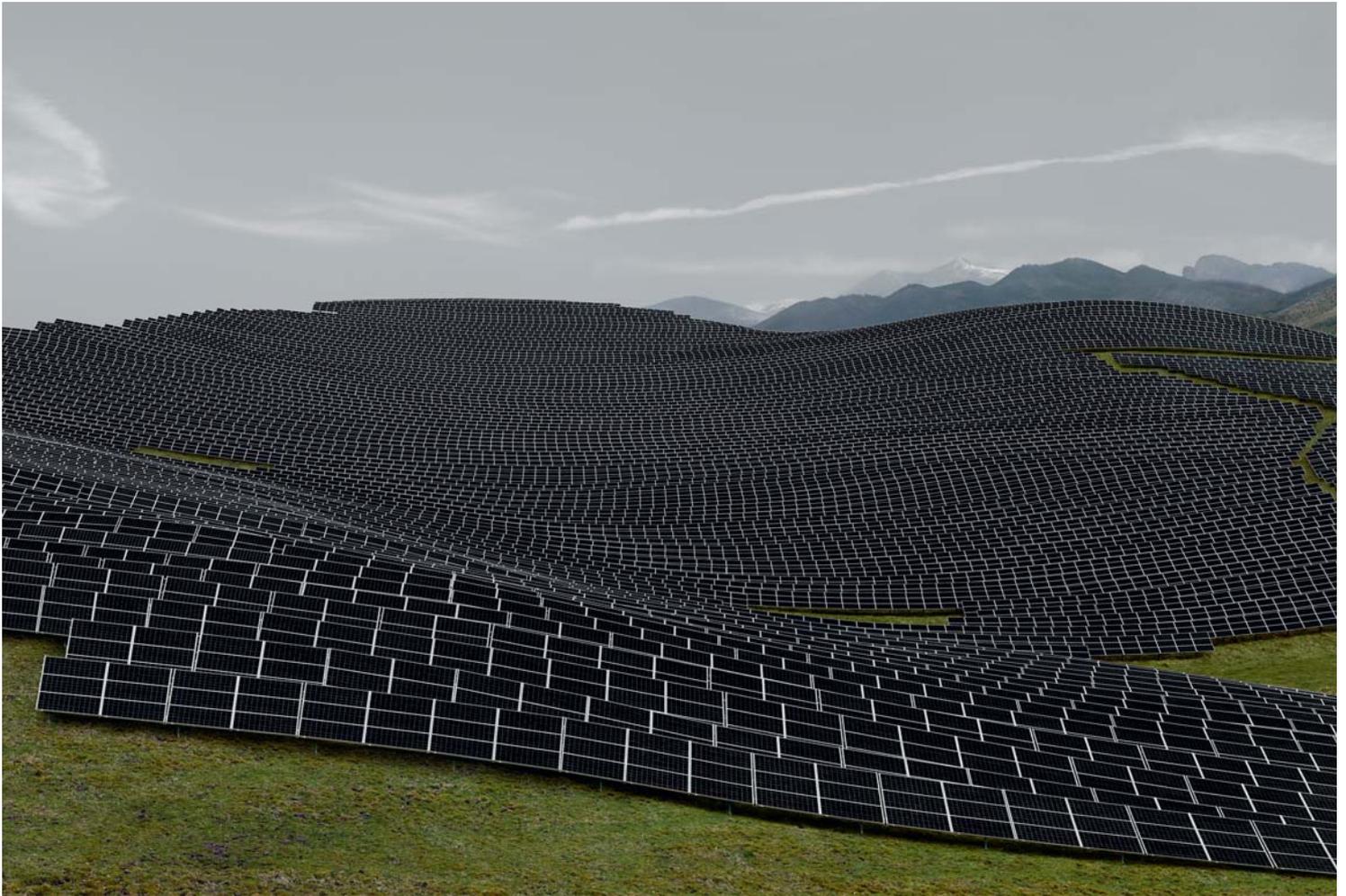


GAIA

S1 | 2019

ECOLOGICAL PERSPECTIVES FOR SCIENCE AND SOCIETY

ÖKOLOGISCHE PERSPEKTIVEN FÜR WISSENSCHAFT UND GESELLSCHAFT



SPECIAL ISSUE

SUSTAINABLE ECONOMY: PERSPECTIVES OF CHANGE

GAI^A

ECOLOGICAL PERSPECTIVES FOR SCIENCE AND SOCIETY
ÖKOLOGISCHE PERSPEKTIVEN FÜR WISSENSCHAFT UND GESELLSCHAFT

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The business of business is mutual cooperation for sustainable development



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Currently, shrinking economies are encountering economies with unprecedented growth rates. Neither accounts for the costs involved in the support of nature and the environment, or the societal and ethical costs of hunger and obesity. Such a stance is irrational. Ignoring ecological consequences and side effects speaks against logic, even an economic one.

Corporate financial disclosure might cover important areas of a given enterprise's value; they are blind, however, to the ecological and social costs. Most critical are the risks that the people in charge know nothing about, as opposed to those they deliberately ignore. This means that the concept of the "triple bottom line"¹ is dead. Historically, the concept claimed the turf of the shareholder value in the sustainability debate and politics. Advanced corporate politics, however, is beginning to abandon this line of thinking. Corporations are experimenting with improved approaches that calculate the full costs and losses of their business model and the full societal benefits, including the supply chain, and even the lifecycle of goods and services. "Big data" technology will allow and probably demand full data access. As yet the vision of joint and several data disclosure and accountability may seem far-fetched. It is not. Economic thinking in the Anthropocene needs to catch up with the challenges of climate change and sustainability politics.

Sustainable Development Goals (SDGs) tell a story about the possibility of a better future and about the universality of the idea of a better future. This story runs counter to the atmosphere of fear and conflict in today's world, and it runs counter to the narrow and self-centered way the mainstream economy is being interpreted today. This story is in the middle of the road, though the road is bumpy and steep. The implementation of *SDGs* and the *2030 Agenda for Sustainable Development* lies with the national states, but it is open to all entities. The *SDGs* suggest the importance of two simple circumstances: one, we have neighbors all over the world, regardless of how far away the actual borders are. Two, any company's license to operate is linked to much broader social interaction than traditional corporatism still wants us to believe.

Steering the next economy and entrepreneurial leadership towards sustainability will require more research and engagement. Well-resourced and meaningful participation is a key factor. Selling dystopia or preaching gloom and doom scenarios belong to yesterday. As it is also shown in this special issue, a transformation to a sustainable economy is about new business and consumer practices, with no one left behind. It requires the testing of institutional and cultural framework conditions that make it possible for research and practice to devise and develop solutions that address the deep-seated causes of non-sustainability. We need a new interface between the principle of innovation and the principle of environmental precaution to respond to the urgency and the potential of the *SDGs*. This interface must be science-based, people-centered and carried out through visionary politics.

¹ The triple bottom line is an accounting framework to measure the overall performance of a company in economic, social and ecological respect.

Günther Bachmann

GAIIA

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COVER PICTURE: Located in southern France, the Les Mées solar farm covers some 200 hectares with over 100,000 solar modules. In his picture, the photographer Andreas Gursky captures the ambivalent manifestations of our modern economy and way of life. When it comes to the environment, the generation of power from solar energy seems to be both good and bad. In general, we tend to associate the transition towards sustainable development with technical innovations such as solar panels. Technical innovations, however, are not sufficient. For a true change of course towards sustainability, social innovations are required. Sustainable economy approaches are the theme of this special issue and explore new social and political forms of action. Instead of focusing on technological innovations, these new developments intend to change consumption patterns and business models.

Andreas Gursky, Les Mées (Detail), 2016

© Andreas Gursky/Courtesy Sprüth Magers/VG Bild-Kunst, Bonn 2019

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SPECIAL ISSUE

SUSTAINABLE ECONOMY: PERSPECTIVES OF CHANGE

Weekly shopping tours for fancy clothes. The newest smartphone. Trading conflict minerals from the Democratic Republic of Congo. Relocating workplaces to low-wage countries. Many of our consumption and production patterns are unsustainable. Should we continue like this, we will be endangering not only our own livelihoods but those of future generations as well. We must change our business models and consumption practices. We must adopt change-based perspectives. With their focus on social innovations, sustainable economy approaches promise to advance transformation towards sustainability. This special issue presents conceptual and empirical analyses on the drivers

and obstacles, as well as social and economic implications, of sustainable economy approaches, conducted within the *Social-Ecological Research (SOEF)* funding priority of the German Federal Ministry of Education and Research and the *SOEF* funding measure *Sustainable Economy*. The papers included in this issue range from aggregated assessments of structural effects to single, sector-specific case studies. They introduce, among other things, new governance approaches, strategies for involving new actors in the development of sustainability innovations, innovative cohousing initiatives, and potential paths of transformation for sustainably managing supply chains.

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Social-ecological research for the transformation to a sustainable economy

Opening up new perspectives for change

Reaching the Sustainable Development Goals requires a transformation to a sustainable economy.

This special issue presents new scientific results produced within projects of the funding measure Sustainable Economy, which is part of the Social-Ecological Research (SOEF) funding priority of the German Federal Ministry of Education and Research. The articles focus on new lines of inquiry with regard to impacts, governance approaches, and sector-specific conditions and options for a transformation to a sustainable economy.

Rainer Walz (Guest Editor), Ralph Wilhelm

Social-ecological research for the transformation to a sustainable economy. Opening up new perspectives for change

GAIA 28/S1 (2019): 180–183 | **Keywords:** social-ecological research, sustainable economy, sustainable production and consumption transformation, transition

A high level of production and consumption of goods and services reflect prosperity and quality of life. However, at the same time, this leads to social-ecological problems such as the destruction of nature with the loss of biodiversity, overexploitation of natural resources, environmental pollution and exploitative working conditions. The unsustainable production and consumption patterns of our economic system with companies and citizens as key players represent a crucial social challenge. One goal, therefore, is to turn companies and consumers into shapers of social-ecological change. The task of companies is to reorganise their production processes in accordance with sustainability principles and to influence consumption patterns. The role of citizens is more diverse. As the consumers and users of products and services, they exert influence, finance projects (e.g., through investing and crowdfunding) and are involved in civic activities. They are also increasingly becoming producers themselves, of food, for example (e.g., urban gardening or food sharing). As a result, the spheres of production and consumption are becoming increasingly interconnected (prosuming), leading to the creation of cooperative innovation processes between companies and consumers (BMBF 2015, p. 19).

