cleaning targets and adapt to requirements regarding the quality of the water bodies into which the treated wastewater is discharged (Neubert, 2003).

In May 2020, after several years of debate, the EU approved the new regulation on minimum requirements for water reuse (date of application 26 June 2023). The regulation addresses the issue of water scarcity, lays down minimum requirements for water quality and monitoring, and sets out key risk management tasks to guarantee that the reuse of treated wastewater in agriculture is safe (EU, 2020). Article 4 touches elements of the emerging technology since it defines minimum requirements plant operators have to comply with before treated wastewater can be used for agricultural irrigation (EU, 2020). However, the regulation only addresses conventional (soil-based) plant cultivation and ignores hydroponic cultivation systems. Hydroponic plant cultivation is critical and calls for a different regulatory focus. Depending on their composition, soils adsorb many pollutants from water. In hydroponic plant cultivation there is no soil and therefore no potential buffer between the plants and the water that can prevent the plants from absorbing pollutants.

All in all, existing water governance frameworks have a different regulatory focus (protection of surface waters and groundwater) thereby widely neglecting the resources available in wastewater for liquid fertilizer production. As yet, existing water governance frameworks only address conventional (soil-based) plant cultivation systems, not paying sufficient attention to soil-less plant cultivation systems (hydroponic).

5.1.2. Limit Values for Contaminants of Emerging Concern

Risks and governance of contaminants of emerging concern in water for reuse in agricultural irrigation are topical issues (Helmecke et al., 2020). In Germany, different groups of substances have been detected in wastewater,

such as pharmaceuticals, pesticides, or biocides, which need to be reduced in any case, but even more so when wastewater is used in agricultural irrigation (UBA, 2019). Currently, treated wastewater carries risks of contamination, e.g., with salmonella and bacteria (German Federal Institute for Risk Assessment [BfR], Federal Research Centre for Cultivated Plants [JKI], & Max Rubner-Institut [MRI], 2020) or pathogens, and of not having an adequate concentration of nutrients to allow successful plant production (Neubert, 2003).

When food is grown using treated wastewater, quality requirements have to be suitably high, especially regarding limit values for contaminants of emerging concern. A key aspect is to avoid health risks. With agricultural reuse of wastewater, the requirements for treated wastewater change regarding water quality, treatment, downstream usage, and monitoring of the process and quality (Drewes et al., 2018). Limit values for pharmaceuticals in wastewater are an issue of particular concern (UBA, 2014). These substances are discharged into wastewater not only by humans, but also through livestock farms and veterinary medicine. If treated wastewater is reused in agricultural production, there is a residual risk that plants do absorb pharmaceuticals and their metabolites from treated wastewater (Miller, Nason, Karthikeyan, & Pedersen, 2016). However, the risks posed by the consumption of the affected foods usually remain within the limits or below the threshold of toxicological concern of the European Food Safety Authority (EFSA; Prosser & Sibley, 2015; Riemenschneider et al., 2016).

The new EU regulation on minimum requirements for water reuse does not set limit values for contaminants of emerging concern. It only determines water quality requirements regarding E. coli, BOD5, TSS, and turbidity (EU, 2020, Annex I). It states that minimum requirements "do not preclude food business operators from obtaining the water quality required to comply with Regulation (EC) No. 852/2004 using, at a subsequent stage, several water treatment options alone or in combination with non-treatment options" and clarifies that "the primary responsibility for food safety is borne by the food business operator" (EU, 2020, p. 36).

5.1.3. Food Safety and Hygiene and Maximum Levels for Certain Contaminants in Foodstuffs

If food was grown applying the emerging technology, it would have to comply with food safety and hygiene regulations and legal limits for contaminants in foodstuffs. European food safety regulations and standards provide the legal framework for food production in the member states. The European General Food Law Regulation ([EC] No. 178/2002) lays down general principles and requirements of food law, establishes the EFSA, and specifies procedures in matters of food safety (EU, 2002). The main components of European food safety are the responsibility of entrepreneurs, traceability in the entire food chain, official food control, the precautionary principle, and independent scientific risk assessment, risk management and transparent risk communication to consumers (German Federal Ministry of Food and Agriculture [BMEL], 2018a). Implementation of food safety addresses the entire food chain under the slogan 'from field to fork' and connects different policy issues, e.g., contaminants, animal welfare, plant protection, food production and distribution, and food sector innovation (EFSA, 2012). The food safety responsibility of entrepreneurs implies that producers of food vouchsafe that it is safe for humans (BMEL, 2018a). Still, further clarification of responsibilities of actors involved in food production applying the emerging technology is needed.

According to Chapter VII(3) of the EU regulation on the hygiene of foodstuffs ([EC] No. 852/2004):

> [R]ecycled water used in processing or as an ingredient is not to present a risk of contamination. It has to be of the same standard as potable water, unless the competent authority is satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form. (EU, 2004, p. 21)

The German Food Hygiene Regulation explicitly refers to adverse effects on food caused by "human and animal excreta, waste, wastewater, cleaning agents, plant protection products, veterinary drugs, biocidal products or unsuitable treatment and preparation processes" (Federal Republic of Germany, 2016, p. 1).

The German Food and Feed Code authorizes the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) to prohibit or restrict placing foodstuffs which are exposed to contamination of air, water, or soil on the market (Federal Republic of Germany, 2005). According to Controls Regulation (EU) 2017/625 (replacing Regulation [EC] No. 882/2004), national enforcement authorities are to monitor compliance with "food and feed law, rules on animal health and welfare, plant health, and plant protection products" (EU, 2017).

Regarding the emerging technology, maximum levels for certain contaminants in foodstuffs are a critical issue. The EU regulation on setting maximum levels for certain contaminants in foodstuffs ([EC] No. 1881/2006) defines maximum levels for nitrate, mycotoxins, metals (lead, cadmium, mercury, tin), 3-monochloropropane-1,2-diol (3-MCPD), dioxins and dioxin-like polychlorinated biphenyls (PCBs), and benzo(a)pyrene (EU, 2006b). The As Low As Reasonably Achievable (ALARA) principle applies to substances, for which no fixed limit values or maximum levels in food have been set (BMEL, 2020a). The ALARA principle stems from the EU Council regulation laying down community procedures for contaminants in food ([EEC] No 315/93), which states in Article *2*(2) that contaminant levels shall be kept as low as can reasonably be achieved by following good practices at all stages of food production (EU, 1993). However,

existing regulations are too vague regarding contaminants that can potentially emanate when applying the emerging technology.

5.2. Food-Water-Technology Nexus Issues and Policy Demands

Public and private policy-entrepreneurs raise different demands regarding FWTN issues arising from the emerging technology. The analysis reveals dispute over FWTN issues within and between water and food sectors and across policy levels. Main debates are on the necessity, safety, and cost-efficiency of water reuse (Section 5.2.1), risk assessment and minimum quality requirements (Section 5.2.2), and food supply chain transparency as well as labeling (Section 5.2.3).

5.2.1. Debates on the Necessity, Safety, and Cost-Efficiency of Water Reuse

In Germany, policy actors dispute whether wastewater reuse in agriculture is necessary, safe, and cost-efficient (I1, I2, I5).

For a long time, policy actors in Germany called into question the necessity of using treated wastewater for irrigation in agriculture (I5; Teiser, 2018). They argued that Germany is not an arid country, and, because of climate and soil quality, comprehensive irrigation of agricultural land is necessary only in few areas (Teiser, 2018). Only the cities of Braunschweig and Wolfsburg use treated wastewater for irrigation regularly in agriculture. The two exemptions are justified by traditional practices and specific soil conditions that impact agricultural production (I5). In recent years, the problems of water scarcity and aridity are receiving growing political attention. According to current data from the World Resources Institute (2020), Germany is among those European countries that are increasingly affected by medium-high levels of water stress. There is growing public concern that—fueled by the impacts of climate change—available water resources in Germany will further decrease in the future, especially in hot and dry summer months (Heggie, 2020). The issues of aridity and drought are also perceived of as challenges for agricultural policy, especially because of the increased risk of crop failure (BMEL, 2018b). In 2018, the Nature and Biodiversity Conservation Union (NABU; 2018) criticized the German agricultural sector for not being sufficiently prepared for dealing with the impacts of climate change. According to the NABU, agriculture in Germany needs to become much more compatible with nature and the climate to ensure resilience to extreme weather events (NABU, 2018). In the light of growing concerns about water scarcity and aridity, the issues of wastewater reuse in agriculture and related treatment technologies are gaining more attention in Germany.

The safety of water reuse is contested (I5). In May 2018, the UBA, responsible for scientific risk assessments concerning water affairs, published a list of questions and answers on the EU's proposal for the new regulation on minimum requirements for water reuse (UBA, 2018). While the UBA (2018) criticizes the proposal as not reaching far enough to guarantee safe use of wastewater in agricultural irrigation, wastewater treatment plant operators emphasize how strict the requirements are and that wastewater treatment plants must be upgraded to comply with the limit values (I5). The UBA demands risks that potentially arise from water reuse be taken into account. It criticizes that pollutants which can exist in treated wastewater, e.g., disinfection by-products, micropollutants, and peri- and poly-fluorinated alkyl substances (PFAS), are not considered by the common minimum requirements (UBA, 2018). The UBA also stresses possible negative effects on the environment. Persistent substances can accumulate in the soil and enter the groundwater through wastewater reuse in agriculture (UBA, 2018). Since the new EU regulation impacts agricultural production in Germany, it is surprising that we cannot find any comments on wastewater reuse in agriculture by the BMEL. This seems to indicate a missing connection between food and wastewater issues.

There are also critical debates on the cost efficiency of water reuse in agriculture (I1, I2). Even though water reuse technologies can treat wastewater to nearly any needed quality, advanced treatment involves high costs (Helmecke et al., 2020). In 2018, the German Alliance for Public Water Management (AöW), representing public operators of water supply, wastewater disposal, and river basin management, published a position paper commenting on the EU's proposal for water reuse. AöW (2018) favors water reuse only for areas with high water stress. It argues that additional costs for upgrading sewage treatment plants to meet the necessary requirements for agricultural irrigation should not be the concern of the operators of the treatment plants (AöW, 2018).

Interview data and focused stakeholder discussions also reveal the importance of financial aspects for operators of sewage treatment plants, as well as shifts in their self-perception (I1, I2, I5). As yet, only a few operators see themselves as providers of nutrients usable in food production. Financial incentives, such as financial relief for closing resource cycles (I1), could be drivers for the conversion of conventional sewage treatment plants into NEWtrient®-Centers. Sewage treatment plant operators depend on the acceptance of consumers, who pay for wastewater disposal and, thus, try to keep costs low (I1, I2). If it benefitted them financially, operators would probably be more open to applying new technologies, e.g., regarding fertilizer production (I2).

5.2.2. Risk Assessment and Minimum Quality Requirements for Water Reuse

Policy actors in the EU and Germany stress the issues of quality requirements and risks of water reuse in agriculture.

In 2017, the EFSA, in charge of scientific risk assessment regarding European food safety, was requested to review a draft report from the Joint Research Centre of the European Commission on the development of minimum quality requirements for water reuse in agricultural irrigation. The EFSA (2017, p. 11) points to negative impacts on human and animal health, stressing that "contaminated irrigation water is certainly a possible, and sometimes likely, source of pathogen contamination of fresh fruits, vegetables, animal feed and pastures." The EFSA (2017) recommends assessing the importance of the microbiological quality of irrigation water on human or animal illness caused by a specific pathogen before a minimum quality requirement for a specific hazard can be established. The EFSA (2017, p. 14) differentiates food crop categories and recommends making explicit "whether the edible part of the product will or will not be in direct contact with the irrigation water."

In Germany, the AöW (2018) and the UBA (2018) target risks of water reuse in agriculture. It is surprising that, so far, BMEL has not raised the issue since it is in charge of food safety and risk management and stresses that consumers need to be able to rely on the fact that what they eat is safe and harmless to their health (BMEL, 2020b). In April 2020, the BfR, which is mandated to conduct independent scientific risk assessments for BMEL, published a joint statement with the JKI and MRI on the risks of treated wastewater for fruit and vegetables for raw consumption. The research organizations propose a new directive setting minimum quality requirements for treated wastewater for use in agricultural irrigation (BfR, JKI, & MRI, 2020).

Our own survey results further substantiate the relevance of the issues of risk and minimum quality requirements. Responding to the question of which risks stakeholders perceive as most significant regarding the emerging technology, they name risks to human health first, followed by technological, environmental, economic, and social risks.

5.2.3. Food Supply Chain Transparency and Labeling

Research findings reveal the relevance of debates on food transparency and labeling. Consumer research shows that, for German consumers, information on the origin and ingredients of food products is most important, followed by details on production and processing methods, and sustainability aspects (Nitzko, 2019). As yet, there is no labeling requirement in the EU for food products produced with treated wastewater. Thus, it is not transparent for consumers whether food has been produced or irrigated with treated wastewater (UBA, 2018). This is also criticized by policy actors from the water sector. AöW (2018, p. 3) states that it is "necessary for consumers to know, by means of appropriate labelling, which irrigation method was used in the production of agricultural products."

Our surveys reveal that stakeholders demand information about the emerging technology food production process, the safety of food products, risk control and management approaches, and benefits compared to conventional agriculture. The findings are confirmed by interview data. A food marketing expert underlined the importance of informing consumers about the new technology to create acceptance of the production process and potentially higher food prices (I3). Consumers are especially attracted to foods they can feel good about eating (I4). The emerging technology, thus, should produce "food products with a story" (I4), telling consumers how food from the new production process is more sustainable than that from conventional agricultural production (I1, I3).

5.3. Food-Water-Technology Nexus Governance Implications

Substantial and procedural policy adjustments are needed to facilitate the step-by-step transformation of conventional sewage treatment plants into resource suppliers for urban agricultural production. Empirical findings indicate that food safety standards will have to be adjusted to the new circumstance that food could be produced at sewage treatment plants in the future. Wastewater regulations will have to shift the focus to food policy issues (I5). Limit values for different contaminants of emerging concern are needed, because there is a huge difference between discharging treated wastewater into water bodies and recovering nutrients from wastewater for urban food production. There is also a need to realign regulatory responsibilities across sectors as approving and monitoring tasks of supervisory authorities—both food control and water authorities—will become much more complex (I1).