Reaching the *Sustainable Development Goals (SDGs)* requires numerous eco-innovations. This is reflected in policy initiatives

such as eco-innovation action plans on both the national and EU level, which concentrate mostly on technical innovations (Walz et al. 2019a). However, organisational, institutional and social innovations are needed in addition to technical ones, and it is their combination, which can lead to a transformation towards sustainable development. Despite the progress made in corporate activities and sustainable consumption patterns, the road to a transformation towards a sustainable economy is still a long one. A survey on recent trends in Germany (Walz et al. 2017) concluded that

- most eco-innovations still focus on technical innovations,
- the dynamics of German corporate eco-innovations seems to stagnate,
- despite progress in corporate sustainability reporting, there is still a lack of integration of sustainability issues into the strategic positioning of corporations,
- the importance of sustainability for consumption decisions has been stabilising on a moderate level, and adjusting actual behaviour is still subject to numerous restrictions.

Research for sustainable economy

A sustainable economy has been addressed in numerous scientific articles in the past. Figure 1 illustrates the results of a literature analysis of publications in journals referenced by SCOPUS. The number of publications which use the term “sustainable economy” in their title, abstract, or among their keywords, has been increasing steadily. The number of articles dealing with transformation and a sustainable development, however, is lower by more than the factor of ten. Albeit increasing substantially in recent years, the number of publications explicitly identifying with a social-ecological research is also rather low. Given the need to improve our knowledge about these issues, there clearly is a need to

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increase research with a social-ecological focus on transformation to a sustainable economy.

Social change processes and transformations under the guiding principle of sustainable development form the central focus of the *Social-Ecological Research (SOEF)* funding priority of the Federal Ministry of Education and Research (BMBF), which integrates the perspective of social sustainability research into the research agenda of the German Federal Government for the Green Economy (BMBF 2016). Instead of focusing on isolated environmental problems, social-ecological research analyses the complex problem of interrelationships and interactions between society and nature. This is based on the insight that sustainable development can be achieved only if technical and social innovations, such as new social practices of consumption or the development of new business models, mesh with one another (Wilhelm and Schulz 2017, pp. 217 ff.).

An interdisciplinary and transdisciplinary research approach needs to be used to develop proposals to solve these societal problems. Beginning with the problem description, the necessary natural, engineering or social science disciplines as well as the affected social actors with their context-related knowledge are to be integrated. Social actors, such as representatives of companies, local authorities or nongovernmental organisations, must be involved in such processes as knowledge bearers on the one hand and, on the other hand, must be persuaded to put the research results into practice. Participation in transdisciplinary social-ecological research means participation in understanding and shaping transformational processes. The aim is to make the knowledge generated available to social stakeholders in the most direct way possible (BMBF 2015, pp. 3 ff.) (figure 2, p. 182). In addition, the transformation to a sustainable economy that is ecologically compatible, socially equitable and, at the same time, competitive also requires a supportive framework.

Research projects set impulses

All these aspects have been addressed in the *SOEF* programme with its funding focus on the *Sustainable Economy (Nachhaltiges Wirtschaften, NAWI)*:¹ in the period from 2015 to 2020, the BMBF will provide funding of approximately 32 million euros to a total of 30 research groups (*NAWI* projects). The sponsored project teams conduct research into various issues and areas of life – from clothing, mobility, nutrition, construction and housing to logistics and tourism (figure 3, p. 183). Some of the *NAWI* projects analyse consumer behaviour, as consumers are to be better informed about sustainable products and services and encouraged to consume sustainably. These projects can build on the results of the *SOEF* funding measure *Sustainable Consumption – From Knowledge to Action* (funding period 2008 to 2013, cf. Defila et al. 2014). Other projects examine business models, production forms and

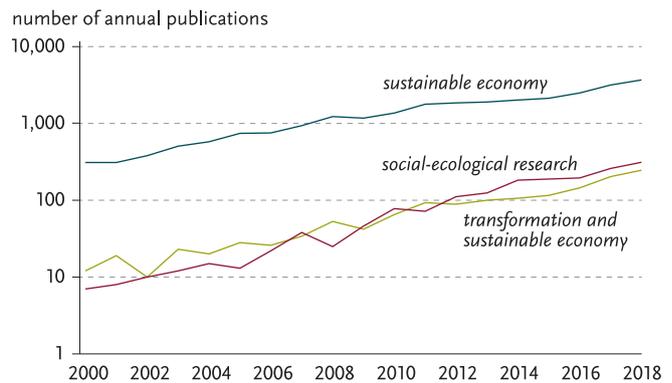


FIGURE 1: Number of annual publications referenced in SCOPUS database which use the terms *sustainable economy*, *transformation and sustainable economy*, and *social-ecological research* in their title, or abstract, or among their keywords. Source: data retrieved from SCOPUS.

value chains with regard to their sustainability potential. Together with practitioners, sustainability innovations are created and strategies are developed for the dissemination of successful approaches. In addition, overarching recommendations for political action are developed as to how obstacles to the transformation of the economy towards sustainability can be removed, and which approaches can be used to successfully support such a transformation (cf. Wilhelm 2015, pp. 199 f.).

An accompanying project called *NaWiKo: Scientific Coordination of Research Projects on a Sustainable Economy* supported the research.² Various workshops and conferences were organised in order to facilitate communication between the projects and support transfer activities. Furthermore, *NaWiKo* aims at synthesizing the results of the projects. Thus, researchers from different projects were encouraged to team up and develop conclusions, which are drawn from more than one project. The synthesis activities also aim at making insights from the *NAWI* projects available to the broader scientific community in order to enhance future discussion. Based on a call for papers among the *NAWI* project partners, this special issue brings together a collection of articles particularly suited to show the range of issues analysed in *NAWI*.

Lines of inquiry

So far, the discussion about the potential and impacts of sustainable economy approaches has mainly taken place on the level of single case studies. This stands in contrast to other arenas of environmental policy, such as climate change, where aggregated assessments are abundant. During the course of the *NAWI* projects, the need for a more aggregated assessment became apparent. In order to trigger a debate about this crucial issue, we included two articles within the *Forum* section:

¹ Funding measure *Sustainable Economy* and project list of the research networks see: <https://www.fona.de/en/measures/funding-measures/sustainable-economy.php>.

² <https://nachhaltigeswirtschaften-soef.de/en>

- **Wruk et al. (pp. 184–189)** present an approach to quantify the sharing economy in its heterogeneity of forms and effects. They argue that approaches towards quantifying the sharing economy could enrich societal knowledge about this phenomenon and, thus, fuel societal transformation.
- **Walz et al. (pp. 190–197)** quantify the implications of two scenarios of sustainable economy approaches, whose scope is based on NAWI projects. They focus on the nexus of intended emission reduction and unintended structural implications for the economy.

In one form or another, most NAWI projects touch upon the need to adjust policies. Thompson (1991) distinguishes markets, hierarchies and networks as archetypes of coordination in societies. The effectiveness of hierarchies has been questioned in the last decades, among other reasons, due to globalisation and the reduced steering capacity of the nation-state. Scholars, such as the Nobel Prize winner Elinor Ostrom, have underlined the need for diverse institutional arrangements that put decisions as close as possible to the level of the single actors involved. Recently, innovation policy scholars, such as Mazzucato (2018) or Edler and Boon

(2018), have called for new governance arrangements to support mission-oriented innovation policies. Against this background, two articles present specific governance insights from a NAWI perspective:

- **Heyen (pp. 198–203)** looks at governance in the sectors of mobility, agriculture and food. In particular, he focuses on the role of traditional policy instruments in transformation strategies.
- According to **Jacob et al. (pp. 204–209)**, new governance approaches appear necessary to govern a transformation of the economy. They focus on the emergence of governance innovations from the bottom up by non-state actors.

Many of the NAWI projects focus on specific sectors, and address obstacles to, and success factors for, sustainable economy approaches. The global nature of the challenges emerges, such as the need to incorporate international parts of the life cycle of products. New consumption patterns are needed, and new actors have to be involved, in order to move towards sustainability.

- **Süßbauer et al. (pp. 210–217)** investigate the potential role of ordinary employees in enhancing corporate sustainability. They analyse four transdisciplinary research projects, all aimed at initiating, accompanying and analysing processes of sustainability transformation within companies.
- **Hiete et al. (pp. 218–225)** analyse voluntary standards for minerals, which have been developed as a reaction to social and environmental problems in mining. Despite the heterogeneity of the standards, they arrive at a tripartite distinction, which they use to identify potential transformation paths to make standards more effective.
- **Heyen and Wolff (pp. 226–232)** ask why the German energy transition (*Energiewende*) has been more successful than the attempted transition to organic agriculture. Their article analyses the drivers and barriers of both processes to identify key factors that explain the difference.
- **Hacke et al. (pp. 233–239)** explore innovative initiatives in housing. They introduce cohousing as a social innovation, discuss the factors affecting its diffusion, and provide information about its social impacts.



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FIGURE 2: An example of knowledge transfer from the funding measure *Sustainable Economy* to the public is the interactive exhibition *use-less – Slow Fashion against waste and ugly clothes*. The exhibition stems from work carried out at the Hannover University of Applied Sciences and Arts, among others within the framework of the *Innovations for Sustainable Clothing (InNaBe)* project (see also Kleinhüeckelkotten and Neitzke 2019, in this issue). Visitors to the exhibition learn in a hands-on manner how fashion is created and how it can be produced in a sustainable way. The aim of the exhibition is to challenge visitors to reflect on their own consumption habits. On display are designs created by students of the fashion design course at the Hannover University of Applied Sciences and Arts. The picture shows the work *Damaged* designed by Dilan Capan. The exhibition, which runs until October 20, 2019, is taking place at the Hafenumuseum Speicher XI in Bremen, Germany. https://useless-ausstellung.de/wp/wp-content/uploads/use-less-DilanCapan_DAMAGED_PatrickSlesiora.jpg

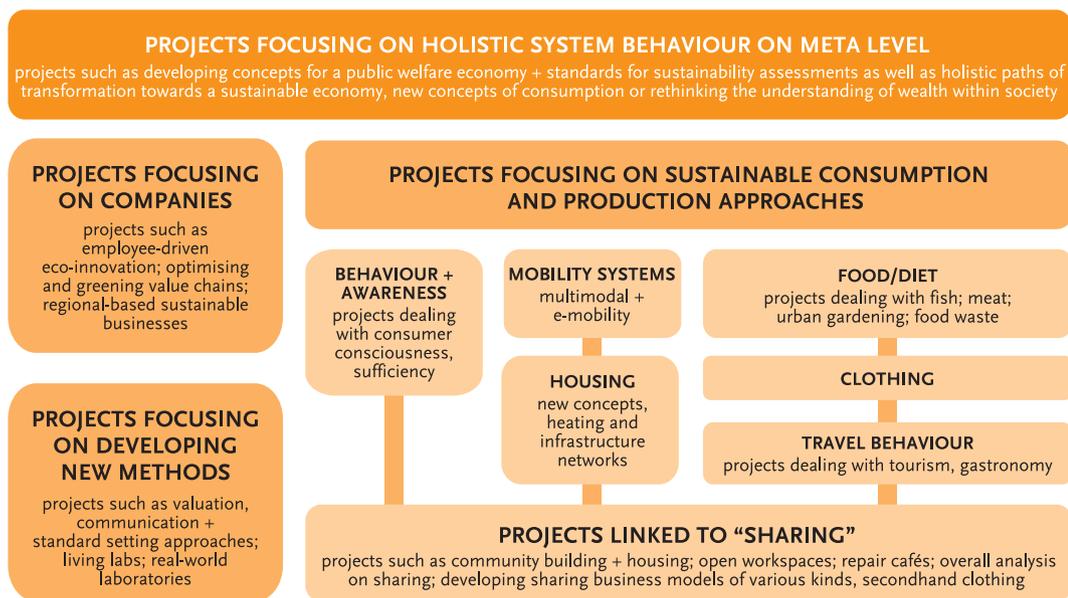


FIGURE 3: Scope of projects within the funding measure *Sustainable Economy (NAWI)*.