However, findings indicate that policy agents from the water and food sectors prefer working within their own sphere of control for now. There is a need to cross the lines of defined resorts and responsibilities. Water and food policies need to be more integrated to capture synergies, take advantage of complementarities, and avoid contradictions in regulatory efforts. These findings correspond with research on SDG implementation that stresses the importance of minimizing situations in which sustainability policies offset one another (Liu et al., 2015; Pradhan et al., 2017). Cross-sectoral governance should be implemented collaboratively by ministries of agriculture and forestry, environment, water and natural resources, fisheries and marine resources, and health (Sachs et al., 2019). Although interdepartmental, so-called inter-ministerial committees have been set up in Germany to deal with cross-sectoral issues that will pose challenges in the future, there is still room for maneuver.

6. Conclusion

Technology innovation is a cross-cutting component of the 2030 Agenda and an important pillar for the

implementation of the SDGs. This study shows that the emerging SUSKULT technology has the potential to facilitate SDG implementation in Germany. Simultaneously, it creates cross-sectoral interlinkages and policy demands that substantiate the need for more integrated governance to ensure the smart use of technology in SDG implementation. What can be achieved in SDG implementation through technology innovation from a nexus perspective depends on various factors: the context, the issues, the actors and capacities involved, the constructiveness of the dialog, the availability of information (data and knowledge), and the political will (Carmona-Moreno et al., 2018).

As a means of accelerating the achievement of the SDGs, starting from the bottom up seems to be a promising approach. Bottom-up solutions underline the important role of the local context for sustainability transitions. Innovative technologies like the emerging SUSKULT technology necessitate appropriate infrastructure and governance frameworks based on investments, information, and capacities at the individual, systems and organizational levels (UN Environment Management Group, 2019). Governing related FWTN issues involves appropriate urban design and planning. Regarding the implementation of SDG 2, cities are the ones to provide services, to promote healthy diets and healthy food environments, and to create procurement processes that consider the need for supporting the consumption of healthy and safe food with a low environmental impact (Siragusa et al., 2020, p. 41). Local governments can also actively promote sustainable urban agriculture practices both at the individual level and through community projects (Siragusa et al., 2020, p. 41). Regarding the implementation of SDG 6, cities are responsible for delivering drinking water and wastewater services and are called upon to further increase wastewater treatment and water use efficiency. Cities that play a leadership role in SDG implementation by means of technology innovation can create incentives for other cities to follow. As Johnson (2020, p. 435) rightly points out, there is a long tradition of cities learning from each other that offers opportunity for sharing experiences around how best to integrate nexus thinking into urban planning and design.

The bottom up perspective is necessary but will not be sufficient to ensure SDG implementation. Findings point to the need for identifying synergies between sectors, jurisdictions, and technology innovations at different governance levels (global, national, local). Ongoing policy debates about the reuse of wastewater and existing water regulations in the EU and Germany reveal a different regulatory focus (protection of surface waters, groundwater, and soil) and regulatory gaps, and are mainly sector-driven. They widely neglect the possibility of using recovered nutrients from municipal wastewater in urban agricultural production and, so far, only address conventional (soil-based) production. Technology innovation offers the opportunity to reflect on co-benefits between sectors and governance levels but it also reveals a number of new FWTN challenges, policy demands, and future research tasks. Achieving the SDGs by means of technological innovation requires governance frameworks that align global, national, and local strategies and allow for the development of shared understandings of FWTN challenges, especially with regard to the risks related to new technologies. Findings point to the need for new institutional arrangements that address FWTN issues, enable user ownership and cooperation, as well as broader societal participation. Despite the best institutional efforts, integrated governance also depends on changes in the self-conception of policy actors and their willingness to take on authority beyond sectoral logics. If food is produced in NEWtrient®-Centers in the future, wastewater operators will be part of the food production process, just like the food producers will become involved in the wastewater cleaning processes.

Finally, findings point to the issue of preventing technology development from losing sight of the public interest. Social sciences can create 'nexus forums' (Cairns & Krzywoszynska, 2016) where stakeholders discuss different understandings of FWTN challenges and offset power imbalances. The emerging technology is developed in a joint project where public and private sector actors, research institutions, and local stakeholders jointly advance cross-sector research and development. The participatory research approach allows feedback loops between theory and practice and participation of stakeholders in the development of research questions, concepts, and technologies. Stakeholder participation will considerably impact the implementation of scientific results to respond to global sustainability challenges and is likely to increase the future effectiveness and legitimacy of the emerging technology.

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Conflict of Interests

The authors declare no conflict of interests.

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Article

A New Generation of Sustainability Governance: Potentials for 2030 Agenda Implementation in Swiss Cantons

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Abstract
Governments and administrations at all levels play a central role in shaping sustainable development. Over the past 30 years, many have developed differentiated sustainability governance arrangements (SGAs) to incorporate sustainability into their governing practice. The 2030 Agenda for Sustainable Development, which the UN adopted in 2015, brings with it some significant conceptual shifts in sustainability thinking that, in turn, entail new governance requirements. Starting from practical calls for improved understanding of the requirements and conditions of 2030 Agenda implementation 'on the ground,' this article examines existing SGAs' potential to deal with the generational shift that the 2030 Agenda implies. To this end, four ideal-typical SGAs representing an early generation of sustainability governance at the subnational level in Switzerland are related to five specific governance requirements emerging from the 2030 Agenda. The analysis highlights different possibilities and limitations of the four SGAs to meet 2030 Agenda requirements and points to the need for context-specific reforms of first-generation sustainability governance in the wake of the new Agenda.

Keywords
2030 agenda; governance transformation; government; subnational level; sustainability governance; Sustainable Development Goals; Switzerland

Issue
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1. Introduction

Since the emergence and spread of the idea of sustainable development, governments and public administrations have been playing a central role in its implementation. In addition to pursuing specific sustainability goals through concrete sectoral policy action (e.g., energy and climate policies targeting greenhouse gas emissions), governments have become engaged in sustainability-oriented meta-governance (Meuleman, 2019; Meuleman & Niestroy, 2015). This involves making sustainability—including its specific characteristics, such as a long-term perspective or the integrated consideration of social, economic, and environmental dimensions—an orientation that permeates and guides all governmental and administrative actions. To this end, governments have developed manifold institutions and practices over the past 30 years, including administrative units responsible for sustainability, overarching sustainability visions and strategies, and sustainability impact assessments (Lafferty & Meadowcroft, 2000; Steurer, 2010). In concrete contexts, different institutions and practices together form complex sustainability governance arrangements (SGAs; Bornemann, 2014). With their focus on shaping the conditions for policymaking and governance along normative and functional

sustainability requirements, SGAs perform an internal sustainability-oriented meta-governance function geared toward 'sustainabilizing the government machinery' (Bornemann & Christen, 2019a, 2019b).

The 2030 Agenda marks a new milestone in the development of sustainability thinking and governance. For the first time in history, the international community has agreed on a global, long-term, comprehensive, and (relatively) tangible Agenda aimed at a systemic transformation of the world toward sustainability (Biermann, Kanie, & Kim, 2017; Kanie & Biermann, 2017). The new agenda entails several shifts in the understanding of sustainable development that carry implications for the interpretation and practice of sustainability governance (Bowen et al., 2017; Hajer et al., 2015; Meuleman & Niestroy, 2015). For example, it concretizes the normative quality of sustainability by defining 17 global Sustainable Development Goals (SDGs) and 169 targets, as well as accentuates the integrative claim of sustainability by emphasizing the systemic linkages of goals as a central element of sustainability (Boas, Biermann, & Kanie, 2016; Le Blanc, 2015; Nilsson & Weitz, 2019; Stafford-Smith et al., 2017).

While a wealth of experience already exists at the national level (see, e.g., Allen, Metternicht, & Wiedmann, 2018; Forestier & Kim, 2020; Tosun & Leininger, 2017), implementation of the 2030 Agenda still seems to be in its infancy at the subnational level (cf. Valencia et al., 2019). For example, in Switzerland, the national government plays a pioneering role in implementing the 2030 Agenda, whereas the cantons display only sporadic implementation efforts. Cantonal administrations are merely getting ready to begin considering the new Agenda in their actions. From several background conversations and interviews with administrative practitioners working in cantonal sustainability units, we know that they face the challenge of determining whether and to what extent they can rely on existing SGAs to implement the 2030 Agenda and how they should further develop these arrangements to prepare them for the new Agenda's specific requirements.

Motivated by this practical concern, this article examines present-generation SGAs' potential for implementing the 2030 Agenda by asking: To what extent are existing SGAs prepared to meet the new governance requirements of the 2030 Agenda? We address this question through an exemplary analysis of four ideal-typical SGAs that we identified in a previous study on sustainability governance practices in cantonal administrations in Switzerland (Bornemann & Christen, 2019a, 2019b). While these types of SGAs (problem-oriented, management-oriented, strategy-oriented, and network-oriented) are characteristic of the pre-2030 Agenda phase in Switzerland, their general nature makes them very likely applicable beyond this context. By examining these four ideal-typical governance arrangements in terms of their possibilities and limitations for considering newly emerging governance requirements from the 2030 Agenda, our analysis sheds light on how pre-established governance contexts could shape its implementation. Specifically, it contributes to a richer "understanding of the diverse contexts and ways in which governments will have to navigate and address the inevitable choices and conflicts, synergies and trade-offs" associated with the Agenda's implementation (Newell et al., 2019, p. 1).

Considering its underlying practical concern, our study is not to be seen as a classical, theoretically based, empirical analysis that takes a backward-looking perspective to describe and explain what is the case and why. In the spirit of a forward-oriented approach to transformative sustainability research (see Jahn, Bergmann, & Keil, 2012), it instead aims to examine to what extent existing (governance) systems can enable or block the implementation of certain governance requirements (see, on exploration, Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006). To this end, our analysis combines empirically generalized system knowledge (i.e., the functioning of four ideal-typical SGAs) with orientation knowledge (i.e., the 2030 Agenda's new governance requirements). This lays a foundation for generating (action-oriented) transformation knowledge on how the 2030 Agenda can be implemented more effectively in diverse governance contexts 'on the ground,' as well as determining which governance transformations will be necessary for this (see Grunwald, 2007).

Following this introduction, we outline the four ideal-typical SGAs that we view as characteristic of the early generation of sustainability governance in Swiss cantons (Section 2). We then specify five conceptual shifts that are characteristic of the new generation of 2030 Agenda sustainability thinking, giving rise to new governance requirements (Section 3). Confronting these emerging requirements with the four ideal-typical SGAs, we examine the latter's possibilities and limitations to meet the 2030 Agenda's governance requirements (Section 4). We conclude with perspectives for future research and practice (Section 5).

2. An Early Generation of Sustainability Governance: Four Ideal-Typical Governance Arrangements in Swiss Cantons

Governments have reacted in many ways to the rise of the sustainability agenda. In addition to aligning specific sectoral policies with sustainability goals, we can observe the development of more general sustainability-oriented governance arrangements at various governmental levels (Baker & Eckerberg, 2008; Bruyninckx, Happaerts, & Van den Brande, 2012; Lafferty & Meadowcroft, 2000; Steurer, 2008). These refer to configurations of institutional, procedural, and programmatic elements geared toward the systematic consideration, internalization, and implementation of sustainability concerns in government and administrative actions. In the sense of sustainability-oriented meta-governance (Meuleman,

2019), they aim at the 'sustainabilization of the government machinery,' i.e., the sustainability-oriented transformation of the conditions and orientations of governmental actions (Bornemann & Christen, 2019a, 2019b). At the national level, these arrangements typically comprise national sustainability strategies and related institutions and processes, forming a considerable variety of sustainability arrangements (see, e.g., OECD, 2007; Steurer & Hametner, 2013; Volkery, Swanson, Jacob, Bregha, & Pintér, 2006). Given that subnational governments are less tied to international obligations, they tend to have even greater leeway in interpreting and implementing sustainability governance on the ground (Baker & Eckerberg, 2008; Bruyninckx et al., 2012).

Based on a qualitative study that refers to the subnational level in Switzerland, we identified four ideal-typical approaches to anchoring sustainability in government actions, namely problem-oriented, management-oriented, strategy-oriented, and network-oriented SGAs. These four ideal types are characterized by specific configurations of polity-, policy- and politics-related governance conditions and activities, the interaction of which produces characteristic governance rationales, i.e., ways of knowing and doing sustainability governance 'on the ground' (see, for more details, Bornemann & Christen, 2019a).

2.1. Problem-Oriented Sustainability Governance Arrangement

The problem-oriented SGA type is characterized by a distinct focus on concrete sustainability problems and policies. Within such governance arrangements, administrators tend to adopt a pragmatic logic of administrative policymaking (Hansen & Ejersbo, 2002; Paehlke & Torgerson, 1990), i.e., they aim to solve problems within given administrative structures and procedures. The unit responsible for sustainability typically is located in a specialized department, usually the environmental department, and, thus, is embedded in the normal bureaucratic decision-making mechanism. Sustainability-oriented activities are based on a stable legitimation framework comprising executive orders or subordinate laws prescribing sustainability-oriented tasks for the administration. Administrative actors responsible for sustainability view themselves as acting in a rather rigorous and formalized setting without major opportunities to shape their own working conditions. They respond to requests by providing support to other units in the form of problem-oriented expertise or reports (e.g., cantonal sustainability reports), as well as with instructions or instruments (e.g., sustainability assessments). Apart from occasional meetings, they have no direct access to political decision-makers, such as elected politicians or high-level administrators. The dominant practice in administrations belonging to this type of sustainability governance arrangement comprises incremental and selective problem-solving.