- **Kleinhüchelkotten and Neitzke (pp. 240–248)** focus on sustainable production and consumption patterns with regard to clothing. They analyse a multitude of economic, technical, social and personal factors to determine which factors impede or support a change towards more sustainability.

As this special issue demonstrates, sustainable economy approaches in their heterogeneous form promise to advance transformation towards sustainability. However, more conceptual and empirical analyses will be necessary to assess potentials and implications, policy mix and new forms of governance, and the systemization of the differences and commonalities of sector-specific approaches.

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Quantifying the sharing economy

An approach for measuring the ecological, social, and economic effects

The sharing economy is often considered either the most promising “pathway to a sustainable market economy” or, conversely, a “hyper-capitalistic” exploitation of natural and social resources. Such contrasting images can influence the societal valuation of sharing economy models, thereby misleading or hindering processes of transformation. Approaches toward quantifying the sharing economy have the potential for enriching societal knowledge and, in the process, fuelling societal transformation as the ecological, social, and economic effects of such developments as carsharing become apparent.

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Quantifying the sharing economy. An approach for measuring the ecological, social, and economic effects

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Since the emergence of the sharing economy, academics and the public discuss about its contribution to a more sustainable society (Schor 2016). On the one hand, proponents emphasize that sharing models have the potential to enhance sustainability in ecological, economic, and social terms. This is because sharing allows, for instance, a more efficient use of natural resources (Botsman and Rogers 2010), leads to lower prices for consumers (Huefner 2015), or makes products and services affordable to a larger number of people, thus enhancing social inclusion and participation (Bardhi and Eckhardt 2012). On the other hand, it is increasingly questioned whether these potentials can actually be realized or whether negative effects outweigh the positive ones. Existing work points to downsides that arise from increasing commercialization of private life (Martin 2016) and from re-using saved resources for activities that have negative effects (Leismann et al. 2013). Instead of leading a pathway toward a more sustainable economy and society (Heinrichs 2013), the sharing economy might thus lead to a “nightmarish form of neoliberalism” or “hyper-capitalism” (Martin 2016, Scholz 2016).

Such different positions influence valuation processes (Lamont 2012), in which society assigns meaning and legitimacy to a phenomenon like the sharing economy or to particular forms within that domain. An increase of legitimacy can lead to an increased

use of a certain sharing practice and to the diffusion of the respective organizational form. Positive social evaluations of sharing models can thus serve as “window of opportunity” and make it more likely that user preferences and practices co-evolve accordingly (Geels 2002). In contrast, a devaluation of a form might trigger regulatory interventions. For instance, municipalities come under pressure to regulate accommodation-sharing platforms when problems on the housing market are connected with these platforms (Vith et al. 2019). Having assigned values is consequential, in the sense that it shapes the behavior of various societal actors (Engels and Wang 2018).

Quantification can negatively and positively influence societal valuation processes: A potentially negative influence emerges from the fact that numbers and figures are easier to communicate and are more likely to be remembered, picked up, and spread further than complex arguments. Hence, actors who want to influence societal debates are tempted to communicate numbers even when these numbers are only weakly supported by scientific research. Positive influences on societal valuation processes stem from three opportunities the quantification provides:

Comparing: Quantification allows metrical relationships to be created between different and seemingly incomparable objects (Engels and Wang 2018). This means that by using quantifiable indicators, we can compare different sharing models with each other and with established forms of economic activities.

Aggregating: Quantitative results of different research projects can be combined and aggregated to a certain extent when the underlying mechanisms of data collection were reported in a transparent manner. Aggregating results from scientific inquiries can enhance the social stock of knowledge on this complex phenomenon.

Reporting: Reporting new results can trigger an update of existing social valuations (Engels and Wang 2018) and stir up societal de-

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bates (Lamont 2012). With changes in the social stock of knowledge, the development of regulatory frameworks to support socially desirable sharing models is enhanced, and users are more likely to adapt their behavior.

To make use of these opportunities, we developed an approach to quantify the sharing economy. We start with a summary of its goals, present the steps, and discuss its contributions and limitations.

Goals and challenges of quantifying the sharing economy

To advance quantification of the sharing economy, we identified three major goals and connected challenges.

First, we need a deeper knowledge of the scope and size of the sharing economy (Martin 2016). Quantitative data helps to define and evaluate the phenomenon’s relevance to society and the economy. A challenge for quantifying its size is that there is no commonly shared definition of “the sharing economy”. Ever since its emergence, experts have described the sharing economy as a “fuzzy” (Plewnia and Guenther 2018) or broad “umbrella concept” (Acquier et al. 2017); one scholar has outright stated that “the shar-

ing economy lacks a shared definition” (Botsman 2013). The question of who is part of the sharing economy and who is not has led to heated debate, including attempts to distinguish “real sharing” from “pseudo-sharing” (Belk 2014) or the sharing economy from concepts such as “on-demand economy”, or “access-based economy” (Frenken and Schor 2017). Despite continuing efforts to find a common definition (Codagnone and Martens 2016), recent work suggests the issue has not yet been resolved (Mair and Reischauer 2017). Acknowledging the lack of a commonly shared definition, most researchers take a pragmatic approach when quantifying the size of the sharing economy and focus their analyses on selected key sectors (PricewaterhouseCoopers 2014, European Commission 2018). As a result, existing work includes different sharing models in the analyses, which leads to diverging observations. For instance, while PricewaterhouseCoopers (2014) identified 275 sharing platforms, the study of the European Commission (2018) observed that approximately 600 platforms were active in the same region, although the overall number of platforms might be lower because platforms can be active in several regions. In addition, current researchers have focused on online platforms and for-profit organizations in their quantification efforts. As a result, we have little knowledge on nonprofit organizations and offline models, such as community gardens (figure 1) or neighborhood platforms. The lack of knowledge on the size of these relevant parts of the sharing economy calls for further attempts at quantification. >

FIGURE 1: Approaches for quantifying the sharing economy mostly focus on online models and for-profit models – therefore there is a need to integrate knowledge on nonprofit organizations and offline models, such as neighborhood platforms or community gardens. The photo is taken at the Prinzessinnengärten in Berlin.



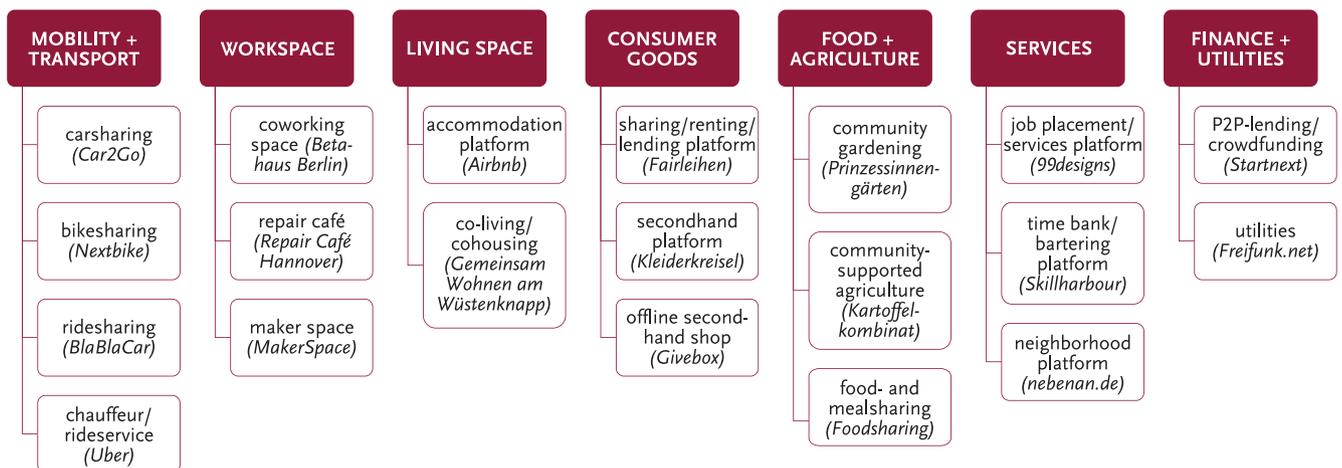


FIGURE 2: Application areas, sharing models and examples: we conducted a systematic analysis of academic literature on the sharing economy to identify application areas for sharing models. To do so, we searched for publications using keywords in *Google Scholar* in November and December 2016. We read the most often cited publications and collected all labels that referred to application areas for shar-

ing models (for a more detailed description see Wruk et al. 2019). We decided to focus on models involving sharing, lending, swapping, or commonly using physical products and spaces, as well as offering a workforce or services. We thereby included online and offline models. This allowed us to identify a range of 20 different sharing models – in brackets, we provide examples for each model.

Second, we should make differences visible between different sharing models. Quantifying effects of different models will help us understand which sharing models deserve support because they involve positive effects for economy, society, or the natural environment and which models might require stronger surveillance and regulation. The diversity of sharing models represents a challenge to quantification. Diversity, in particular, occurs because sharing organizations are active in several areas of application, including mobility, accommodation, private and professional services, consumer goods, food and agriculture, and others, therefore offering different products or services (Owyang 2016). Thus, we cannot easily compare or aggregate the differing outputs of these diverse sharing organizations, which complicates the quantification of effects. One consequence from this challenge is that existing work has so far focused on single areas of application, with accommodation (e.g., Aznar et al. 2017, Zervas et al. 2017) and mobility (e.g., Firmkorn and Müller 2011, Martin and Shaheen 2011) having received the most attention. Existing work interested in effects of different sharing models, mostly relies on expert evaluations of potential effects (Bierwirth et al. 2018). As a result, we need more work measuring and comparing effects across diverse sharing models.

Third, we need to measure economic, social, and ecological effects of sharing economy organizations at the same time. For instance, one expectation is that local initiatives like community gardens or repair cafés are crucial for strengthening social cohesion in neighborhoods but may not reduce environmental pollution on a larger scale and have few economic contributions. Quantitative data would systematically explore and verify or reject such expectations. A challenge for such work is developing a measurement model that conceptualizes social, economic, and ecological effects at the same time and in one model (Robinson and Tinker 1997).

What complicates such studies is the lack of an established set of indicators applicable in the context of the sharing economy. Studying traditional companies, we can fall back on a wide range of existing indicators (Roca and Searcy 2012) like those provided by the *Global Reporting Standards Initiative*¹. However, comparable standard sets of indicators are not available for the sharing economy, and existing sets of indicators fail to represent particularities in sharing models (Trenz et al. 2018). The lack of an integrated measurement model has led to situations in which most studies focus only on one dimension of sustainability. We find researchers studying either economic (e.g., Horn and Merante 2017, Hub 2017, Petropoulos 2016), social (e.g., Greenwood and Wattal 2017, Schor 2017), or ecological effects (Firkorn and Müller 2011, Ludmann 2018), and few studies considering two of these dimensions (e.g., Wachsmuth and Weisler 2018).

i-share approach to quantification

To address the three goals and the connected challenges, we developed in the research project *i-share*² an approach to quantify the sharing economy in its diversity of forms and effects in five steps.

Theorizing: Because of the newness of the sharing economy as a field of scientific inquiry, theoretical elaborations lag behind societal debates and practical developments, meaning there is a growing need for theorizing on sharing models and effect mechanisms (Heinrichs 2013). To initiate this process, we started our inquiry with an exploratory study and analyzed diverse sharing organizations based on interviews and data from their websites. On this

1 www.globalreporting.org/standards

2 www.i-share-economy.org

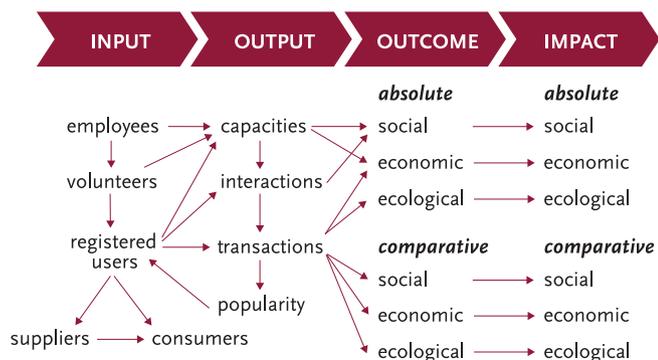


FIGURE 3: *i-share* model: Based on the *IOOI* model (Bagnoli and Megali 2011, Khandker et al. 2009), the figure visualizes relationships between inputs, outputs, outcomes and impact in the sharing economy. Major inputs refer to the groups participating in sharing organizations. Outputs include capacities, social interactions and transactions. Organizational outcomes are measured in social, ecological and economic dimensions and in absolute and comparative terms. Outcomes are aggregated to capture the impact on different levels such as individual sharing models or the sharing economy in Germany as a whole.

basis, we identified key features characterizing different sharing models and distilled generic operating principles and influence indicators therein.

Mapping: In the second step, we identified and mapped sharing economy organizations in Germany. Our solution to deal with the lack of a shared definition was working with a broad conceptualization of the sharing economy by encompassing various existing definitions. To do so, we conducted a systematic analysis of academic literature on the sharing economy to identify application areas for sharing models (for a detailed description see Wruk et al. 2019). This allowed us to identify a range of 20 different sharing models, including accommodation platforms, carsharing providers, lending and renting platforms for consumer goods, co-working spaces, community gardens, and others (figure 2). The broad scope made sure that no potentially relevant aspect of the phenomenon was omitted. Such an approach is in-line with recent publications arguing for a broad understanding of the sharing economy (Plewnia and Guenther 2018, Trenz et al. 2018). We identified sharing economy organizations active in one of these areas of application through desktop search, media analyses and using a Web crawler.

Our attempt to quantify the sharing economy is an invitation to other researchers to improve our methods. Each additional study increases scientific knowledge about the sharing economy and provides an opportunity to refine societal debates.

Modeling: We developed a generic model and a set of indicators that are applicable to all kinds of sharing organizations by adapting the established *IOOI* model, which considers the elements input, output, outcome, and impact (figure 3). The basic idea of the model was to capture the relations between invested resources (input), an organization’s activities and services (outputs), its effects on target groups (outcome), and their consequences for the economy and society as a whole (impact) (Bagnoli and Megali 2011, Khandker et al. 2009).

As shown in figure 3, major inputs refer to the groups participating in sharing organizations. Employees and/or volunteers

are typically responsible for establishing and maintaining digital and physical infrastructure and for managing the community of users that take over the role of consumers and providers. The number of employees, volunteers and the number and composition of registered users, therefore, represent key input indicators.

Users typically contribute to the provision of sharing services by offering their private cars, apartments, spaces, time, professional skills, or other resources. As a result, making apartments, cars, etc. available as capacities that can be accessed by registered users is one of the outputs of sharing organizations. Other outputs are social interactions and transactions. The number of social interactions – which can be, for instance, direct or online encounters between users – represents an output indicator. Indicators to capture transactions depend on the area of application. This is the number of passenger kilometers per year in the case of carsharing organizations or the number of overnight stays in the case of accommodation sharing.

The model defines social, economic, and ecological outcomes in two ways. First, to capture whether sharing economy organizations, for instance, enhance social inclusion, we can determine in absolute terms how many people above a certain age or with a migration background participate in interactions and transactions, which represents an outcome indicator in the social dimension. Second, in order to interpret these absolute numbers, it is also relevant to know how many people from these social groups participate in sharing organizations compared to traditional offers and, thus, calculate outcomes in comparative terms.

To capture outcomes in the ecological dimension, we used CO₂ emissions in kilogram per time unit as our key indicator. This is because CO₂ equivalents can be calculated for various outputs that sharing organizations produce. This includes, for instance, vehicle-kilometers in the mobility context (Firnborn and Müller 2011) or saved items of clothing for clothing-sharing offerings (Behrendt et al. 2017). Economic outcome indicators are the income generated for employees and the organization or for external providers in peer-to-peer models.

Such organizational outcomes in all three sustainability dimensions can be aggregated on different levels to calculate the aggreg-

gated outcome (which represents in our conceptualization what is meant by “impact” in the generic IOOI model) of different application areas or the sharing economy as a whole.

Measuring: In the next step, data on the indicators in the model is collected. The main data source is a survey among sharing organizations in Germany that were identified in the mapping process. Through this data source, we are confident in receiving information on input and output indicators from the participants. Additional data sources and statistics allow us to calculate outcome and impact indicators. This is especially important in cases where organizations are not able to make a valid assessment or where we want to evaluate comparative effects. For instance, we assume that sharing organizations have no exact knowledge on the CO₂ emissions of their activities.

Interpreting: Finally, the mapping of sharing organizations, the measurement model and the gathered data result in a quantification of the sharing economy. For instance, we can quantify the size of different sub-sectors and of the sharing economy in Germany as a whole, with their inputs and outputs and social, ecological, and economic outcomes. To do so, we develop a simulation tool that allows us to analyze the effects on different levels and for different assumptions. As such, it also enables us to generate different scenarios considering the potential development of the sharing economy and its effects. This helps us to make well-informed interpretations of our empirical results.

Conclusion

Our approach helps us to find answers to the central questions about the extent and effects of the sharing economy outlined above. First, mapping sharing organizations and collecting data about

them provides us with valuable information about the size of the sharing economy. Applying a broad understanding to the sharing economy, thereby, helped us to deal with the definitional issues. Second, we teased out differences between sharing models and, at the same time, made sure that we can compare and aggregate the observed effects. Third, we developed a model with indicators regarding the three dimensions of sustainability. However, the current version of the model does not capture second-order effects or unintended consequences that result from user or provider decisions and behavior. For instance, understanding rebound-effects (Santarius 2015) was beyond the scope of our current model.

Although we cannot consider all quantification issues, our attempt to quantify the sharing economy is an invitation to other researchers to improve our methods of theorizing, mapping, modeling, measuring, and interpreting data. Each additional study increases scientific knowledge about the sharing economy and provides an opportunity to refine societal debates.

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Wider economic and social implications of sustainable economy approaches

Some insights from a scenario exercise

For sustainable economy approaches to gain more political support and be more present in forums of public debate, they must be allowed to have their wider economic and social implications subjected to scrutiny. Our focus is on the nexus of intended emission reduction and unintended structural implications on the economy. In order to gain insights into the possible implications, we construct two sustainable economy scenarios for Germany. The scope of these scenarios is based on 30 research projects of the funding measure Sustainable Economy. Our model based analysis shows that the effects of these scenarios on emissions are in the order of magnitude of seven to twelve percent of German annual CO₂-emissions. The net effects on employment are moderate, but labor markets face huge challenges in managing the high number of job turnovers.

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Wider economic and social implications of sustainable economy approaches. Some insights from a scenario exercise

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There are an increasing number of research projects on the sustainable economy, such as those funded by the German Federal Ministry of Education and Research (BMBF) in its *Social-Ecological Research* program (SOEF) on the *Sustainable Economy (Nachhaltiges Wirtschaften, NAWI)*. Within this funding measure, 30 research projects (NAWI projects) investigated a variety of approaches for a sustainable economy. A few looked at systemic behavior on the meta level, such as transformation paths and public welfare. Others focused on company strategies, such as managing value chains or involving employees, or on new methodologies, such as living labs or tools for sustainability evaluation. Most projects, however, focused on sector-specific approaches to sustain-

able consumption and production, such as mobility, housing, the sharing economy, soft tourism, sustainable diets and clothes (see the description of the funding measure *Sustainable Economy* in the introduction to this special issue and additional information in the online supplement, appendix 11). The approaches investigated in the NAWI projects have in common that they do not focus on technological innovations, but intend to change consumption patterns and business models (see additional information in the online supplement, appendix 1).