2.2. Management-Oriented Sustainability Governance Arrangement

The management-oriented approach to sustainability governance in government and public administration is distinguished by goal-oriented steering and monitoring (Christensen & Lægreid, 2006; Steurer, 2007). Unlike incremental problem-oriented SGAs, this type is geared toward designing a decision architecture that enables the efficient implementation of politically defined sustainability goals. Efficiency is viewed as the central guiding principle of sustainability governance, to be achieved through a management cycle that enables the systematic and rational implementation of goals through continuous monitoring and evaluation. Accordingly, sustainability-oriented administrative bodies are concerned with the development and implementation of sustainability indicators, although these typically relate less to the level of policy outputs and more to aggregate social developments. In addition, sustainability units are concerned with the communication and visualization of these indicators within the administration, the further development of internal processes, and the design and promotion of instruments for the ex-ante sustainability assessment of policies and projects. Sustainability units typically are located somewhere high in the administrative hierarchy, close to the political-administrative decision center (i.e., the core executive). Their activities rely on a strong legitimation basis—such as high-level political decisions, laws, or even constitutional norms—interpreted in terms of sustainability. The dominant practice in this SGA type is oriented toward adhering to and optimizing administrative procedures so that they support sustainable decision-making.

2.3. Strategy-Oriented Sustainability Governance Arrangement

Similar to the management-oriented approach, the strategy-oriented SGA type is characterized by attempts to improve governance conditions for sustainable development actively and systematically. However, in this approach, sustainability actors also extend their orientation and activities to the politics dimension. They consciously combine (substantive) policy and (power-related) politics considerations to promote sustainability in a goal-oriented way (Tils, 2007). More than with the other types, sustainability units in these SGAs participate in the political game, e.g., by addressing different hierarchical levels within the administration and also by influencing the political agenda. Sustainability units can do so because they are positioned at the top of the administrative hierarchy. Although they do not normally have directive authority, they are linked closely to the center of political power, a position they use to engage actively with political and administrative decision-makers, as well as mobilize support for sustainability issues. Therefore, sustainability governance is based not only on legal but

also on considerable political legitimation. The predominant concern with sustainability governance under the strategic approach is to create, shape, and use political opportunities for sustainability.

2.4. Network-Oriented Sustainability Governance Arrangement

The network-oriented SGA type is characterized by its distinct focus on creating collaborative relationships with actors inside and outside the administration (Koppenjan & Klijn, 2004). Compared with the other types, formal policies and even constitutional goals that provide orientation for sustainability governance play a minor role. Instead, this type is characterized by flexible, time-limited sustainability programs and projects. The formal responsibility for sustainability is located at some distance from the political decision centers. Sustainability units sometimes are even outsourced to external bodies, such as state foundations. They operate on the periphery of the state, but given their (financial and informational) dependencies, in the 'shadow of hierarchy.' Rather than approaching political decision-makers, sustainability units realize their diverse goals and projects by searching for varied collaborators. Because they operate outside of administrative hierarchies, they try to build supportive and flexible networks with administrative and social actors. Sustainability units demonstrate strong concerns about sustainability issues and have a relatively large amount of autonomy in setting their own agendas. They conceive of themselves as independent experts and advisors in sustainability issues who provide support to other administrative units and societal actors. Overall, networking and collaboration with societal and administrative actors to mobilize support for sustainability concerns are the dominant practices under network-oriented sustainability governance.

Overall, the four ideal types illustrate a broad spectrum of ways to pursue sustainability governance in the context of government and administration. Actual real-world SGAs may combine elements of different types into hybrid forms. Although we have derived the four types from sustainability governance in Swiss cantons, we assume that they represent basic rationales that potentially can be found in other contexts as well. We now turn to the question with which specific governance requirements the 2030 Agenda confronts these early-generation SGAs.

3. A New Generation of Sustainability Thinking: Five Governance Requirements from the 2030 Agenda

The 2030 Agenda, adopted by the UN General Assembly in 2015, represents an unprecedented milestone in international sustainability politics, which began more than 30 years ago with the Brundtland Report and took shape through a series of global environment and development conferences (Meadowcroft et al., 2019). In its basic normative thrust—the realization of intertemporal and international justice under the conditions of fundamental ecological limits—the 2030 Agenda displays considerable continuity with the sustainability discourse that precedes it. However, it also entails several significant conceptual shifts, i.e., changed interpretations of basic elements of sustainability thinking that together can be interpreted as a new generation of sustainability thinking. Whatever the underlying drivers might be—whether it is the integration of sustainability with the Millennium Development Goals (Boas et al., 2016; Fukuda-Parr, 2016; Langford, 2016), the rise of the Anthropocene as a new ontological framework (Biermann & Lövbrand, 2019), or the increasing reference to 'transformation' discourse (Brand, 2017)—these shifts in sustainability thinking also involve changed understandings of which governance forms are viewed as appropriate and functional with regard to sustainability, i.e., the requirements for sustainability governance. With a certain degree of simplification and without any claim of completeness, we identified five conceptual shifts and related governance requirements in the discourse around the 2030 Agenda. They refer to the construction of normativity, the substantive extension of the sustainability idea, the understanding of policy integration, the involvement of actors, and the sustainability idea's basic action orientation (see Table 1).

3.1. Normativity

Sustainability always has been attributed to a strong normative quality based on universal value-theoretical foundations (Dobson, 1996). Sustainability stands for a concept of human development that combines a complex idea of intergenerational and international justice with respect to ecological limits and the integrity of social-ecological systems (Christen & Schmidt, 2012). For a long time, this understanding served as an open frame of reference for an increasingly evolving variety of sector- and context-specific concepts, rules, and criteria for sustainable development. Accordingly, the first task of sustainability-oriented governance was to clarify the meaning of sustainable development for the respective social, ecological, and economic contexts (Meadowcroft, 2007). The 2030 Agenda re-emphasizes sustainability's normativity while slightly altering its quality. Instead of an open normativity circulating around a generic sustainability definition, the Agenda promotes a system of 17 SDGs, each of which is specified further in terms of a set of targets and quantifiable indicators. For the first time in history, a relatively concrete system of goals exists specifying the direction of a societal transformation toward sustainability. These goals and their related targets now have become central reference points for thinking about and shaping sustainability governance, as well as key motivators for sustainability-oriented governance through global goals (Biermann et al., 2017; Kanie & Biermann, 2017). As a consequence, new require-

Table 1. Conceptual shifts in sustainability thinking and governance.

Conceptual element	Early generation of sustainability thinking	New generation of sustainability thinking
Normativity	Universal but open definition	Differentiated global goal system
Extension	Ecological focus	Broad societal scope
Integration	Environmental policy integration	Systemic policy integration
Inclusion	Stakeholder participation	Engagement of 'the people'
Orientation	Social-ecological problems	Social-ecological transformation

ments for dealing with normativity have arisen, namely the need to translate global goals into local contexts and, inversely, to relate policy activities with overall global goals. This is reflected in a system of regular reporting by national governments to the UN-based High-Level Political Forum (Persson, Weitz, & Nilsson, 2016).

This mechanism of normative translation, from global to local and back, leads to a partial closure of the interpretation horizon, i.e., any locally articulated understanding of sustainable development is now expected to connect to one or more global SDGs, if not to the SDG system as a whole. Therefore, sustainability governance practices must justify themselves in relation to SDGs. They also must be able to replace open interpretations of sustainability with localized interpretations of SDGs, which are integrated into a global monitoring and review system.

3.2. Extension

Sustainable development already had been framed in the Brundtland Report as a comprehensive sociopolitical idea comprising multiple goals linked to all kinds of action areas, including food security, protection of natural resources, energy, and urban development (Meadowcroft, 2000; WCED, 1987). Conceptual sustainability models covering multiple (usually ecological, economic, and social) dimensions, columns, or subsystems capture the idea's broad, descriptive, and normative scope (Purvis, Mao, & Robinson, 2019). Although this extensive vision of sustainable development was reinvigorated in the international discourse, it has not always been embraced in academic and political discourse. In fact, there were strong tendencies to feature narrower sustainability conceptions, e.g., interpretations with an emphasis on the ecological dimension (Boström, 2012; Dobson, 1996). By linking the sustainability debate with the global development agenda, which so far has been epitomized by the Millennium Development Goals, the 2030 Agenda brings the sustainability idea's comprehensive character back to the fore and pushes it up to a new level (Langford, 2016; Le Blanc, 2015). The newly accentuated extension of sustainability is reflected inter alia in the Agenda's commitment to the Five P's—people, planet, prosperity, peace, and partnership—and its comprehensive goal architecture. Therefore, the 2030 Agenda is (finally) taking sustainability out of its ecological niche and elevating it to a model for society as a whole. Its implementation requires governance institutions and practices with the capacity to bring SDGs to bear the full spectrum of policy areas (Meuleman, 2019).

3.3. Integration

Sustainable development represents a political idea of social development that emphasizes the global character, inter-temporalism, and interdependence of crisis phenomena in the modern age (Meadowcroft, 2000). It problematizes the dominant model of societal development, which is characterized by a neglect of the interdependencies between the partial developments in different social subsystems and a disregard for their respective side effects and limits (Brand, 2017). To recognize interdependencies and address side effects, calls for (policy) integration have been stable elements of the sustainability debate (Bornemann, 2014). Sustainability governance essentially has been conceived as integrative governance, i.e., a form of governance that cuts across problem areas and policy silos. For a long time, an interpretation of integration in terms of environmental policy integration was dominant. This approach was aimed at infusing ecological goals into other policy areas (Jordan & Lenschow, 2010) and sometimes prioritizing ecological concerns over other sectoral policy goals (Lafferty & Hovden, 2003). This arguably has changed in the context of the 2030 Agenda. Starting from the notion of an indivisible goal system (Le Blanc, 2015; Nilsson & Weitz, 2019), the focus is no longer on the unidirectional integration of sectoral goals into other policy areas. Integration instead refers to the analysis of mutual interactions in the form of trade-offs and synergies between basically all SDGs with the aim of identifying particularly 'critical' SDGs whose pursuance induces positive effects in the SDG system as a whole (Weitz, Carlsen, Nilsson, & Skånberg, 2018; see also Bornemann & Weiland, 2021; for a critical perspective on goal prioritization, see Forestier & Kim, 2020). In terms of governance, this newly accentuated concept of integration requires SGAs that systematically can take into account the interrelationships between all SDGs that are relevant and meaningful in a given governance context, and on this basis, define priority SDGs (or targets) with the highest systemic impact.

3.4. Inclusion

In the discussion about sustainable development and how to govern it, an insight quickly took hold that governments alone do not hold the responsibility and capacity to realize sustainable development. Instead, sustainability governance should include societal actors who not only become involved in defining what sustainable development means in particular contexts but also participate in sustainability-oriented problem-solving (Meadowcroft, 2007). It was, above all, Agenda 21 that emphasized participation as a central principle of sustainability governance (UNCED, 1992). It was argued that sustainable development cannot be decreed but that it must be initiated in a participatory manner involving relevant social actors, primarily organized stakeholders (Meadowcroft, 2004). With the turn toward the 2030 Agenda, we observed a slight shift in the interpretation of participation. While negotiators in certain countries were reluctant to include references to democracy, they still agreed on an understanding of participation that seemed to go beyond the established notion of stakeholder participation characteristic of the post-Rio sustainability debate (Langford, 2016). Both the process of formulating the 2030 Agenda, with its attempts to consult individual world citizens (Kamau, Chasek, & O'Connor, 2018), and the emphatic reference to the 'people' in the preamble suggest that the stakeholder participation model is opening up to the broader civil society, including all kinds of organized and non-organized collective and individual actors (Fukuda-Parr, 2016). This poses new challenges and requirements with regard to broad involvement by social actors in sustainability governance.

3.5. Orientation

Sustainable development is an idea that echoes the problematic consequences of the prevailing model of social development deeply rooted in the ideas, culture, and structures of (Western) modernity. In the context of the earlier sustainability discourse, these consequences were understood and addressed in terms of social-ecological problems. Regarded as particularly complex or even 'wicked,' these problems generally are viewed as the objects of concern in sustainability governance (Voss, Newig, Kastens, Monstadt, & Nölting, 2007). Although social-ecological problems continue to be an important reference point in sustainability thinking, the 2030 Agenda entails a broadening of the problem orientation toward shaping social-ecological transformations. The 2030 Agenda's vanishing point includes global goals that guide the transformation of our world (UN, 2015). Apart from emphasizing all countries' responsibility to take action in their respective contexts, the transformative turn that the 2030 Agenda promotes reflects the insight that simple adjustments within the existing system in the sense of problem-oriented solutions are insufficient to overcome the multiple social-ecological crises (Brand, 2017). Instead, the pervasive and open-ended character of the challenges for far-reaching, cross-sectoral, and cross-level changes to the system itself: A fundamental restructuring of economic production and consumption patterns and a reorientation of the individual and collective values and ways of thinking that produce them (Sachs et al., 2019). Therefore, sustainability governance in the sense of the 2030 Agenda primarily aims to shape social-ecological transformations (and less so to solve problems), placing specific requirements on SGAs' ability to take social-ecological change into account and make it the subject of governance processes.

4. New Meets Old: Possibilities and Limitations of Sustainability Governance Arrangements in Implementing the 2030 Agenda

We now turn to the question to what extent existing SGAs from the pre-2030 Agenda era are prepared to meet the 2030 Agenda's new governance requirements. To do so, we systematically relate the four ideal types of SGAs outlined in Section 2 with the five governance requirements presented in the previous Section 3. This opens a structured interpretive space to evaluate the possibilities and limitations of SGAs to meet the 2030 Agenda's governance requirements (see Table 2).

4.1. Problem-Oriented Sustainability Governance and the 2030 Agenda

In problem-oriented SGAs, sustainability governance follows an incremental, piecemeal approach that addresses context-specific problems often associated with specific policy sectors. Problem-oriented SGAs seem well-suited to address the 2030 Agenda's normativity. For example, they lack collectively binding understandings of sustainability that could stand in the way of the SDGs as a new normative frame of reference. If the sustainability units succeed in refocusing their advisory resources on the SDGs, they can support the 'localization' of global goals by linking them to concrete problems on the ground. Moreover, considering that the responsible sustainability units are located within specialist administrative departments, they may have the expertise to monitor and compile information on the achievement of SDGs and relate that information to an overall global monitoring and review system.

However, for the same administrative specialization reason, problem-oriented SGAs tend to have a relatively narrow focus on only a few SDGs, thereby limiting their potential to address the extensive 2030 Agenda. Considering the sectoral anchoring of the sustainability unit and the prevailing logic of a sectoral approach to problems, the working agenda in such SGAs is determined less by overarching goals than by specific contextual problems. Problem-oriented SGAs certainly may try to refer to a wide range of SDGs in their problem-

oriented sustainability advice, but they are neither in a structural position nor do they have the resources to initiate an extensive approach to implementing the SDG system as a whole. They also lack the power resources to push other administrative units to consider a broader range of SDGs beyond their usual problem framings.