However, there is limited information about the intended environmental implications of the approaches investigated in these projects (see also online supplement, appendix 1, with a survey of the 30 NAWI projects). From the perspective of policymakers, it is not only the magnitude of the intended effects of emission reductions that is important, but also the magnitude of any unintended effects on production, employment and income within the economy. In particular, the question about which sectors and which groups might be affected is important from the perspective of political economy: agency and the political power of groups affected by the policies determine whether policies can be agreed on, and what accompanying measures are necessary to adjust policies to the needs of the potential losers. In addition, not only the interests of companies matter. Sectoral and regional economic effects translate into social impacts on those employed within these sectors. The ongoing debate about Germany's phaseout of lignite shows the importance of such implications.

The wider economic implications of climate policies were investigated early on (see Walz and Schleich 2009 for an overview of German studies). More recently, the debates about renewable

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energy support, or about the *German Climate Action Plan 2050* are now accompanied by such impact analysis (Duscha et al. 2016, Öko-Institut et al. 2018, Sievers et al. 2019). As well as climate policy, a few studies have been conducted on the circular economy (Walz 2011, Pfaff and Sartorius 2015, Distelkamp and Meyer 2017). These studies indicate that a circular economy will have small positive net employment effects, but substantial structural implications.

The starting point of our essay is the claim that sustainable economy approaches must be willing to subject themselves to scrutiny with regard to their wider economic and social implications. In order to demonstrate the need for such an undertaking, we performed a scenario exercise, which illustrates the wider economic and social implications of sustainable economy approaches. Thus, our essay is not based on a fully-fledged study which analyzes the emission reduction potential of sustainable economy approaches and the resulting effects in detail. In particular, we do not intend to quantify the emission reductions that can be achieved by sustainable economy approaches. Instead, our focus is on the nexus of intended emission reduction and unintended structural implications on the economy. The *NAWI* projects aim to reduce emissions. At the same time, they intend to preserve – if not increase – the personal well-being of the actors involved. Our objective is to raise awareness that the economic implications that accompany intended emission reductions might be substantial due to indirect structural effects. In order to demonstrate the importance of these indirect effects, we quantified the implications in two generic scenarios of sustainable economy approaches.

The wider environmental, economic and social effects of sustainable economy approaches

Impact assessment studies of climate change abatement generally build on scenario analysis. Depending on the modeling approach used, this analysis is performed by integrated models (e. g., *IMACLIM*), which are used in particular for impact assessments of very aggregated and long-term scenarios, such as the long-term analysis of *Shared Socioeconomic Pathways* of the Intergovernmental Panel on Climate Change (IPCC) (see Marangoni et al. 2017). Another approach often used to analyze technological and structural detail is to link techno-economic simulation models, which simulate technological change and associated changes in costs and demand, with economic models, such as in the literature cited above on the German energy transition (*Energiewende*).

The logic of analyzing the implications of sustainable economy approaches is somewhat different and more closely resembles the analysis of circular economy approaches. As mentioned in the introductory section, the emission reductions of the approaches analyzed in the *NAWI* projects are not triggered by a technical change in the production process or in products, but rather a change in the

level of demand for products or services. Thus, the sustainable economy approaches can be described as a sum of positive and negative demand impulses. These demand impulses lead to further increases (if impulses are positive) or decreases (if impulses are negative) of demand along the respective value changes, which induce changes in emissions, employment and value added. There are different kinds of demand impulses:

- Changes in consumption patterns and increasing sufficiency imply a reduction in the demand for and therefore the production of certain products (negative demand impulse).
- Changes in the type of product or service within a sector (e. g., change from conventionally produced towards organic food) imply that demand is reduced (negative demand impulse) in some segments of the sector, and increased in others in the same sector (positive impulse).
- Substitution between sectors shifts demand from one sector (negative demand impulse) to another (positive demand impulse).

The effects of these impulses induce further changes along the value chain. Thus, positive impulses induce an increase in demand for the associated value chain, and vice versa for negative impulses. In sum, the shift from value chains affected by negative impulses to value chains affected by positive ones leads to structural change within the economy. As the specific emissions of the production of goods in each sector differ, changes in value chains also lead to different emission levels. However, different sectors also show different import and employment intensities, different regional distribution, and different qualification requirements. Ultimately, shifts in demand lead to structural change within the economy.

Scenario methodology

Deriving the demand impulses, which extend along the respective value chains and ultimately drive changes in emissions, employment and value added, requires quantitative assumptions about demand changes. As there are neither detailed models available, nor in-depth studies of the diffusion of the different sustainable economy approaches, we constructed quantitative scenarios for our exercise. Scenarios do not aim at projecting the future, but define a possible future. They are a well-known methodology to handle uncertainty, and are frequently used in combination with strategic foresight and scenario workshops (Durance and Godet 2010). In Germany, scenarios are even included in the official standard setting of methodologies for technology assessment (VDI guideline 3780 on technology assessment). Quantitative scenarios consist of a storyline, framework assumptions, and specific assumptions, which are used to derive the impulses. Together, they describe the scenarios in quantitative terms (Craig et al. 2002).

1 The supplement is available at <https://www.oekom.de/supplementary-files.html#15041>.

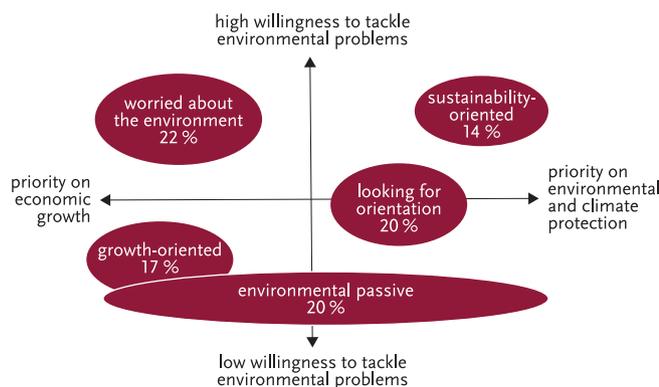


FIGURE 1: Lifestyle segments framed with regard to the environment. Source: based on Scholl et al. (2015).

Scope of scenarios

We draw on the 30 *NAWI* projects to define the scope of the scenarios. We performed a desktop study of documents from these projects, supported by a survey sent to all the project leaders. Based on this information, it was possible to characterize the *NAWI* projects with regard to the thematic scope of the sustainability strategy, and mechanisms likely to lead to the diffusion and impacts of the approaches studied within each project. According to this characterization, most *NAWI* projects focus on sector-specific strategies, in particular mobility, housing, the sharing economy, soft tourism, sustainable diets and clothes (see online supplement, appendix 1, Walz and Wilhelm 2019, in this issue). As some *NAWI* projects also include non-sector-specific approaches, such as managing value chains, valuation and communication tools, or new business models, we also included crosscutting elements in our scenarios.

Storylines of scenarios

Based on the information gathered from the desktop study of *NAWI* project publications (see full literature list in the online supplement, appendix 4), the scope of the scenarios and the storylines were developed. Simultaneously, we performed a literature review of various foresight studies and linked these to the storylines (see online supplement, appendix 2). Applying this dual approach allowed us to develop plausible storylines and quantitative assumptions. Once developed, the scenarios were reviewed, and the plausibility and consistency of assumptions were confirmed in an expert workshop.

The following trends are mentioned in the foresight studies we reviewed (see online supplement, appendix 2): there is an increase in environmental literacy and environmental awareness. There is a development towards a knowledge and information society, and digital solutions are increasingly implemented, assuming that issues of data security and privacy do not develop into major obstacles. Cyber-value chains and more decentralized production sys-

tems become more competitive. Finally, lifestyles continue to become more heterogeneous, with issues such as work-life balance, and the need for flexible solutions tailored to individual needs becoming more important.

Our analysis of the *NAWI* projects showed that their approaches are related to two different storylines: shifts within and across sectors that utilize new solutions, and approaches that put more emphasis on behavioral aspects and sufficiency strategies. Based on these storylines, we constructed two scenarios. The stringency of these scenarios is not extreme, but more moderate, reflecting changes that might be feasible within a medium time horizon (e.g., ten years). The base case for comparison is always today's level of activities. We checked the plausibility and consistency of these scenarios by embedding these scenarios into the trends identified in the foresight studies mentioned above (see online supplement, appendix 2, table A-2-2 on key factors for scenario storylines).

Scenario *S1* represents a “modernization embedded in an information and knowledge society”. It assumes no major changes in the distribution of lifestyles among the population, and no major changes in consumption patterns. Basically, we assume that the high importance of environmental issues supports a strategy of increasingly using technological and organizational megatrends to lower the transaction and opportunity costs of sustainable economy approaches, and make them more convenient for consumers. This trend is supported by the increasing importance of individualistic solutions, without compromising comfort levels.

Scenario *S2* encompasses the changes assumed for scenario *S1*, but adds major changes in behavior. Thus, we call it a “value and lifestyle transformation embedded in an information and knowledge society”. The cornerstone of scenario *S2* is the assumption that the share of population following a sustainability-oriented lifestyle, which is currently estimated at about 14 percent (figure 1), increases to 30 percent. Furthermore, it is assumed that the actual behavior of this sustainability-oriented segment embraces environmental awareness and attitudes much more stringently. We assume that these changes also extend to consumption. The concepts of “using less” and sufficiency strategies become the social norm within the sustainability-oriented segment. According to the post-growth paradigm (Paech n.y.), income and quality of life are increasingly decoupled. Thus, the interest in nonformal and collaborative work increases (figure 2) (even though this might be less productive when measured in standard terms), and the willingness to reduce both working hours and income increases.

Scenario assumptions and quantification

Analyzing the scope of *NAWI* projects revealed the major sectors addressed by sustainable economy approaches. The following sector-specific strategies were considered (see online supplement, appendix 3 for details):

- Sharing schemes and longer product lifetimes lead to a declining production of consumer goods, but increased activi-

ties such as rentals, maintenance and repairs, and the associated additional transportation requirements. We assume that the potential for this strategy is much higher in scenario *S2*, because people are willing to use it for environmental reasons even if it leads to additional (opportunity) costs.

- In scenario *S2*, we assume that people following a sustainability lifestyle are also willing to substitute air travel for leisure by domestic vacations. This leads to an increased demand for domestic rail and road transportation, but also for services provided by the domestic hotel and restaurant sector. No such shift is assumed for scenario *S1*.
- Increased availability and supply of new mobility concepts, which are supported by IT solutions and accompanying business concepts, make the use of public transport more attractive in scenario *S1*. Thus, public transport services substitute motorized individual transport. This shift is even more pronounced in scenario *S2*, because people are willing to use public transport for environmental reasons, even if it is associated with less convenience and higher (opportunity) costs. In scenario *S2*, this also leads to a drop in the number of private cars owned.
- The demand for new clothing is reduced due to lifestyle changes towards slow fashion and secondhand clothing, and is sup-

ported by an increased environmental awareness (see also Kleinhüchelkotten and Neitzke 2019, in this issue). Compared to scenario *S1*, this effect is twice as strong in scenario *S2*, because people pursue this strategy much more strongly, due to sufficiency strategies becoming the social norm in the sustainability-oriented segment of the population.

- Lifestyle and improved ways of classifying and marketing high quality food bring about a shift in demand from conventional towards organic food in scenario *S1*. Furthermore, it is assumed that better coordination leads to a reduction in food waste. In addition, in scenario *S2*, more people change their eating habits towards higher shares of vegetarian food and less meat in absolute terms.
- New housing concepts are also part of sustainable economy approaches (see Hacke et al. 2019, in this issue). The increasing use of management systems linked to smart homes and metering lead to an increase in the demand for electronics, but reduce the energy demand associated with housing. In scenario *S1*, it is assumed that these shifts are cost neutral for consumers. Scenario *S2* assumes that there is a willingness to use these technologies to a higher extent, even though they might lead to additional consumer costs. Furthermore, it is assumed that people change their behavior to save heating energy.

FIGURE 2: A space for encounter, community and cooperation: *Open Workshops* provide more than knowledge, tools and materials. They contribute to sustainable social development. Hand-made products help to reflect consumption and production patterns.



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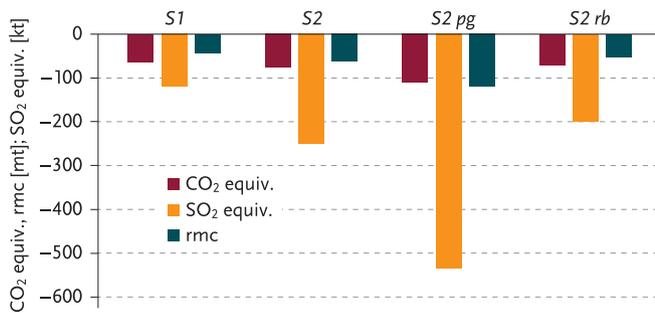


FIGURE 3: Emission reductions of the scenarios *S1*, *S2*, *post-growth (S2 pg)* and *rebound (S2 rb)* compared to Germany's current emissions. All scenarios show substantial emission reductions. equiv. = equivalents, rmc = raw material consumption, t = metric ton, mt = mega tons, kt = kilo tons.

In addition to these sector-specific shifts, we assume that better information and communication technologies lead to increased transparency along the value chain (see also Hiete et al. 2019, in this issue about changes along value chains). Thus, the information costs required identifying products with a more environmentally friendly supply chain decrease. This is supported by strategies to encourage employees to become ambassadors of their companies' environmentally friendly products (see Süßbauer et al. 2019, in this issue). For both scenarios, we assume that the supply chains of consumer products exploit their no-regret potentials more intensively, resulting in lower emissions at no additional costs.

Based on a literature analysis, estimations on the project level, and the survey of project leaders, this storyline was translated into quantitative assumptions about the strategies to be included in the scenarios. In an expert workshop including researchers from *NAWI* projects, among others, the assumptions were discussed and various changes suggested. A detailed list of the assumptions made and the rationale for choosing specific figures are shown in the online supplement, appendix 3.

Impulses from the scenarios

In scenario *S1*, the sum of positive impulses (increasing demand for environmentally friendlier products and services) equals the negative impulses. In scenario *S2*, the negative impulses exceed the positive ones (see online supplement, appendix 3 with detailed information on the impulses). In line with the storyline of scenario *S2*, we assume that a sustainability-oriented lifestyle leads to a re-evaluation of the importance of income obtained by formal employment versus quality of life and having more time available for other activities. We assume that people are not using the reduced expenditures to buy other goods, but that people who reduce their consumption are willing to reduce their employment and associated earnings by the same amount, too.

In a sensitivity analysis, we posit that this assumption does not hold. Instead, we assume that the level of employment and the income of those who reduce their consumption expenditure do not change. As earnings do not change, we assume that the reduced

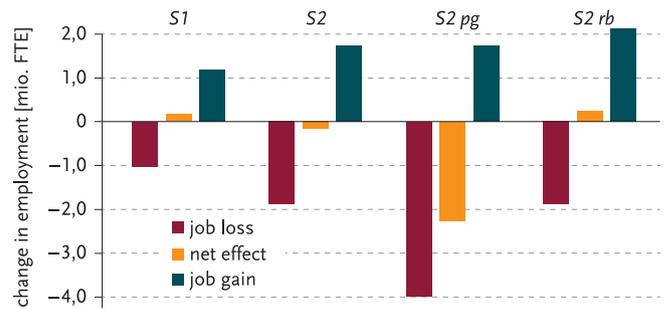


FIGURE 4: Employment effects of the scenarios *S1*, *S2*, *post-growth (S2 pg)* and *rebound (S2 rb)* in full-time equivalents (FTE) compared to current German employment. All scenarios lead to structural changes; scenario *S2 pg* shows the greatest impacts.

expenditures (the difference between higher negative and lower positive impulses) is used for consumption. This is equivalent to a macroeconomic rebound effect, which is why we call this sensitivity analysis *Scenario 2 rebound (S2 rb)*. In the post-growth literature, however, it is also argued that a post-growth mentality is associated with both a reduced consumption level and a voluntary reduction of employment in order to increase personal well-being (Kallis et al. 2018). Indeed, Paech (n. y.) assumes that people might reduce their employment to 50 percent of a full-time equivalent in a post-growth society. In order to account for this perspective, we performed a second sensitivity analysis for such a *Scenario 2 post growth (S2 pg)*. It assumes that the sustainability-oriented population segment reduces its employment and associated earnings by 25 percentage points. The resulting reduction in earnings exceeds the reduction in consumption expenditures (the difference between higher negative and lower positive impulses) roughly by the factor of four. Economic consistency requires that the reduction in earnings equals the reduction in consumer demand. Thus, we assume that there is an additional reduction of consumer demand in the order of about 75 billion euros.

Impacts of the scenarios

We used a static environmentally extended global multi-regional input-output model (cf. Miller and Blair 2009) to analyze the impacts of the scenarios. This is based on version 3.3 of the multi-regional input-output database *EXIOBASE* (Stadler et al. 2018), which contains input-output tables up to the year 2011. Prior national versions of this model have been used, for example to analyze the effect of circular economy strategies, or the impacts of material efficiency technologies (Walz 2011, Pfaff and Sartorius 2015). More information on input-output modeling, especially on how to use static input-output analysis in the context of prospective scenario analysis can be found in the online supplement, appendix 3.

In order to highlight the structural changes of growing and shrinking activities, the impulses of the two scenarios described above are fed into the model separately. The overall net effects represent the difference between the effects of positive impulses along

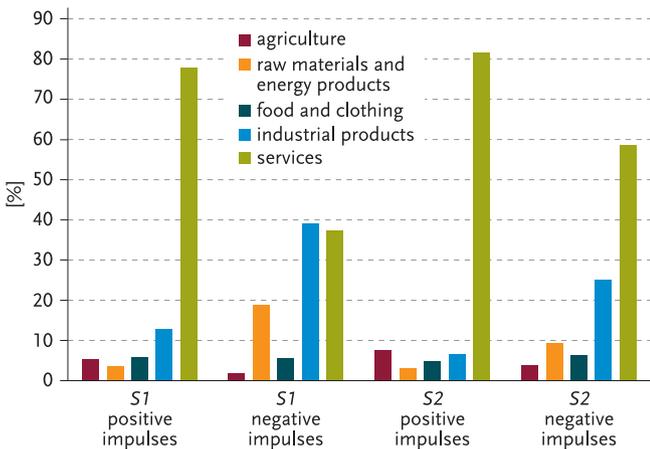


FIGURE 5: Sectoral composition of the value chains of positive and negative demand impulses. In both scenarios S1 and S2, the difference in the composition of the value chain of positive and negative impulses indicate that shifts in demand lead to a higher share of services and a lower share of industrial production.

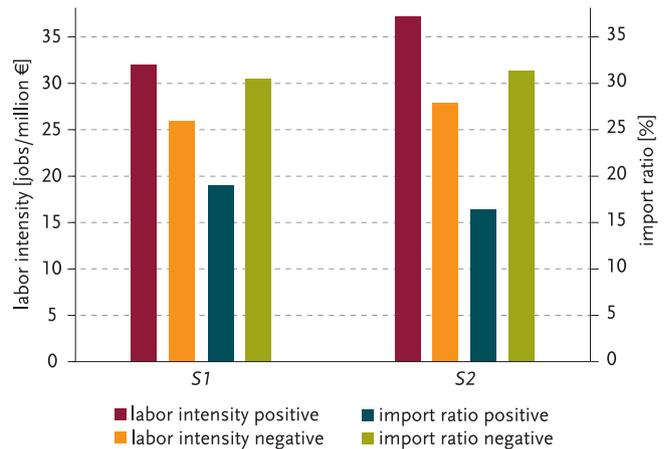


FIGURE 6: Labor intensity and import ratio of the value chains of positive and negative demand impulses. In both scenarios S1 and S2, the differences between the value chain of positive and negative impulses indicate that shifts in demand lead to a lower import ratio and a higher domestic labor intensity.

the value chain and the effects of negative impulses along the value chain. The model is economically consistent and accounts for the dependency of the different sectors along the value chain, including effects on imports. It yields results of economic effects such as production, value added and number of jobs, as well as environmental impacts. The economic and environmental results reported here refer to impacts within Germany only.

Simulating the impacts of the scenarios yields results on various levels. Figure 3 presents key results concerning the effects of the two scenarios and the sensitivity analysis on emissions. There are substantial reductions in emissions. Compared to today's lev-

Figure 4 outlines the employment effects associated with the scenarios. These employment effects are reported in full-time equivalents (FTE). Thus, they do not show how many people work part-time. The figure shows job losses and gains, and net employment effects. The net effects are small for scenarios S1, S2 and S2rb, with small employment gains for S1 and S2rb, and a small decrease for S2. Not surprisingly, scenario S2pg, shows greater impacts, with substantial reductions in employment induced by people opting to work less.