Clear limits also exist for the problem-oriented type regarding the realization of the systemic integration model associated with the 2030 Agenda. Problem-oriented SGAs are more likely to follow the classical pattern of sectoral policymaking than to overcome it. It is quite possible that the 2030 Agenda could encourage actors to identify new links between sectoral problems and create new integrative settings in which previously unconnected issues are treated as nexus problems (see, for empirical indications, Tosun & Leininger, 2017). However, given the limited resources of problem-oriented sustainability divisions, their sectoral orientation, and their distance from the decision-making center, it is rather unlikely that such an arrangement would be able to realize systemic policy integration, i.e., the analysis of context-related SDG interactions to identify priority goals for the government as a whole.

The ability to fulfill the 2030 Agenda's inclusion requirement is also likely to be rather weak in the context of a problem-oriented SGA. The anchoring of the responsible sustainability unit in a specialized department promotes a rational bureaucratic action logic that is rather exclusivist in social terms. Apart from organized stakeholders who voice their concerns through institutionalized channels of administrative interest mediation, there are no venues for broader participation of

Table 2. Assessment of the potentials of different SGA types to meet the 2030 Agenda's governance requirements.

	Problem-oriented SGA	Management-oriented SGA	Strategy-oriented SGA	Network-oriented SGA
Normativity Differentiated global goal system	+ Problem-related reception and reporting of selected SDGs	+/− Established target system and monitoring practice, but significant path dependencies and gridlock	+ Politically and legally backed goal system	+/− Has potential to connect goals to activities of involved societal actors, but lacks systematic monitoring and reviewing
Extension Broad societal scope	− Focus on SDGs relevant to context-specific problems only	+ Management system prepared to cover many policy areas	+/− Systemic extension, but potentially limited by political considerations	+/− Dependent on network extension, but incentivized for network expansion
Integration Systemic policy integration	+/− Punctual nexus approaches, but no systemic integration	+/− Capacity to analyze systemic interactions, but not for setting priorities	+ Has potential to analyze interactions and to identify and propose policy priorities	− Accidental setup of nexus problems, but no systemic integration and identification of policy priorities
Inclusion Broad engagement of 'the people'	−/+ No established participation practice, but has potential for problem-oriented inclusion of different actors	− No consideration of external actors due to inward-looking efficiency-oriented management logic	− Exclusivist logic; actors included only if politically promising	+ Experience in organizing stakeholder participation, but less so in citizen participation
Orientation Social-ecological transformation	− Focus on solving problems rather than shaping transformations	− Efficiency logic encourages process optimization, rather than substantial transformation	+ Has potential to connect the 2030 Agenda to transformative political agendas	+/− Has capacity to mobilize actors from below, but disconnected from political agenda

all kinds of organized and non-organized societal actors. However, the problem-oriented governance type's orientation toward specific problems 'on the ground,' in principle, can provide a promising basis for cooperation with other social actors working on the localization of SDGs.

Another limitation of problem-oriented SGAs concerns the implementation of the 2030 Agenda's transformative orientation. The practical focus of this type of arrangement is on identifying and solving confined problems, whereas the 2030 Agenda calls for engaging with societal transformations. It is obvious that all attempts to solve sustainability problems most likely impact transformations. However, problem-oriented SGAs do not seem to have the capacity to consider the fundamental embedding of problems in social change processes and make these processes the objects of governance.

4.2. Management-Oriented Sustainability Governance and the 2030 Agenda

Management-oriented SGAs generally are well-prepared to embrace the 2030 Agenda's new normative quality. Because they are based on a goal-oriented management cycle that includes the continuous monitoring and evaluation of progress toward specific sustainability goals, they fit well into the global monitoring and review process organized by the High-Level Political Forum. While a management rationale seems to be congruent with the management process that the 2030 Agenda implies, impeding factors also exist. The investments that have been made to build and maintain the existing sustainability-oriented goal and monitoring system create certain path dependencies that could be the basis for a potential aversion to change. The challenge is to transform existing goal and indicator systems, which have been developed and maintained for years, into new systems aligned with the SDGs and, thus, a political challenge that is certainly beyond the capacity of a management approach. Given rather scarce political support and administrative resources, it is questionable whether management-oriented SGAs can overcome path dependencies and replace existing goal and indicator systems with new ones.

In contrast to the problem-oriented type of SGA's rather selective and narrow scope, which is limited to only those SDGs that are related to concrete problems on the ground, a management-oriented governance style offers prima facie supportive conditions for extensive coverage of the SDG system. With management-oriented SGAs, sustainability units occupy a comparatively high position in the administrative hierarchy, allowing them to oversee the activities of the entire government apparatus. In combination with a comprehensive management process that basically covers the government's entire policy universe, this enables these units to monitor the sustainability implications of all possible policy areas.

Management-oriented SGAs' efficiency orientation can be conducive to responding to the 2030 Agenda's new integration requirements. Integration, in the context of the Agenda, is about understanding the systemic interactions between SDGs to identify these goals, whose pursuit with the lowest possible use of resources leads to the greatest possible effects in the SDG system. The management-oriented type of SGA provides a suitable framework for such efficiency-oriented goal definition. The prioritization logic of the 2030 Agenda, which is geared toward pursuing the most impactful goals possible, corresponds with a management approach geared toward realizing efficiency gains.

Management-oriented SGAs focus on step-by-step achievement of objectives and the continuous improvement of relevant processes, including management cycles. The focus is clearly on internal governance processes, for which more extensive and differentiated information is made available with the help of monitoring and evaluation systems. External societal actors' involvement plays a rather subordinate role in such an inward-looking, efficiency-oriented management rationale. Given its relative exclusivity, the management-oriented governance approach is hardly prepared to enable broader inclusion of non-organized stakeholders and citizens. Inclusion only plays a role when it serves to optimize the management process, e.g., by enabling more efficient knowledge generation with the help of societal and civil society actors.

With their goal and monitoring systems, management-oriented SGAs seem well-prepared to adopt the 2030 Agenda's transformative orientation. These systems are geared toward continuously observing societal dynamics and providing the knowledge basis for considering these dynamics in policymaking and governance. However, two potential drawbacks exist. One is that the efficiency logic prevailing in management-oriented SGAs can lead to an attempt to adapt the existing goal systems as smoothly and as conflict-free as possible to the SDGs, instead of changing them substantially in the direction of the SDGs. Another potential drawback is that management-oriented SGAs generally focus on monitoring aggregate social developments, not policy outputs and impacts as such, which would provide an important basis for transformative governance.

4.3. Strategy-Oriented Sustainability Governance and the 2030 Agenda

Strategy-oriented sustainability governance is about creating, shaping, and using political opportunities to foster the integration of sustainability into government action. Such an approach should be well-equipped to adopt the 2030 Agenda's new normative quality, i.e., to translate the 2030 Agenda into localized understandings of sustainability that are connected to the global goals. Considering that strategy-oriented arrangements already contain overarching sustainability goals—sometimes even linked to constitutional principles, overarching government visions, and long-term government

strategies—the SDGs encounter a differentiated, legally, and politically backed system of sustainability principles and goals. While this tends not to be the case for the management-oriented approach, strategy-oriented SGAs are more political and more easily can link the SDGs to politically relevant goals and agendas. Consequently, there is a greater chance than in management-oriented SGAs that the transition to a new goal system based on the SDGs will receive political attention and support and that SDGs' implementation will be embedded in relevant political agendas.

The political logic of strategy-oriented SGAs, however, is a potential drawback for considering the broad extension of the 2030 Agenda because it promotes selective interpretation and adoption of sustainable development goals (see Forestier & Kim, 2020). Thus, strategy-oriented sustainability divisions are encouraged to focus only on those parts of the goal system that are most promising in terms of political impact. SDGs that lie outside the spectrum of political attention, e.g., because they are viewed as irrelevant to the profiling of political decision-makers vis-à-vis voters, may be neglected. However, the close connection between sustainability and overarching governmental goal and planning schemes, characteristic of strategically oriented SGAs, provides fertile ground for the 2030 Agenda to become a meta-policy that guides several first-order policies in all areas of government action (Meuleman & Niestroy, 2015).

The relatively high anchoring of the strategy-oriented SGA provides a promising context for dealing with the 2030 Agenda's new integration requirement. Departments will be urged to work together if clear political commitments and expectations must be fulfilled. Whereas an arrangement at the working level always will encounter systematic boundaries to push for integration, a politically backed strategic arrangement may not be in a position to enforce integration, but it can activate respective support to encourage departments to work together. However, there is also a drawback. Integration in the context of the 2030 Agenda involves the systematic analysis of contextual goal interactions and, based on this, a prioritization of those goals that promise the greatest overall benefits. When the analytically derived priorities are not consistent with political goals, the latter will overshadow the former.

Similarly, the demand for inclusion is likely to be met only sporadically whenever social actors' participation in the respective strategy-oriented SGA is viewed as politically favorable. This concern underscores general doubts about the strategy-oriented governance type's inclusivity. Given its placement high in the administrative hierarchy and near the political decision center, there might be a tendency in this arrangement to adopt an elitist orientation that is disconnected from stakeholders and citizens' concerns. The inclusion of these actors might be pursued only as far as it is deemed politically useful, thereby leading to a selective interpretation and practice of actor participation.

Similar to management-oriented SGAs, strategy-oriented approaches to sustainability governance typically include capacities for monitoring societal dynamics and reflecting on them in light of SDGs. In addition, strategy-oriented SGAs also provide approaches to policy monitoring, which enable policy learning. Given their proximity to the political decision center, they also have considerable capacities to establish links between SDGs and relevant political agendas and policy processes. Taken together, this elicits a considerable potential to address the 2030 Agenda's transformative orientation.

4.4. Network-Oriented Sustainability Governance and the 2030 Agenda

In a network-oriented SGA, sustainability governance is about creating and maintaining links between administrative and social actors. The network serves as a basis for launching concrete sustainability projects and mobilizing societal support that drives government action toward sustainability. On the one hand, network-oriented SGAs have a considerable potential to embrace the 2030 Agenda's normative requirements. The intensive communicative exchange between administrative and social actors offers a solid basis for developing links between the Agenda and context-relevant sustainability issues in terms of locally meaningful interpretations of SDGs. Due to their project-oriented focus, which is, at best, loosely related to an overarching sustainability vision, network-oriented SGAs do not face the challenge of overcoming or adapting existing goal and indicator systems. Instead, they enter an untapped field and have much conceptual leeway for making sense of the SDGs on the ground. On the other hand, the lack of systematic approaches and experience in dealing with overarching sustainability goals impairs their ability to collect and monitor the contributions of local sustainability projects and report them to a national or global monitoring and review system.

Network-oriented SGAs' potential to meet the 2030 Agenda's extension requirements is equally ambivalent. The extent to which it can take over the entire spectrum of SDGs, or only a selection of some SDGs, will depend on the already existing network's size and composition. The rather open bottom-up approach to identifying and pursuing sustainability-related issues relevant to local social actors carries the risk that only a few SDGs will be viewed as meaningful and relevant, while other SDGs that are not represented by network actors will fall through the cracks. However, given that network-based SGAs are incentivized to grow in size (to maintain or expand their government-provided resource base), the sustainability units that usually organize the network could view the 2030 Agenda as a strategic moment to address new issues and reach out to actors that were previously outside the scope of sustainability governance.

Regarding integration, network-oriented SGAs' potential is also ambivalent. On the one hand, the posi-

tioning of the sustainability unit outside the administration, its relative autonomy from sectoral constraints, and the diversity of the social actors involved in the network offer favorable conditions for interlocking multiple sectoral problems and SDGs into integrative nexus arrangements. On the other hand, network-oriented SGAs lack the potential to follow the systemic integration approach that the 2030 Agenda advocates, which entails systematically analyzing interactions between SDGs to identify priority goals whose pursuit would create positive ripple effects for the SDG system as a whole. Not only do the respective arrangements lack the resources and expertise to conduct systematic and contextualized analyses of SDG interactions, but they also have no mandate and no political support to identify and communicate political priorities to be pursued by the government as a whole.

For quite obvious reasons, network-oriented arrangements appear to be relatively well-prepared to implement the 2030 Agenda's inclusion requirements. Because of their characteristic outward orientation toward society, these arrangements are most likely to have experience with involving interest groups in shaping sustainable development. Considering that incentives exist to expand the network to maintain their resource base, the organizers of the sustainability governance network could use the Agenda as an opportunity to reach out to new actors and involve them in governance arrangements. Given the predominant focus on organized stakeholders, one challenge for network-oriented SGAs could be to involve non-organized individual actors, such as citizens or residents. These actors have preferences and interaction orientations that differ from organized stakeholder groups, as well as different expectations in terms of the organization of participation processes.

Network-oriented SGAs' relative distance from the political decision-making center is also a condition for their mixed transformation potential. On the one hand, they have considerable potential to initiate and drive transformations from below, e.g., by bringing social actors together and mobilizing them to address nexus problems. This is also likely to stimulate transformation in the government and administration. On the other hand, their transformative potential is highly selective and localized, and not systematically tied to the monitoring of overarching social-ecological dynamics in the respective context. They also remain potentially detached from overarching governmental processes that are designed to monitor and shape social-ecological dynamics.

Overall, the analysis shows that the four ideal-typical SGAs have different potentials to realize the 2030 Agenda's governance requirements. In some instances, contingent potentials are discernible. None of the ideal-typical arrangements fulfills all requirements, but in looking across the requirements, it appears that they all can be met by different SGAs. Accordingly, while there appears to be no single SGA that is fully prepared to implement the 2030 Agenda, different arrangements are prepared to meet specific requirements. For a complete fulfillment of all requirements, the virtues of different ideal types would need to be combined in hybrid SGAs. For example, strategy-oriented approaches could overcome their potential weaknesses in terms of inclusion by adopting participatory elements characteristic of network-oriented arrangements.

5. Conclusion and Perspectives

To what extent are governments equipped to implement the more recent 2030 Agenda within their existing arrangements of sustainability governance that date from an earlier period? This article argues that the 2030 Agenda does not mean a simple continuation of 'business as usual' in governing sustainability. Instead, governments face a generational shift in sustainability thinking that brings with it new governance requirements and challenges the governance arrangements already in place.