It also becomes obvious that the scenarios lead to major structural changes as well. The number of jobs gained, induced by pos-

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el, the emission reduction for example for greenhouse gases is equivalent to seven to twelve percent of German annual emissions. The difference between scenarios S2 and S2rb can be interpreted as the size of the macroeconomic rebound effect. Nevertheless, this difference is only about ten percent of the emissions reduction achieved in scenario S2. Thus, even if people in the sustainable lifestyle segment are not willing to reduce their employment, there are still substantial emission reductions.

The economic implications of the scenarios show a small increase in value added for scenario S1. For scenario S2, the value added decreases by twelve billion euros, induced by the reduction in consumption expenditures. The loss of value added is much higher in the *post-growth scenario S2pg*, reflecting the much higher reduction in labor earnings. It is interesting to see that value added also increases in the *rebound scenario S2rb*.

itive impulses, and of job losses, induced by negative impulses, are both substantial. The labor turnover rate in scenarios S1 and S2 is in the order of three to four million jobs, indicating a considerable challenge for the labor markets to accommodate these changes.

A more thorough analysis leads to additional information about what drives these changes. The shift in demand from the value chains of the negative impulses to the value chain of the positive impulses leads to substantial changes in the sectoral composition of the economy. Compared to the value chain of the negative impulses, the value chain of the positive impulses shows a much higher share of services, and a lower share of industrial production (figure 5). This difference is especially strong in scenario S1, but also substantial in scenario S2. Thus, sustainable economy approaches are likely to induce sectoral change towards an increase



in the importance of service sectors. As different sectors also show different propensities to import and different labor intensities, the sectoral changes translate to differences in import and labor intensities between the value chains: for all scenarios, the import intensity of the value chain of negative impulses is higher than that of the value chain of positive impulses (figure 6). Thus, the sustainable economy scenarios act like an import substitution strategy. Furthermore, the labor intensity of the domestic value chain of positive impulses is higher than that of the value chain of negative impulses (figure 6). This explains why the impact on employment is stronger than the impact on production and value added. Finally, the sectoral changes also lead to other structural effects: the net employment effects are more positive for women than for men. Furthermore, there are effects on qualification levels. The scenarios bring about a polarization of qualification requirements, with low and high qualification requirements more positively affected than medium qualification levels.

What can we learn from analyzing the wider implications of *Sustainable Economy* approaches?

The magnitude of emission reductions obviously depends on the scenario assumptions. If more options are included that have a greater effect of specific emission reductions, or if a higher level of diffusion in the population is assumed, more emissions can be reduced. On the other hand, one could argue that our assumptions are rather optimistic. For example, it is by no means guaranteed that all the sharing options will lead to a reduction in emissions (see Wruk et al. 2019, in this issue). The assumption in scenario *S2* of an increasing share of the population who follows a sustainable lifestyle and changes their actual behavior towards sustainability is also optimistic in our view, especially when looking at the past development of consumption behavior (Scholl et al. 2015). Finally, further technological change might reduce the specific emission reduction potential that can be mobilized by behavioral changes. Clearly, we need more studies that explicitly examine the aggregated potential of sustainable economy approaches. Thus, it is necessary to continue developing and assessing more elaborated scenarios – our results are only a first step in this direction.

The employment results can be explained by differences in labor intensities and the export ratios of the positive and negative impulses. We evaluate these structural effects as rather robust. The shift in demand from negative to positive impulses leads to lower import intensity. Thus, sustainable economy approaches act as import substitution strategies. The results also indicate structural change towards more service-oriented activities with higher labor intensity. Thus, the scenarios are likely to reinforce some of the structural changes that are typical for other modernization strategies. This also includes the polarization of qualifications: the structural change from industry to services also reduces the overall share of medium qualifications in the scenarios.

Towards a debate on intended and unintended effects

The main goal of this essay was to spark a discussion about the intended and unintended effects of sustainable economy approaches. It can be debated whether ten percent is the upper ceiling of the additional reductions that can be achieved by such approaches in the medium term, or whether much higher or lower potentials are realistic. From our point of view, reducing emissions by ten percent compared to current German emission levels represents huge progress, as this is on top of the emission reductions achieved by technical innovations. Nevertheless, a debate is clearly necessary on the realistic diffusion potential of sustainable economy approaches.

Second, if we look at the net effects on production and employment, there seem to be no strong unintended effects. The modeling results indicate a modernization of the economy and structural changes that actually bring about moderate positive net employment effects for Germany. The strong negative effects on employment in a post-growth scenario are an integral part of such a scenario and could be interpreted as intended effects from the perspective of people willing to reduce their working time voluntarily.

Third, we regard structural adjustments as posing the biggest challenge. Indeed, the moderate net effects mask the huge challenge that labor markets face in managing the high number of job turnovers. There is no guarantee that regional or qualification-specific labor markets will be able to absorb job losses and provide new jobs in their respective segment. This could translate in a substantial involuntary reduction of employment. The structural shifts also indicate less jobs in industry and more jobs in service oriented sectors. This triggers the polarization of the required qualification levels, and led us to the hypothesis that well-paid industrial jobs might be substituted by both more low-paid and more high-paid jobs in other sectors. There is a need to analyze the effects on personal income distribution in much more detail to corroborate these results, for example by differentiating income quartiles. The same holds for regional effects, which proved to be an important dimension in the analysis of Sievers et al. (2019). However, if a thorough and more detailed analysis reveals detrimental effects, it has to be kept in mind that these can have substantial political implications. A loss of industrial jobs might contribute to political changes, as seen, for example, in the US, the UK debate about Brexit, or the analyses of political developments in Germany that link support for the populist right-wing party AfD to regions strongly affected by the loss of industrial jobs due to globalization (Südekum et al. 2017).

The structural effects are most pronounced in the post-growth sensitivity analysis of scenario *S2 pg*: there are intended effects in the form of voluntary lower earnings in the sustainable lifestyle segment. However, these effects also lead to reductions of production and employment in all sectors and among all segments of the population. Thus, there are also strong unintended effects on segments of society that may have no interest at all in following a post-growth path.

To sum up our arguments, we see multiple challenges arising from the unintended indirect effects of sustainable economy approaches. These challenges do not represent an argument against these approaches. However, we do see the need to move the debate about sustainable economy approaches forward: it is not enough to look at how to design such approaches and overcome obstacles, nor is it enough to improve direct evaluation by looking on the intended direct impact of the approaches. These approaches will only gain wider support on the political level if it can be shown what their indirect structural effects are, what unintended social frictions they might cause, and how these frictions can be mediated. Only then will all groups in society perceive sustainable economy approaches as fair. Our scenario exercise demonstrates that the unintended structural effects might indeed be substantial. This underlines the importance of analyzing the wider economic and social implications in much more detail than our scenario exercise. Such a thorough analysis would be a necessary starting point to moving towards a debate that truly embeds sustainable economy approaches in an overall economic transformation strategy on a domestic as well as an international level.

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Governance-Ansätze für nachhaltige Transformationen auf dem Prüfstand dreier Praxisfelder

Um die planetaren Grenzen einzuhalten, müssen wir viele Produktions- und Konsummuster grundlegend ändern. Die politische Gestaltung der notwendigen soziotechnischen Transformationsprozesse wird durch Unsicherheiten, Pfadabhängigkeiten, Ziel-, Werte- und Machtkonflikte – um nur einige Steuerungshemmnisse zu nennen – erschwert. Klassische Umweltpolitikinstrumente allein reichen nicht aus. Der Aufsatz präsentiert sechs aus der Transformationsforschung abgeleitete Governance-Ansätze, die in der praktischen (Umwelt-)Politik bisher noch zu wenig berücksichtigt werden, und diskutiert ihre Anwendung und Umsetzbarkeit anhand dreier konkreter Handlungsfelder: Mobilität, Landwirtschaft und Ernährung sowie Digitalisierung.

Dirk Arne Heyen

Governance approaches to sustainable transformations put to the test in three areas of practice | GAIA 28/S1 (2019): 198–203

Keywords: digitalisation, exnovation, governance, meat, mobility, social innovation, societal trends, transformation, transition, vision building

Angesichts großer Nachhaltigkeitsherausforderungen hat sich der Begriff „Transformation“ etabliert. In Anlehnung an die internationale Literatur zu *sustainability transitions* (Geels 2005) verstehen wir darunter den umfassenden und nachhaltigen Wandel soziotechnischer Systeme wie Energie, Verkehr und Landwirtschaft. Diese sind geprägt durch das Zusammenspiel bestimmter Technologien und Produkte, Markt- und Infrastrukturen, Politikinstrumente, Werte und Praktiken (vergleiche Heyen und Wolff 2019, in diesem Heft). Im Rahmen von Transformationen verändern sich deren Ausprägungen grundlegend und gegenseitig („Koevolution“).

Geprägt von der Transformationsforschung (vergleiche Überblick in Heyen und Brohmann 2017), insbesondere dem Ansatz des *transition management* (Loorbach 2010) und eigenen Vorarbeiten (Grießhammer und Brohmann 2015, Jacob et al. 2015), haben das Öko-Institut und das Forschungszentrum für Umweltpolitik der Freien Universität Berlin ein handlungsanleitendes Konzept *Transformative Umweltpolitik* für das Bundesumweltministerium (BMU) entwickelt (Jacob et al. im Erscheinen, Wolff et al. 2018). Kern des Konzepts bilden Governance-Ansätze, die die „klassische“ (Umwelt-)Politik ergänzen sollen. Sie wurden vor dem Hintergrund ausgewählt, dass soziotechnische Transformationen Merkmale aufweisen, die ihre aktive Gestaltung erschweren. Dazu gehören Unsicherheiten und Nichtwissen, Komplexität, Inter-

dependenzen und Pfadabhängigkeiten, auf viele Akteure verteilte Ressourcen sowie Ziel-, Werte- und Machtkonflikte (siehe ausführlich Jacob et al. im Erscheinen).