The 2030 Agenda is characterized by a specific normativity and a broad substantive extension of the scope of sustainable development, a systemic policy integration concept, a highly inclusive outlook, and a transformative action orientation. In their implementation, these requirements encounter established governance arrangements that are intended to turn sustainability into government action. Using four ideal-typical SGAs that stem from an analysis of Swiss cantons as an example, we have shown how the five specific governance requirements match or challenge these four ideal-typical arrangements and their respective governance rationales. Although our analysis is merely illustrative, and we make no particular generalization claims, we assume that the four governance rationales can be found in SGAs outside Swiss cantons (Bornemann & Christen, 2019a), which is why our observations are also relevant to other contexts.

Our analysis suggests that none of the four ideal-typical SGAs meets all five requirements. The arrangements come with different possibilities and limitations with respect to meeting the governance requirements associated with the conceptual shifts in sustainability thinking emerging in the wake of the 2030 Agenda. Further in-depth qualitative case studies should show whether there are real existing SGAs that succeed in meeting all requirements by combining different elements of the four ideal-typical arrangements. Such analyses also would need to consider whether and to what extent actual measures to implement the 2030 Agenda influence or even change existing SGAs' functioning.

From a practical perspective, we conclude that implementing the 2030 Agenda requires a close examination of existing SGAs' functioning in relation to the Agenda's new governance requirements. Such an examination could reveal the need for targeted and context-dependent adjustments of existing governance arrangements, making 2030 Agenda implementation not only a

question of organizing and steering societal transformations but also of transforming existing SGAs. The discussion of the possibilities and limitations of ideal-typical SGAs in dealing with the five governance requirements indicates where such sustainability governance transformations should begin and what they should target. It thereby opens up perspectives on how to design real-world governance arrangements that combine the respective strengths of different ideal-typical SGAs to meet the governance requirements that arise in the wake of the new generation of sustainability thinking under the 2030 Agenda.

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Conflict of Interests

The authors declare no conflicts of interest.

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Article

Conceptualizing Interactions between SDGs and Urban Sustainability Transformations in Covid-19 Times

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Abstract
Given the potential of cities to contribute to a more sustainable world as framed by the Sustainable Development Goals (SDGs) of the UN 2030 Development Agenda, this article focuses on Urban Sustainability Transformations. We take a closer look at the potentials, contradictions and challenges that SDG implementation in cities involves in light of the current Covid-19 pandemic. We argue that SDG implementation needs to consider these global challenges in order to pursue its transformative approach. As a starting point we take SDG 11 and its subtargets to achieve resilient cities and communities, with a focus on German cities. The article will thus contribute to the discussion on the constraints associated with implementing SDGs in cities, given the multiple challenges and actors involved, and the complexity this implies for Urban Sustainability Transformations.

Keywords
cities; Covid-19; Germany; pandemic; SDGs; urban sustainability

Issue
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1. Introduction: The Urban Dimension of Transformations to Sustainability

Ongoing debates on sustainability highlight the need for far-reaching radical processes of change, since piecemeal changes of current modes of development seem to lack the wherewithal to achieve a more sustainable world (Brand, 2016). These changes, so-called transformations to sustainability (Hackmann & Lera St. Clair, 2012), are coveted in a variety of sectors, such as agriculture, industrial production and consumption.

Urban areas are another prominent sphere with a clearly visible need for transformations to sustainability. Current forms of urban development have been proved widely unsustainable (Loorbach & Shiroyama, 2016) and cannot be interpolated in the future, as planetary boundaries are soon expected to be crossed. We argue, like other authors (e.g., German Advisory Council on Global Change, 2011; McCormick, Anderberg, Coenen, & Neij, 2013), that transformation towards more sustainable development is necessary if cities are to contribute to managing the consequences of Global Environmental

Change, as well as of demographic and economic change. This not least because the heavy use of resources contributes substantially to Global Environmental Change, notably as a result of high greenhouse gas emissions.

In this context, we consider Urban Sustainability Transformations as radical, multi-dimensional alterations to a given system that can go across system borders and deal with multiple as well as uncertain development options (McCormick et al., 2013). As a planned solution towards sustainable development in cities, Urban Sustainability Transformations should be understood as non-linear expressions of complex interactions and consequences of a wide range of different processes.

The 'Global Sustainable Development Report 2019: The Future is Now' sees urban and peri-urban development as one of the six entry points that "offer the most promise for achieving the desired transformations at the necessary scale and speed" (Messerli et al., 2019, p. XXI). Since the majority of humankind lives in urban and peri-urban areas (and this share is likely to increase by 2050), urban sustainability plays a major role in achieving the 2030 Agenda. While the important role of cities in the global sustainability discourse has gained increased recognition and become a new paradigm for future development (Angelo & Wachsmuth, 2020), there is less unanimity on the question of how cities should actually be transformed into a more sustainable version of themselves.

The 2030 Agenda and its Sustainable Development Goals (SDGs) pursue a transformative programme, as its full title 'Transforming our world' demonstrates. The shift towards an urban dimension to political sustainable agendas is notably reflected in SDG 11 "making cities and human settlements inclusive, safe, resilient and sustainable" (UN, 2015). Other SDGs, such as 4, 6 and 13, also make strong reference to urban areas as an arena for their implementation and demonstrate that Urban Sustainability Transformations should address different sectors. Furthermore, the UNs' New Urban Agenda, which was adopted at the Habitat III conference in Quito in 2016, sets standards and principles for local SDG implementation. It aims to provide the groundwork for urban policies and approaches towards a more sustainable urban development (UN Habitat, 2015). The mixed outcomes of the Habitat III conference and complaints about a lack of binding global and national agreements again demonstrate that implementing urban development calls for transformation to more sustainable situations than currently prevail. Although the New Urban Agenda points out opportunities for urbanization as an engine of sustainability (UN, 2015), how these radical transformations as indicated by the SDGs are to be achieved remains vague. SDG 17 presents initial ideas on implementing Urban Sustainability Transformations on a global scale. Among these are capacity development, finance, and systemic issues (UN, 2015). It is, nonetheless, more a general guideline than a concrete manual.

Quite a number of articles have been published in response to the adoption of SDGs in cities, pointing out a range of difficulties (see, for example, Fenton & Gustafsson, 2017; Koch et al., 2019; Krellenberg, Koch, Schubert, & Libbe, 2019; Patel et al., 2017; Simon et al., 2016), and highlighting the need for appropriate indicators, existing SDG data problems, governance issues, and lack of financial resources. One key aspect is the level of concreteness. We argue that support for the implementation of SDGs in cities calls for a stronger focus on specific urban characteristics, processes, and targets in the context of shifting towards sustainability. This corresponds to what has been established in the context of other related terms and concepts, such as urban vulnerability (Krellenberg, Welz, Link, & Barth, 2016; Romero-Lankao & Qin, 2011) or urban resilience (Meerow, Newell, & Stults, 2016): Urban issues has become a buzz word without the necessary emphasis on specific 'urban' aspects that make a difference. According to Krellenberg et al. (2016) we see cities as a social product, characterized by a concentration of physical assets such as housing, infrastructure and communication networks, as an engine of economic growth, as centres of political power and representation, with consumers of ecological resources and producers of contaminants, hubs of cultural diversity and resource, as well as the outcome of the historical aggregation of physical assets. Following the distinction made by McCormick et al. (2013, p. 4), that "sustainable urban development is primarily about development in urban areas while sustainable urban transformation is about development or change of urban areas," it is precisely this embedment of the SDGs for urban transformations in an overall sustainable urban development framework that we argue is still missing. Furthermore, we contend that SDG implementation in cities must also take account of current global challenges and developments in order to pursue its transformative approach.

Since the adoption of the 2030 Agenda in 2015, profound societal and technological changes have taken place, but are not yet reflected in the SDGs. The most radical game changer has been the Covid-19 pandemic and its global impact on the economy and society at large. The question arises as to whether Covid-19 necessitates a realignment of the SDGs and their respective targets and indicators. Initiatives such as the 'Make sustainability a top priority to bolster resilience!' by the German Science Platform Sustainability 2030 has underlined the relationship between sustainability transformations and SDGs, arguing that post-pandemic economic recovery should follow SDG guidelines. Following this up, the UN High Level Political Forum points out that "the Covid-19 pandemic has highlighted the important role of local governments as the provider of services closest to people" (High Level Political Forum on Sustainable Development, 2020).

While several articles have been published on how Covid-19 possibly affects the way in which cities are organized (Megahed & Ghoneim, 2020; Sharifi &

Khavarian-Garmsir, 2020; Venter, Barton, Gundersen, Figari, & Nowell, 2020) and why cities are a catalyst for the rapid spread of diseases such as Covid-19 (Neiderud, 2015), the impact of Covid-19 on the urban implementation of SDGs remains fuzzy. This is reflected, for example, in the UNESCO argumentation that the severe impact of the Covid-19 pandemic on cities raises fundamental questions about sustainable urban development, and indicates the need to rethink development strategies towards more resource efficiency, quality of life and resilience (UNESCO, 2020). That said, the situation brought about by Covid-19 asks what urban transformations to sustainability should look like and calls for rethinking how cities can contribute to SDG implementation.

In this article we take SDG 11 and its subtargets to achieve resilient cities and communities as a starting point and discuss how the Covid-19 pandemic affects SDG implementation. Here we refer for the most part to the situation in German cities but the findings also stem from and are transferable to cities in other countries. Given the fact that very few research results on the specific impact of Covid-19 on selected fields of sustainability exist, we mainly use recent study reports, working papers and national newspaper articles as sources in describing the specific situation in Germany.

2. Resilience as a Key Dimension of Urban Sustainability Transformations and the Covid-19 Pandemic

Cities are places where interwoven processes of Global Environmental Change, demographic and economic change take place simultaneously, with urbanization processes putting continuous pressure on natural resources. In the following, we refer to work that sees the need for urban transformations to sustainability to consider resource efficiency, quality of life and resilience among its key dimensions, such as that of Kabisch et al. (2018), Krellenberg et al. (2016), and Kabisch and Kuhlicke (2014).

Conspicuous in the cities of today is the high exploitation of scarce resources such as land, water and energy. This frequently goes hand in hand with growing social inequality in terms of resource distribution and accessibility and demands new forms of resource efficiency. Resource efficiency is considered a starting point for debates on additional strategies such as resource consistency and sufficiency (Kabisch et al., 2018). Furthermore, local residents aspire to a higher quality of life both for themselves and for future generations, one that points to the benefits of urban transformations, which in turn need to be addressed and communicated in sustainability transformations. These aspects pertain to the physical, social, environmental, economic, and institutional features concerned (Węziak-Białowolska, 2016). In addition, different coping capacity levels of institutions, citizens, and infrastructures with regard to crises or hazardous events should be strengthened in cities, whereby coping capacity refers to the ability to prepare for, cope with and recover from a hazardous event towards resilience. After Meerow et al. (2016, p. 39) "urban resilience refers to the ability of an urban system…to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity." Such actions are designed to allow for a swift return to a state of normality, without implying long-term changes (transformations; Twigg et al., 2017) or adaptation to the hazard concerned (Krellenberg et al., 2016). In our understanding, resilience and transformation are not opposing but complementary concepts, whereas resilience at the end of a transformation process is key to developing long-term dynamic stability (Folke et al., 2011). Although Meerow et al. (2016, p. 46) show that "growing emphasis on enhancing the resilience of cities in the face of unprecedented urbanization and climate change" exists, climate change is by no means the only challenge.

Given the current Covid-19 pandemic, it has perhaps become more obvious than ever before just how vital the resilience dimension is for cities and the degree to which resilience is entwined with resource efficiency and quality of life. Today's supply chains, for example, depend on interregional and international connectivity. The provision of cities with consumer goods hinges on the free-flowing movement of people and goods. In the case of disturbances, however, supply chains may become unstable and jeopardize urban resilience. The Covid-19 situation has proved how vulnerable we are when it comes to a grave crisis, and how this can be a threat to our high dependency on interconnected markets and supply chains. Although the issue of sustainable consumption has evolved on the international policy agenda since the Rio Conference (Cohen, 2020), we were made painfully aware of the implications for our daily lives in the course of worldwide lockdowns. We argue that this indicates the need to adjust current growth-driven strategies and refocus on regional and local production and consumption patterns in order to become more resilient and in turn more sustainable (see also Hakovirta & Denuwara, 2020). These ideas are far from new but have been discussed for years. This ties in with approaches such as urban metabolism (e.g., Ferrão & Fernández, 2013; Troy, 2012), circular economies (e.g., Geissdoerfer, Savaget, Bocken, & Hultink, 2017; Ghisellini, Cialani, & Ulgiati, 2016), the food-water-energy nexus (Romero-Lankao, McPhearson, & Davidson, 2017), or prosumers (Tukiainen, Leminen, & Westerlund, 2015), all of which address first and foremost the resource efficiency dimension, albeit with the potential to increase resilience and quality of life in the long run. In the same vein, Bai, Nagendra, Shi, and Liu (2020) argue that during the pandemic people's interest in urban agriculture, for example, increased, yet another method of enhancing resilience.

The pandemic furthermore demonstrates the important role of urban green spaces, for example, and their

potential to trigger the resilience people need to bounce back to its threats and to contribute to a higher quality of life. Venter et al. (2020) have shown for Oslo that the recreational use of green space in residential areas, city parks and peri-urban areas has increased. Kleinschroth and Kowarik (2020) argue that further development of urban green infrastructure should be an integral part of key changes in response to the experience of the current crisis. That said, it should be kept in mind that urban greening is not socially just per se, and trade-offs between ecological and social outcomes of urban greening strategies do exist and are in greater evidence in pandemic times such as unequal access and distribution (Haase et al., 2017). What is more, urban inequality and inclusive recovery issues are crucial in terms of the link between sustainability and pandemic response (Acuto, Dickey, Butcher, & Washbourne, 2020). Overall, Ratho and Johns (2020) concluded for the current global pandemic that cities have so far coped with the situation in different ways, arguing with data from the relevant authorities and their various levels of coordination.

Recent debates in Germany at all levels have addressed resilience in relation to Covid-19 and discussed methods of overcoming the multiple economic crisis caused by the pandemic. It is widely accepted that public funding and policies are needed in order to balance its adverse effects. The state subsidises branches of the economy that have been hardest hit by the crisis, giving companies the chance to bounce back. In this sense, public action against Covid-19 is at first glance a prime example of resilience, because the measures involved serve the rapid "return to desired functions in the face of a disturbance" (Meerow et al., 2016, p. 39). Here, Covid-19 is the disturbance and measures implemented by Germany such as short-time work compensation ('Kurzarbeitergeld') or public funding for the tourism industry evidence attempts to set the scene for a rapid return to the pre-Covid-19 situation. This economic perspective, it should be remarked, does not answer the question of whether a return to the pre-Covid-19 situation is in fact desirable or not, or if windows of opportunity in which to rethink the former status quo in terms of sustainability are envisaged.

We argue that from a sustainability perspective further issues need to be considered: Resilience is taken up in SDG 13 'Climate action,' with resilience understood as the target of strengthening a system against turbulences and creating functions and structures that are less vulnerable in times of crisis (Revi et al., 2014). This relates to the conviction that sustainable development can only be achieved with effective climate action, such as mitigation and adaptation. Target 13.1 of this SDG reads as follows: 'Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.' In other words, the aim is to achieve transformation towards CO_2 neutrality in cities—undoubtedly a tremendous contribution to climate change mitigation und sustainability—since resource efficiency alone would not produce the necessary input. Instead, measures should also comprise environmental and ecological issues other than energy, such as water, biodiversity, and natural resources (de Jong, Joss, Schraven, Zhan, & Weijnen, 2015). In this light, "providing equally distributed ecosystem services and guaranteeing positive community perception and involvement in the management of these services is what builds the basis for future sustainable and resilient cities" (Chelleri, Kua, Sanchez, Nahiduzzaman, & Thondhlana, 2016, p. 5), which likewise ties in with SDG interlinkages. Coming back to the example of urban green spaces, these bear the potential to reduce, for example, urban flooding events as well as urban heat islands (Koch, Bilke, Helbig, & Schlink, 2018). In short, current Covid-19 resilience strategies need to address a broader sustainability context and at the same time take into account the specific situation of each city and the potential contribution of the Covid-19 recovery to Urban Sustainability Transformations.

3. Building Urban Resilience in Times of Covid-19: Reconsidering SDG 11

The Covid-19 pandemic clearly reveals how aspects of Urban Sustainability Transformations can change under shifting framing conditions. The pandemic underlines the pressing need for urgent action in terms of, for example, trade and employment, social and public health, and the environment, all of which could endanger SDG implementation (Leal Filho, Brandli, Lange Salvia, Rayman-Bacchus, & Platje, 2020). On the other hand, the pandemic also shows us the capacity of people to adapt to change (e.g., home schooling and home office, travel restrictions). It nevertheless remains to be seen how willing people will ultimately be to change their attitudes in the long run, particularly when the restrictions lead to waivers that are unacceptable to some.

Some changes wrought by the pandemic, such as the reduction in car traffic, were seen by many as the few positive effects of Covid-19. As a result of less car traffic, air quality and perceived road safety increased and translated to an increase in the quality of life (NASA, 2020, as cited in Honey-Rosés et al., 2020). This was initially evident with the collapse of the international markets during the pandemic and led to remarkable reductions in mobility and transportation. The effects on air quality were noticeable, indicating a possible positive impact on climate in the long run if this trend were to continue after the pandemic. Telecommunication took the place of meetings face to face and local areas such as nearby green spaces were heavily frequented (Newman, 2020). At the same time, recommended stay at home measures, social distancing practices and the general uncertainty about the course of the pandemic and all that that entails led to much psychological distress and to symptoms of anxiety and depression (Xiong et al., 2020) with a heavy impact on well-being and the quality of life. Hence the

assumption that the pandemic is a driver of sustainability transformations in cities falls short of reality. In the following, we use the example of SDG 11 to detail postulations emerging from the Covid-19 pandemic and their interaction with SDG 11.

As a point of departure, we argue that the current pandemic not only challenges the way we live in cities but also how our cities are built. Office space could lose in significance as the notion of home office gains currency and buildings need to be multifunctional and more flexible for different uses and users. The consequences for urban structures and the urban–rural relationship are not yet foreseeable in total. City structures could be transformed, however, using alternative design principles. This could lead to positive assumptions about the Covid-19 impact on urban sustainability, such as those of Pinheiro and Luís (2020, p. 2): This "coronavirus-induced pause represents 'a big chance!' for developing more sustainable systems" (see also Sofo & Sofo, 2020). Cheval et al. (2020) argued in the same vein, stating that the impact of the Covid-19 pandemic may lead to a more sustainable future, including the enhanced resilience of socio-ecological systems and shorter supply chains. In the light of SDG 11, on the other hand, Covid-19 could also lead to developments that are at odds with the targets.

One SDG 11 target reads: 'By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries' (Target 11.3). A UN indicator to measure Target 11.3 is 11.3.1, 'Ratio of land consumption rate to population growth rate.' It is included in countless local initiatives for SDG implementation and calls attention to an essential principle: to reduce land consumption and use existing land in a more resource efficient way. It also relates to recent discussions on urban development and the strategy to implement compact cities and increase their density. This strategy, which was taken up by the 2030 Agenda, is a fairly recent urban development paradigm, particularly in cities of the Global North. The German Sustainability Strategy gives prominence, for example, to reducing daily land use and set a 30 hectares target (daily land use for new settlements and infrastructure is confined to a maximum of 30 hectares). The desired aim has not yet been achieved, with the daily use of new land totalling 56 hectares (Statistisches Bundesamt, 2020). Nevertheless, there is consensus that a reduction in land consumption is imperative to SDG implementation and the achievement of more sustainable urban development. The focus on more compact cities also contradicts older notions of urban development. These were shaped especially in cities of the Global North by suburbanization tendencies and an ever-increasing land consumption rate (Hamel & Keil, 2015). Apart from the SDGs, documents such as the New Urban Agenda, the European Urban Agenda and the New Leipzig Charter for urban development likewise mention dense urban structures as a core element of urban sustainability.

During the Covid-19 pandemic, however, this paradigm has been challenged. Recent health recommendations consider social distancing a crucial measure to reduce the spread of Covid-19. Social distancing, i.e., maintaining distance to other people, is an effective way of avoiding further infections and, with additional measures such as wearing masks and regular handwashing, are part of the German strategy to fight Covid-19. While social distancing is vital to reducing Covid-19 infections, its implementation is taxing, particularly in the urban context with dense urban structures, where social distancing is not always feasible. The threshold of a 1.5 metre minimum distance to other people is easier to achieve in rural than in urban communities. At the same time, being out in the fresh air is key to the quality of life and personal wellbeing. It is not surprising, therefore, that Covid-19 has led to a growing demand for private (green) space in cities and large housing estates, as reports from German Real Estate companies demonstrate (Papon, 2020; Pawlik, 2020). In addition, prices for single family housing or row houses with gardens in suburban areas have risen disproportionately since the beginning of the pandemic (Feld, Schulten, Gerling, Simons, & Wandzik, 2020). Home office activities and the availability of private green spaces were instrumental in this shift in the market. Schneider (2020) argues in an article published by the German Institute for Urban Studies that rural areas and their greater amount of private green spaces could also gain currency as residential locations in post-Covid-19 times. Although it is too early to judge whether this development will continue post-Covid-19, it is at variance with the aim of SDG 11 and the New Urban Agenda to foster denser structures, as well as with former population trends such as 're-urbanization' (Dembski et al., 2019). A widespread argument emerged during the pandemic and sees more private space and less dense structures as boosting the resilience of the city and of society in general, despite early findings on density and Covid-19 in the USA, which revealed that "density is not linked to rates of Covid-19 infection" (Hamidi, Sabouri, & Ewing, 2020, p. 506; see also Sharifi & Khavarian-Garmsir, 2020).

Does this mean we should revisit SDG 11 and its target of land consumption reduction? Does Covid-19 call for the comeback of suburbanization because it involves settlement structures that facilitate social distancing? We argue that taking this path would put SDG implementation at risk. While there is no evidence to corroborate that a specific type of built environment helps to reduce the spread of Covid-19, an overhasty comeback of suburbanization would lead to long-term unsustainable forms of settlement structure, since 1) only affluent households could practise social distancing via private green spaces, while poorer households would still suffer from lack of space, thus leading in all probability to greater social polarization and inequality in cities; 2) the long-term effects of suburbanization, such as the need for new infrastructure and negative effects on the micro

climate, are costly; and 3) establishing new, less dense settlement structures that reflect the social distancing concept would generate new path dependencies and be irreversible post-Covid-19.

We argue, therefore, that rapid elimination of the compact city model and the SDG Target 11.3 constitutes a threat, both from an ecological and a socioeconomic perspective. Returning to the idea of urban transformations as radical, multi-dimensional alterations of a given system that can go across system borders and deal with multiple as well as uncertain development options (McCormick et al., 2013), we consider other solutions more appropriate to achieving resilience in a multi-perspective way, simultaneously fighting the pandemic and adhering to the SDGs. Solutions should strive for a more efficient use of the existing urban space, enabling a wide section of the population to practise social distancing. Making public spaces in cities more eligible by enhancing their physical appearance and designing new ideas for their use would heighten the quality of life both during and after the pandemic. A variety of initiatives in cities have reopened spaces originally used for cars for pedestrians and cyclists (Honey-Rosés et al., 2020). Long-term transformations could be achieved, for example, by remodelling underused parking spaces and converting them into multipurpose spaces (Stadtlücken, 2020).

Another target of SDG 11, Target 11.2, reads 'by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons' and also qualifies as a basis for the discussion on Covid-19 resilience strategies. Indicator 11.2.1. 'proportion of population that has convenient access to public transport, by sex, age and persons with disabilities' sheds light on the unbalanced situation in public transport common to cities. Public transport can only be efficient if used by the many. Hence in terms of social distancing requirements to avoid the further spread of Covid-19, people are currently encouraged to avoid public transport because social distancing there is difficult to maintain (Lai, Webster, Kumari, & Sarkar, 2020). This has led to a decline in the number of public transport passengers (e.g., Kanda & Kivimaa, 2020; for Germany, see Klein, Köhler, & Stein, 2020). In German cities, particularly households with higher incomes tend to avoid public transport during the pandemic (Spiegel Mobilität, 2020). The challenge for public transport operators during this time is therefore to provide safe and reliable public transport services (Gutiérrez, Miravet, & Domènech, 2020). Ideas on how to achieve this in the long run include digitalisation measures such as sensor-based information on train occupancy (Federal Ministry of Transport and Digital Infrastructure, 2020). As an immediate reaction to the Covid-19 pandemic, however, a number of public transport companies reduced the frequency of their buses and light rail trains in response to the lower demand (Lill, 2020). This in turn meant that more people crowded into less trains and buses. Almost as a chain reaction, users became disillusioned with packed buses and trains, and reverted to alternative modes of transport, which frequently meant cars but increasingly trips on foot or by bike (Bauer, Bracher, & Gies, 2020). Cities that had in pre-Covid-19 times endeavoured to foster public transport and reduce individual car traffic encountered a formidable situation. Running public transport efficiently during the pandemic is not an easy task due to the decline in passenger numbers and is seen by passengers as risky. Besides promoting bike lanes and space for walking, cities should look for solutions to the rise in car traffic. SDG subtarget 11.2 seems to have fallen out of time, and Covid-19 social distancing measures could be understood as a call to refocus on private cars and the construction of car-friendly infrastructure.

We argue that despite the challenges presented by Covid-19, turning away from public transport and Target 11.2 would counteract sustainable urban development and lead to undesirable situations, since 1) land as a scare resource is not available for the extension of motorized private transport, 2) social inequalities would most likely intensify due to uneven access to car ownership, and 3) an exponential increase in cars would produce higher emissions and a decline in air quality rates, in turn impacting on climate change and vulnerability to lung disease in general and Covid-19 in particular (Slater, Masih, & Dutta, 2020).

The importance of resilience is hidden in plain sight when it comes to urban transformations and the sustainability framework. Public transport systems in many cities currently lack resilience and the ability to absorb shocks such as the Covid-19 pandemic. Cities should therefore focus on creating resilient public transport systems and implementing SDG 11.2 instead of promoting private car traffic. In addition, new technologies invented for car—or bike-sharing, such as mobility-as-a-service (Kanda & Kivimaa, 2020), could be redesigned to make alternative transport more attractive and regulate access to public and green spaces as a means of satisfying current Covid-19 regulations. In this vein, Lai et al. (2020) argue for post-pandemic urban planning with guidelines for density-specific social distancing in mass transport systems, pedestrian sidewalks, parks, bars and restaurants.

4. Conclusion: The Challenges of Urban Sustainability Transformations in a Situation of Crisis

Having shown that global challenges like Covid-19 seem, at first sight, to question SDGs with reference to resilience as one of three key Urban Sustainability Transformations dimensions, we argue for fundamental changes that are robust and guarantee the resilience of cities in the long run. We also demonstrated that a back-to-the-roots approach as a Covid-19 strategy may

well fall short as it fails to make use of windows of opportunity that have emerged in the throes of the pandemic. Resilience needs to be understood not only as a bounce-back goal but as the future-oriented aim of fundamental Urban Sustainability Transformations. Science can contribute to both aspects with more systemic, scenario-based research that tackles sustainability and resilience as cross-cutting and describes alternative development options. Here, the amount of research on the impact of Covid-19 on sustainable development in cities (and beyond) is rising steadily but it still seems too early to predict the long-term effects. Nonetheless, Covid-19 has taught us lessons on Urban Sustainability Transformations and resilience in a moment of unforeseen crisis, and given us the option of rethinking the future of our cities. It has been clearly shown that resilience does not mean the unconditional return to a pre-pandemic state but instead a discussion on the existing structures to be maintained and the new structures to be designed. Given the research gaps and following up on Chelleri, Waters, Olazabal, and Minucci (2015), we therefore plea for more integrated solutions in cities, which favour, for example, climate change mitigation and adaption and social equity aspects in order to take into account the multiple trade-offs blatantly evident in the pandemic situation. Furthermore, considering resilience in a descriptive rather than normative way might allow for greater attention to equity and justice (Weichselgartner & Kelman, 2015), and account for the power of projects on the ground for more dynamic change (Nightingale et al., 2020).

At the same time, SDGs and their implementation at urban level flag the importance of an inclusive approach: Leave no one behind. Participative approaches in the Covid-19 era and in the logic of combating a pandemic seem outdated. Strong political leaders implement top-down measures that impact heavily on the daily lives of billions of people. While fighting Covid-19 requires uniform and rapid responses and legitimates authoritative measures, SDGs strive for participation, inclusiveness and a bottom-up approach. We argue that this principle is key to SDG implementation in cities and should not be neglected in pandemic times. Research can contribute by analysing windows of opportunity with inclusive approaches, and by means of transdisciplinarity, co-design and co-production, and thus support cities in steering participatory processes.

A robust approach to Urban Sustainability Transformations must also tackle the tension between universal solutions for sustainable urban development and the context-sensitivity of individual cities. Challenges arise in handling the overall aims of the transformative approach of the 2030 Agenda and its SDGs, on the one hand, and the varying institutional, geographic, demographic and economic contexts of each city, on the other. This recognizes that although transformations towards more resilience in different cities call for different forms and different objectives, the underlying principles of Urban Sustainability Transformations exist and, irrespective of their context, must be applied. In other words, while individual cities may implement diverse initiatives such as 'smart cities,' 'low carbon cities,' 'inclusive cities' or 'healthy cities,' all of which can be considered as singular pathways to sustainable urban development, they do not translate to greater overall resilience. In consequence, the existing context can become a delimiting factor for transformation processes or even be subject to change during the transformation process, as the current Covid-19 pandemic shows. This calls for research that reflects the empirical and comparative perspectives of cities in the light of universal SDGs. More specifically, we see an opportunity to strengthen these SDGs with empirical research on the challenges that cities face in Covid-19 times.

While the idea that cities have the potential to solve our global environmental problems in terms of sustainability is enticing, research has not yet delivered sufficiently on how cities can fulfil this mission. Hence, more theoretical and empirical evidence-based and applied research is needed if we are to provide recommendations for urban transformations dedicated to sustainable development options. In this sense, we support the idea of a globally oriented 'urbanization science' (Solecki, Seto, & Marcotullio, 2013) and endorse the notion of an 'urban lens' (Acuto, Larcom, et al., 2020), acknowledging that cities can be effective catalysts for sustainable development while at the same time recognizing obstacles and unforeseen global developments such as the Covid-19 pandemic.

Conflict of Interests

The authors declare no conflict of interests.

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Article

Locating Cities and Their Governments in Multi-Level Sustainability Governance

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Abstract
Cities and their governments are increasingly recognized as important actors in global sustainability governance. With the adoption of the 2030 Agenda for Sustainable Development, their role in the global endeavor to foster sustainability has once again been put in the spotlight. Several scholars have highlighted pioneering local strategies and policies to implement the Sustainable Development Goals and render urban areas more sustainable. However, the question of how such urban sustainability actions are embedded in complex interactions between public and private actors operating at different levels has not been studied in enough detail. Building upon a multi-level governance approach, this article explores the entanglement and interconnectedness of cities and local governments with actors and institutions at various levels and scales to better capture the potential and limitations of urban policymaking contributing to global sustainability. The article finds that on the one hand cities and their governments are well positioned to engage other actors into a policy dialogue. On the other hand, local authorities face considerable budgetary and institutional capacity constraints, and they heavily rely on support from actors at other governmental levels and societal scales to carry out effective sustainability actions in urban areas.

Keywords
2030 Agenda; cities; local governments; multi-level governance; Sustainable Development Goals

Issue
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1. Introduction

Over the past few years, numerous scholars have pointed to the growing importance of cities and their governments in global policymaking (e.g., Amen, Toly, McCarney, & Segbers, 2011; Curtis, 2014). Cities are described as spaces for creative responses to global problems, as sites of new policy cultures with less hierarchical structures, and as important hubs for innovation in the digital age. Mayors and other representatives of local governments moreover increasingly take part in international conferences and form networks and alliances to cooperate with each other and advocate for their common interests (Bäckstrand, Kuyper, Linnér, & Lövbrand, 2017). These developments are not entirely new but seem to have lately gained another quality and are especially prevalent in global sustainability governance.

The 2030 Agenda for Sustainable Development (2030 Agenda) adopted by United Nations General Assembly in 2015 highlights the significance of the local level to attain sustainable development worldwide (United Nations, 2015). The 2030 Agenda encompasses 17 Sustainable Development Goals (SDGs) covering the economic, social, and environmental dimensions of sustainable development. SDG 11 on inclusive, safe, resilient, and sustainable settlements is especially dedicated to the local level and several other goals are closely related to cities and municipalities, such as (inter alia)

SDG 6 on clean water and sanitation, SDG 9 on industry, innovation, and infrastructure, SDG 10 on reduced inequalities, and SDG 12 on responsible consumption and production. This article focuses on the environmental dimension of the 2030 Agenda and explores the role of cities and their governments to achieving these goals.

In the literature, there are many studies about frontrunner cities like Barcelona, Copenhagen, Freiburg, Portland, Sidney, Utrecht, or Yokohama. Numerous authors have shown that the governments of these cities carry out pioneering sustainability measures and adopt nature-based solutions in urban areas (e.g., Dorst, van der Jagt, Raven, & Runhaar, 2019; Simon, 2016). In the C40 Cities Climate Leadership Group, the world's most populous cities share their knowledge on best practices to take climate actions and position themselves as global leaders for attaining sustainability (Davidson, Coenen, & Gleeson, 2019; Román, 2010). Likewise, smaller cities conduct local sustainability projects and join forces in global coalitions, such as the Global Resilient Cities Network or ICLEI—Local Governments for Sustainability, in regional clusters, such as Energy Cities or the ASEAN Smart City Network, as well as in numerous national city associations.

Despite this rise in local sustainability actions, we have to be careful to not overestimate the abilities and capacities of cities and their governments to foster sustainability worldwide. The material resources of mayors and local administrations vary considerably, but they are generally limited and dependent on support from actors at other governmental levels and societal scales. To conduct sustainability projects on the ground, cities and local governments rely on regional and national governments, international funding schemes, civil society engagement, and private corporations that all operate in the multi-level governance system. This is sometimes neglected in the debate about the opportunities of cities and their governments to address sustainability issues in urban areas. The present article therefore explores the embeddedness of cities and their governments in multi-level sustainability governance.

In particular, the article analyzes their entanglement and interconnectedness in multi-level governance dynamics in three dimensions. In a first dimension, the article examines the vertical interlinkages of cities with regional and national governments and their involvement in international conferences led by the United Nations on climate change and sustainable development. In a second dimension, the article scrutinizes the horizontal interplay of municipalities with public and private actors in their jurisdictions. In a third dimension, the article studies the transnational interplay of cities in networks and alliances. The article's principal aim is to put forward a conceptual argument that the abilities and capacities of cities and their governments to contribute to global sustainability need to be seen in the context of the overall multi-level governance system. To develop this argument, the present article focuses on studies from the field of climate and sustainability politics and governance and draws on some illustrative examples from this burgeoning scholarship.

The article proceeds in the following way. In Section 2, I depict the growing recognition of cities in global sustainability governance and contextualize the article within the broader body of literature on this topic. In Section 3, I sketch a multi-level governance perspective for the location of cities and their governments in global sustainability governance. In Section 4, I provide a number of empirical examples to underscore the entanglement and interconnectedness of cities and their governments with other actors in the sustainability domain. Finally, I draw some general conclusions on the role and function of cities and local governments in the global endeavor to achieve sustainability and point to a promising research avenue.

2. The Growing Recognition of Cities in Global Sustainability Governance

This article starts off from the notion that cities and their governments are to a growing extent recognized as key actors in global sustainability governance. And indeed, today most people live in urban areas and a high proportion resides in mega-cities where the bulk of global greenhouse gases is emitted, where large shares of global energy and fresh water are consumed, and where big amounts of waste materials are produced (e.g., Shmelev, 2017). According to the United Nations Human Settlements Programme, about 55% of the approximately 7,5 billion people in the world live in cities (UN Habitat, 2016). Projections by UNDESA state that until 2050 more than two thirds of the world's population will live in urban agglomerations, while in particular large cities with more than five million inhabitants are expected to rise rapidly in the next decades (UNDESA, 2019).

Scholarship on the role of the local level in global policymaking has evolved considerably over the past years. Authors have pointed to global trends of decentralized decision-making and referred to the changing relationship between local and national governments (e.g., Brenner, 1998; Sassen, 1994; Scott, 2001). Studies in the field of environmental politics have also drawn considerable attention to the role of cities and local governments in the global responses to different sustainability problems, first and foremost to the issue of climate change (Betsill, 2001; Bulkeley & Betsill, 2005; Kousky & Schneider, 2003). All these studies have enhanced our understanding of the significance of the local level in global sustainability governance and many other policy domains.

Several authors have lately also argued that cities and their governments are better suited and more agile to address sustainability issues than central governments since they are not caught up in slow and tedious international bargaining processes (Acuto, 2013;

Rosenzweig, Solecki, Hammer, & Mehrotra, 2010). Local authorities are confronted with similar sustainability problems and challenges like air pollution, heat waves, complex supply chains, recycling systems, and basic universal health. There are, however, also strong differences: Some cities, especially mega towns in the global South, are rapidly growing—putting an additional stress on them, while other municipalities in structurally disadvantaged regions suffer from shrinking populations and a brain drain of high-skilled professionals (Hansen, Ban, & Huggins, 2003; Nagendra, Bai, Brondizio, & Lwasa, 2018). Local governments have hence to deal with numerous dimensions of sustainability transformations (Vardoulakis & Kinney, 2019).

A number of cities have adopted targeted strategies and pursue their own policies to render their urban areas more sustainable (Sodiq et al., 2019). These initiatives have been framed as urban sustainability experiments (Peng, Wei, & Bai, 2019; Sengers, Berkhout, Wieczorek, & Raven, 2016). Local governments launch such innovations for different reasons (Fuhr, Hickmann, & Kern, 2018): Cities like Beijing, Delhi or Jakarta face high problem pressure and cope, for instance, with periods of intense smog and air pollution; other cities allow for elements of direct democracy and participation leading to policy innovations for sustainability; some cities have more political leeway and resources to implement local sustainability measures; urban areas like San Francisco with a green industry have become centers for sustainability products; and some mayors have demonstrated political leadership by adopting effective urban sustainability strategies (see also Gordon, 2018).

The pioneering initiatives of some cities to promote sustainability at the local level have in the recent literature been contrasted with the lack of ambition of national governments to fight global environmental problems like climate change, biodiversity loss, and land degradation (Rosenzweig et al., 2010). This has led to frustration with international negotiations on transboundary sustainability issues. Such disappointment has been spurred by the experience of the failure of the climate summit in Copenhagen in 2009 when the heads of state and government of the major powers could not agree on a new climate treaty to replace the Kyoto Protocol (Hoffmann, 2011). As a result, several scholars pointed to alternatives to the tenacious intergovernmental attempts to establish a regulatory framework for dealing with climate change and many of them devoted particular attention to cities and their networks (Chan et al., 2015; Gordon & Acuto, 2015; Romero-Lankao et al., 2018).

This evolving scholarship has raised high expectations in the role and function of cities and local governments in the global response to climate change and the global endeavor to foster sustainable development (Chan et al., 2019). Benjamin Barber's books *If Mayors Ruled the World: Dysfunctional Nations, Rising Cities* (2013) and *Cool Cities: Urban Sovereignty and the Fix for Global Warming* (2017) are prominent examples of such great hopes. That research line has raised public awareness of local sustainability actions. Yet, some of these studies have an overtly optimistic tone regarding the impact of local sustainability initiatives on global developments and tend to overestimate the capacities of cities and their governments to cope with sustainability issues independently from actors at other levels and scales.

While there is good reason to regard cities as important actors in global sustainability governance, this article offers a more nuanced perception of the role of cities and their governments within this realm. To this end, it builds upon a multi-level governance approach and highlights the embeddedness of cities and local governments in urban sustainability policymaking to better capture their potential and limitations for contributing to global sustainability.

3. A Multi-Level Governance Perspective on the Role of Cities and Their Governments in the Sustainability Domain

The term 'multi-level governance' is today widely used in the literature to conceptualize the various linkages between different actors and institutions in a given policy domain or in the whole global governance system. Originally introduced and used by scholars dealing with the European Union to account for the complex relations between local, national, and European levels of decision-making (Hooghe & Marks, 2001; Marks, 1993), authors dealing with environmental politics have subsequently adopted the concept and applied it on national and global climate governance (e.g., Gupta, 2007; Kern & Alber, 2008; Selin & VanDeveer, 2012; Weibust & Meadowcroft, 2014).

Following Liesbet Hooghe and Gary Marks (2003), two types of multi-level governance perspectives can be distinguished. A first Type I multi-level governance perspective focuses on public authorities and their interactions across governmental levels (from the local to the global). A second Type II multi-level governance perspective does not exclusively look at vertical interactions between governmental actors at different levels, but also takes their horizontal relationships with private actors, academic institutions, and civil society groups as well as their transnational interlinkages into account. This latter perspective provides a suitable lens for analyzing the role of cities and local governments in global climate and sustainability policymaking (Bulkeley & Betsill, 2005, 2013).

While the multi-level governance perspective is a useful approach for exploring interlinkages between actors across levels and scales, the concept does not account for the often-huge differences between actors and institutions in terms of power constellations, legal status, or political leeway (Bulkeley & Betsill, 2013). With regard to the topic dealt with in this article, it can be argued that the multi-governance perspective

cannot adequately capture the variances between individual cities across the world and their positions to take urban sustainability actions (Homsy, 2018). To delve deeper into the particularities of different cities and their concrete interlinkages to other actors in the global responses to sustainability problems, the multi-level governance perspective needs to be complemented with other approaches. Thus, the effort of this article to locate cities in multi-level sustainability governance provides some groundwork for future studies that strive to investigate power asymmetries, diverging interests, and norm conflicts between local authorities and actors at other levels and scales.

As noted earlier, the 2030 Agenda is supposed to promote a global sustainability transformation (United Nations, 2015). This global endeavor requires a multi-actor effort in which many transformational developments take place in urban areas (Romero-Lankao et al., 2018), while the various sustainability projects and activities carried out in cities are embedded in the larger governance system. The great advantage of the multi-level governance perspective is that it offers insights into the entanglement and interconnectedness of cities and their governments within the wide web of actors dealing with sustainability. The multi-level perspective shows that cities and local governments are not isolated actors; and it emphasizes that their ability to undertake sustainability projects in their jurisdictions and pursue policies is enabled or constrained by their surrounding landscape of actors and institutions. Building upon a Type II multi-level governance approach (Bache, Bartle, & Flinders, 2016), this article focuses on three dimensions of this embeddedness.

First, the article looks at the vertical integration of cities and local governments within national systems and at their involvement in international conferences. Second, the article looks at horizontal interactions of cities and local governments with civil society groups, educational and scientific institutions, as well as business entities. Third, the article looks at the efforts of cities and local governments to organize themselves in transnational networks and to build alliances for knowledge sharing and formulating best practices. While local governments generally have a good position in the multi-level governance system to engage actors at other governmental levels and societal scales into a policy dialogue, the following sections discuss the connectivity of cities and their governments to other actors in global sustainability governance.

4. Cities and Their Governments in Global Sustainability Governance

The important role of cities in the global response to transboundary environmental problems has already been mentioned in the Brundtland report published in 1987 (World Commission on Environment and Development, 1987, Chapter 8). Shortly after, it was re-emphasized in Agenda 21 which was an outcome of the Earth Summit in Rio de Janeiro in 1992 (United Nations, 1992). With the adoption of the 2030 Agenda and the 17 SDGs in 2015, cities have once again been put in the spotlight of the global endeavor to foster sustainability. Yet, the question of how urban sustainability actions are embedded in complex interactions between public and private actors operating at different levels has not been studied in much detail.

4.1. Vertical Integration and Involvement in International Conferences

Cities and their governments are confronted with numerous sustainability challenges which require local strategies and policies for mitigating air pollution, advancing public transportation systems, improving waste and water management or providing access to basic health facilities for all citizens. Comparative studies on urban sustainability actions demonstrate that the capacities and autonomy of local authorities vary considerably from policy domain to policy domain and from country to country (e.g., Kern & Mol, 2013; Ladner, Keuffer, & Baldersheim, 2016). Swedish municipalities are described as actors with relatively strong resources and leeway to carry out sustainability measures in their jurisdictions (Kronsell & Mukhtar-Landgren, 2018). In contrast, cities in India have a very weak position in the domestic public-administrative system and lack financial means to undertake sustainability projects (Beermann, Damodaran, Jörgensen, & Schreurs, 2016).

Regardless of the varying capacity and autonomy across cities, legal frameworks at higher governmental levels play a decisive role in shaping local policy options for sustainability. To implement large-scale sustainability projects, cities rely on regional and national governments (Homsy & Warner, 2015). In fact, most local governments have limited institutional capacities and financial resources for addressing sustainability (Stehle, Hickmann, Lederer, & Höhne, 2020; Wang, Hawkins, Lebredo, & Berman, 2012). In many cities of the global South where national governments face serious budgetary limitations, effective sustainability actions depend on external funding provided by international agencies or bilateral donors (Nagendra et al., 2018; Stehle, Höhne, Hickmann, & Lederer, 2019). Moreover, urban sustainability initiatives are in many countries hampered by uncoordinated and partly overlapping responsibilities within local government (Cugurullo, 2018; Homsy, 2018) as well as by vested interests, especially in the energy, transportation, or land-use sectors (Elsässer, Hickmann, & Stehle, 2018).

In recent years, cities have increasingly become involved in international conferences. In the global climate regime complex, cities have officially been recognized as 'governmental stakeholders' in 2010 after local governments put considerable effort into augmenting the position of cities in the international climate

negotiations (Zeppel, 2013). In a similar vein, cities are involved in the High-Level Political Forum on Sustainable Development taking place annually under the auspices of the United Nations to track progress of the implementation of the SDGs (Beisheim, 2015; Dellas, Carius, Beisheim, Parnell, & Messner, 2018). At these events, local governments bring in joint interests and showcase urban sustainability initiatives. In 2018, a number of cities started to emulate the national reporting process and submitted Voluntary Local Reviews to highlight their efforts to realize the 2030 Agenda in urban areas (Institute of Global Environmental Strategies, 2020).

While this development underlines the ambition of local governments to become global actors in global sustainability governance, scholars point out that such activities are primarily aimed at raising awareness and attracting funding for sustainability projects from higher governmental levels and private actors (Alberti & Senese, 2020; Hickmann, 2017). Without the support of national and regional, as well as international funding, local authorities are largely constrained in their activities (Haarstad & Wathne, 2019; Homsy & Warner, 2015). Well-functioning vertical relations to actors at higher governmental levels and international agencies are hence crucial for propelling and maintaining urban sustainability initiatives.

4.2. Horizontal Interactions

Cities and their governments are in relative proximity to their population which enables them to bring together different stakeholders and balance different interests to formulate local sustainability solutions. According to different authors, this position is a key advantage of cities and local governments illustrating their large potential for contributing to the promotion of sustainability worldwide (McGranahan & Satterthwaite, 2003; Satterthwaite, 1997). This idea has also been the cornerstone of Agenda 21 which stipulates that local governments should enter into a dialogue with their citizens, community organizations, and private companies, and adopt a Local Agenda 21 to guide the development of their areas towards a more sustainable future (United Nations, 1992, Chapter 28).

A number of cases are described in the literature that show how pioneering local authorities have been successful in forging connections between citizens, non-governmental organizations, and private corporations leading to innovative urban sustainability actions (e.g., Eckerberg, 2012; Selman, 1998). Key success factors identified in the literature include leadership combined with a well-equipped public administration, an active civil society, and a flourishing local green industry (Fitzgerald, 2010; Gilbert, Stevenson, Girardet, & Stren, 2013; Smardon, 2008). In recent years, some local governments have created and become engaged in urban transition spaces where local stakeholders can experiment and develop sustainability solutions in their districts. In such co-creative processes, local authorities are expected to change their roles from traditional governors to facilitators, enablers, and connectors that build trust among local actors (Marvin, Bulkeley, Mai, McCormick, & Palgan, 2018; Nevens, Frantzeskaki, Gorissen, & Loorbach, 2013). This underscores the large potential of local governments to act as transmission belts between the 2030 Agenda and different societal stakeholders.

The entanglement of public and private actors in current governance instruments for promoting sustainability at the local level also bears the danger that private actors take advantage of their influential role as local job provider to lobby for their individual interests which can be detrimental to the provision of the common good. In particular, scholars have shown how private corporations resisted and even undermined local regulation of environmentally harmful practices (Campbell, 1996; Theodore, Peck, & Brenner, 2011). Yet, other studies stress that public and private interests can be brought in line with each other to increase the common good and promote the overall objective of urban sustainability (Solano, Casado, & Ureba, 2017; Van Berkel, Fujita, Hashimoto, & Geng, 2009).

In such horizontal interactions, scientific actors can also play a crucial role for enhancing sustainability at the local level (Bansard, Hickmann, & Kern, 2019). Universities and other scientific institutes provide evidence-based input for urban sustainability policymaking (Romero-Lankao et al., 2018). Scientists engage with local stakeholders in real-world laboratories aimed at reducing the carbon footprint of certain neighborhoods or corporations (Evans & Karvonen, 2014). Researchers contribute to local capacity building and public awareness on sustainability issues and self-govern their behavior towards greater sustainability by limiting air travel, supporting green procurement, or purchasing environmentally-friendly goods (Chaudhury, Vervoort, Kristjanson, Ericksen, & Ainslie, 2013). Such steps require that scholars change their self-conception of neutral experts and leave their comfort zones (van der Hel, 2018).

However, on a global scale, there are still only relatively few instances where local governments, civil society groups, private companies, and researchers effectively work together to foster urban sustainability. While there are some promising examples (mostly in highly industrialized countries), the broader potential of such collaborations still needs to be exploited (Guerra, Schmidt, & Lourenço, 2019; Nevens et al., 2013). According to Paul Fenton and Sara Gustafsson (2017, p. 131): "Significant barriers to change at the intra-municipal level exist, including capacity and resources deficits, political or other interests, or the complexity of the change itself." The focus on cities in the 2030 Agenda could spur urban sustainability action, but structural barriers of cities and their past experiences with Local Agenda 21 need to be reflected and taken seriously when designing sustainability initiatives at the local level.

4.3. Transnational Networks and Alliances

Transnational city networks and alliances have a long tradition and date back to the beginning of the 20th century. Their key characteristics are a voluntary membership, self-governing procedures, and direct implementation of common decisions. In the early 1990s, around the time of the Earth Summit in Rio de Janeiro, several new networks and alliances have been established with the general aim to enhance urban sustainability actions (Keiner & Kim, 2007). Since then, their number has been steadily increasing with a strong focus on the policy domain of climate change (e.g., Bulkeley, 2010). These networks and alliances enable coordination between local authorities with similar interests and allow for inter-municipal dialogues, while they, at the same time, seek to pool their members' influence and highlight the presence of cities at the global stage (Gordon, 2013; Toly, 2008).

Transnational city networks and alliances fulfill different functions and entail varying mechanisms through which they seek to steer their members (Kern & Bulkeley, 2009). In particular, they generate knowledge and provide information on environmental issues, support applications for sustainability project funding and establish stable cooperation channels, set benchmarks and offer certificates for eco-friendly behavior, and get involved in international environmental negotiations and policy discourses on sustainable development. By all these means, networks and alliances encourage learning processes and the exchange of experiences among their city members that deal with sustainability on the ground (Hakelberg, 2014).

Several scholars have emphasized the large opportunities of transnational city networks and alliances to engage in global sustainability governance arguing that they work as policy entrepreneurs and agenda-setters (Acuto & Rayner, 2016; Gordon & Johnson, 2017). In particular, these authors point out that such networks and alliances can to some extent overcome the constraints imposed by national decision-making and international bureaucracies, while not being bound to party interests or political timetables. At the same time, other authors have highlighted that transnational networks and alliances lack adequate funding and heavily rely on financial flows from national governments, international agencies, and private foundations to maintain their services and campaigns (Betsill & Bulkeley, 2007; Hickmann, 2016; Kern & Bulkeley, 2009). Such a dependence on other actors renders cities prone to capture by external interests and agendas (e.g., Gordon, 2018).

Furthermore, recent studies that assess the degree to which transnational networks and alliances of cities steer their members towards sustainability practices and new organizational structures have come to only modest results (Gordon, 2018; Hickmann, Fuhr, Höhne, Lederer, & Stehle, 2017). Scholars particularly contend that although such networks and alliances offer significant support for many cities, their initiatives often lead to nothing because of constraining factors in the national political-economic system as well as the lack of commitment from mayors and local public officials (Stehle et al., 2020).

In a similar vein, authors have shown that the actual effects of such networks and alliances in terms of climate change mitigation are very limited which applies to networks and alliances located in the global South and in the global North (Bansard, Pattberg, & Widerberg, 2017; Stehle et al., 2019). They are essentially not drivers for urban sustainability and low-carbon development, but work rather as catalyst for enhanced action in cities with certain prerequisites, while their general impact is rather low due to persistent budgetary and institutional capacity constraints.

5. Conclusions

This article has discussed the entanglement and interconnectedness of cities and their governments in multi-level governance dynamics for sustainability. While pioneering sustainability initiatives in urban areas underscore the large potential of local authorities to contribute to global sustainability, some studies convey an overtly optimistic tone regarding the impact of local sustainability initiatives on global developments. They tend to overestimate the agency of local governments and seem to neglect that cities are heavily contingent on support from public and private actors to carry out effective sustainability actions in urban areas.

In particular, the article looked at three dimensions of the embeddedness of local authorities in multi-level sustainability governance. First, cities and local governments rely on regional and national governments, as well as international funding agencies to launch and maintain large-scale urban sustainability initiatives. Second, local authorities face structural barriers when designing innovative urban sustainability actions that bring together different local stakeholders and have to expand their traditional governor role. Third, the wider impact of transnational city networks and alliances on local sustainability initiatives is rather low and opens the door for external influence. Such limitations for local authorities to conduct effective urban sustainability actions are often neglected in the literature.

To foster global sustainability and achieve the 17 SDGs, efforts by all political and societal actors are required; and to exploit the full potential of local governments, urban sustainability initiatives must go hand in hand with higher-level policies and programs, enhance ownership of local stakeholders, and be integrated in transnational networks and alliances. Due to their proximity to citizens, local authorities have an advantageous position in the multi-level governance system allowing them to act as transmission belts between the 2030 Agenda and the plethora of local stakeholders operating in the field of sustainable development. Yet, such a function requires steady support from other governmen-

tal levels, stable funding streams, and continuous peer-to-peer learning in networks and alliances.

The all-encompassing character of the 2030 Agenda constitutes a challenge and a chance for cities and their governments. On the one hand, it puts an additional burden on local governments to support the implementation of the SDGs in their jurisdictions, while on the other hand they open up new possibilities for collaboration with actors at other levels and scales under the umbrella of the vision to transform our world. A key lesson from this article is that when assessing the global endeavor to achieve the SDGs, it makes no sense to look at individual actors in isolation from others. Cities and their governments are certainly crucial for achieving the SDGs, but we have to better understand their embeddedness in the multi-level governance system.

A promising avenue for future research is to explore collaborations between cities and other actors for upscaling or diffusing urban sustainability initiatives (Fuhr et al., 2018; Hakelberg, 2014; Peng et al., 2019; van Doren, Driessen, Runhaar, & Giezen, 2018). As cities and urban areas are very heterogeneous, we warrant further knowledge on the success conditions of urban sustainability initiatives and their evolving relationship to national governments, international organizations, intergovernmental agencies, transnational networks and alliances, as well as business entities, scientific institutions, and civil society groups. Open questions in this context include whether, to what extent, and how the collaborative governance approaches of pioneering local authorities within the sustainability domain can be transferred to other cities with their particular characteristics.

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Conflict of Interests

The author declares no conflict of interests.

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