Transformative Umweltpolitik berücksichtigt systemische Hemmnisse, Interessenskonflikte und Widerstände sowie verteilte politische Zuständigkeiten und inkrementelles politisches Handeln stärker als andere Governance-Konzepte der Nachhaltigkeits- und Transformationsforschung. Es vermeidet einen übertriebenen Rationalitäts- und Steuerungsoptimismus, wie er beim *transition management* und dem WBGU-Gutachten (2011) zur Großen Transformation durchscheint. Bisherige Transformationskonzepte sind unseres Erachtens auch häufig unrealistisch optimistisch, was die Möglichkeiten ressortübergreifend integrierter – und dabei auch noch ökologisch anspruchsvoller – Politik betrifft.

Transformative Umweltpolitik versucht mit diesen Hemmnissen realistisch, aber kreativ umzugehen, indem etwa neue Entwicklungen und neue Bündnispartner identifiziert und neue Lösungen zunächst im kleinen, aber realen Raum erprobt und dadurch veranschaulicht werden. Es geht zudem über den Fokus der Nachhaltigkeits- und Transformationsforschung auf Innovation und Nischenförderung hinaus und widmet sich auch der „Exnovation“, also dem Ausstieg aus nichtnachhaltigen Strukturen (Heyen et al. 2017), was erst in jüngster Zeit in den Fokus der Transition-Literatur geriet (Köhler et al. 2019).

Im vorliegenden Aufsatz werden sechs Governance-Ansätze des Konzepts diskutiert. Sie finden sich sowohl im Leitfaden für das BMU (Wolff et al. 2018) als auch im Handbuch, das das Öko-Institut teilweise parallel im vom Bundesministerium für Bildung und Forschung (BMBF) geförderten Projekt *Trafo 3.0* für einen breiteren Adressatenkreis entwickelt hat (Öko-Institut im Erscheinen):

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- Transformationsfelder systemisch analysieren,
- Entwicklung gesellschaftlicher Visionen und Ziele unterstützen,
- gesellschaftliche Trends identifizieren und aufgreifen,
- soziale und systemische Innovationen sowie Experimente fördern,
- nichtnachhaltige Strukturen beenden (Exnovation),
- mit neuen Akteuren vernetzen und verbünden.

Dabei handelt es sich nicht um völlig neue Politikideen, wie unter anderem die Debatte um eine missionsorientierte Innovationspolitik zeigt (Boon und Edler 2018, Mazzucato 2018). Zum Teil wurden sie aber in der Transformationsliteratur bislang vernachlässigt (insbesondere Exnovation, teils auch soziale Innovationen). Vor allem aber werden sie in der praktischen (Umwelt-) Politik bisher immer noch zu wenig oder nicht systematisch berücksichtigt, wie uns ein Referatsleiter im BMU bei der Abschluss-tagung des Projekts *Transformative Umweltpolitik* bestätigte. Gründe, die in Diskussionen im Rahmen dieses Projekts durchschienen, sind mangelnde finanzielle, besonders aber auch zeitliche Kapazitäten, mangelnde methodische Kompetenzen und mangelnde Zusammenarbeit in und zwischen Ministerien.

Aufbauend auf Fallstudien innerhalb der beiden oben genannten Projekte und eines weiteren Vorhabens für das Umweltbundesamt (*Den ökologischen Wandel gestalten*), fragt der Aufsatz nach der Anwendbarkeit der sechs Governance-Ansätze, dem möglichen Nutzen sowie Grenzen und Schwierigkeiten mit Bezug auf drei konkrete Transformationsfelder:

- nachhaltige Transformation von Fleischproduktion und -konsum, mit Fokus auf Schweinefleisch (Quack 2016, 2019) und Gemeinschaftsverpflegung (Teufel im Erscheinen, Teufel und Gensch 2018),
- nachhaltige Transformation der Mobilität, mit Fokus auf Personenverkehr (Heyen im Erscheinen) sowie speziell auf E-Bikes (Blanck und Hülsmann 2017, Blanck im Erscheinen),
- nachhaltige Gestaltung der digitalen Transformation, mit Fokus auf E-Commerce (Kampffmeyer im Erscheinen) sowie papierlosem Publizieren und Lesen (Gensch und Hilbert 2016, Gensch im Erscheinen).

Wie Tabelle 1 darlegt, unterscheiden sich die Transformationen hinsichtlich ihrer derzeitigen Dynamik und ihrer primären Trieb-

TABELLE 1: Die Transformationen im Vergleich hinsichtlich Dynamik und Treibern. Die Digitalisierung wird hauptsächlich von wirtschaftlich orientierten Akteuren vorangetrieben und verläuft rasant. Die angestrebte „Fleischwende“ ist dagegen primär ökologisch motiviert und kommt nur schwer voran. Die Transformation der Mobilität (und Automobilwirtschaft) verbindet ökologische und ökonomische Treiber.

	DYNAMIK DES WANDELS	ÖKOLOGISCHE TREIBER	ÖKONOMISCHE TREIBER
Digitalisierung	+++	(+)	+++
„Fleischwende“	+	+++	+
Verkehrswende	++	+++	++

kräfte. Somit lässt sich vergleichen, inwieweit die Governance-Ansätze für die verschiedenen Fälle ähnlich oder unterschiedlich relevant sind.

Im Folgenden werden die sechs Governance-Ansätze nacheinander diskutiert. Während die konkreten Anwendungsbeispiele den oben genannten Fallstudienpublikationen entnommen sind, erfolgte die Bewertung der Governance-Ansätze (im Sinn eines möglichen Beitrags zu einer nachhaltigen Transformation) durch die jeweiligen Fallstudienautor(inn)en im Rahmen interner Abfragen.

Transformationsfelder systemisch analysieren

Um Transformationsprozesse zu beeinflussen, ist zunächst ein gutes Verständnis des Zusammenspiels der Systemelemente im Transformationsfeld und ihrer Wirkungen auf das ökologische System nötig. Dabei geht es auch um die Identifikation solcher Stellen im System, von denen eine Hebelwirkung auf andere Systemelemente ausgehen kann. Solches Wissen sollte möglichst inter- und transdisziplinär abgesichert werden (Jacob et al. im Erscheinen).

In allen Fallstudien bestätigte sich der Wert des systemischen Blickwinkels für das Verständnis von Problemzusammenhängen und die Identifikation möglicher Systemhebel. Allerdings empfanden die Autor(inn)en die kleinteilige, systematische Abfrage von Wirkbeziehungen als aufwendig und teilweise zu Redundanzen führend. Es gilt somit die nicht ganz triviale Aufgabe zu erfüllen, eine systemische (Anfangs-)Perspektive mit einer Priorisierung zu verbinden.

Gerade im Fall rasanter Transformationen wie der Digitalisierung ist es wichtig, die Analysen regelmäßig zu aktualisieren. So hängen etwa die Ökobilanzen von Onlinehandel und E-Books von vielen sich verändernden Faktoren ab (Gensch und Hilbert 2016, Kampffmeyer im Erscheinen).

Entwicklung gesellschaftlicher Visionen und Ziele unterstützen

Attraktive Zukunftsvisionen können im Kontext langfristiger Transformationsprozesse das Handeln von Akteuren motivieren, orientieren und legitimieren. Um stark widersprüchliche Zukunftsvorstellungen zu vermeiden, sollten Akteure aus Politik, Wirtschaft und Gesellschaft versuchen, gemeinsame Visionen einer nachhaltigen Zukunft zu formulieren. Diese können dann in emotional ansprechenden Narrativen kommuniziert werden. Aus langfristigen Zielszenarien müssen zudem konkrete und überprüfbare Zwischenziele und Transformationspfade abgeleitet werden (Jacob et al. im Erscheinen).

Alle Fallstudien bestätigen, dass breit geteilte nachhaltige Visionen hilfreich wären. Jedoch herrscht überwiegend Skepsis, dass dies in den Transformationsfeldern kurz- bis mittelfristig zu erreichen ist.



Während im Strombereich mittlerweile ein recht weitgehender Konsens über die längerfristigen Ziele besteht und im Rahmen einer Stakeholderkommission nun sogar ein Kompromiss zum Kohleausstieg vorliegt (vergleiche Heyen und Wolff 2019, in diesem Heft), sind bei Mobilität und Landwirtschaft Maßnahmen, aber auch konkrete Ziele weiter hoch umstritten (Quack 2016, Heyen im Erscheinen). Zu einer Annäherung beitragen könnte, dass die etablierten Wirtschaftsakteure ökonomisch unter Druck stehen und nach gesellschaftlich akzeptierten Lösungen und verlässlichen Rahmenbedingungen suchen (Quack 2019).

Die bislang technologie- und effizienzorientierte Innovationsförderung sollte erweitert werden; technische, soziale und regulatorische Innovationen sollten in realweltlichen Kontexten erprobt werden.

Im Agrarbereich wird auf Frankreich als Vorbild verwiesen, dessen Regierung 2017 eine ressortübergreifende Roadmap zu Landwirtschaft und Ernährung erarbeitet hat. Sie erkennt an, dass das System derzeit nicht zukunftsfähig ist und einer Transformation bedarf. Die Roadmap entstand durch einen in Arbeitsgruppen strukturierten Beteiligungsprozess von 700 Akteuren zur gemeinsamen Entwicklung von Maßnahmen. 2018 wurde ein großes Gesetzespaket zur Umsetzung verabschiedet (Quack 2019).

Helfen könnte im deutschen Kontext, Enquete-Kommissionen beim Bundestag einzurichten. Zu Digitalisierung und Künstlicher Intelligenz wurden 2018 zwei solcher Kommissionen eingesetzt, die Fragen nach Zielen, Werten und Regulierungsbedarfen vorantreiben können. Da digitale Entwicklungen so dynamisch und umfassend sind und die damit verbundenen Hoffnungen und Befürchtungen so widersprüchlich, ist die Herausforderung aber immens.

Gesellschaftliche Trends identifizieren und aufgreifen

Ein weiterer Governance-Ansatz besteht darin, ohnehin stattfindende gesellschaftliche Trends frühzeitig zu identifizieren (dabei kann zum Beispiel auf den Foresight-Arbeiten im BMBF aufgebaut werden) und sie auf ihr Nachhaltigkeits- und Transformationspotenzial zu prüfen. Auch Trends, die zunächst unabhängig vom Transformationsfeld oder von Nachhaltigkeitszielen scheinen, können relevant sein. Transformationspolitik sollte positive Trends unterstützen und problematische oder ambivalente Trends in Richtung Nachhaltigkeit beeinflussen (Jacob et al. 2015, im Erscheinen).

Die Fallstudien zeigen dabei eindrücklich die Wechselwirkungen zwischen den Feldern: Der Trend zu *instant delivery* im Onlinehandel wirkt sich etwa problematisch auf den Verkehr aus. Die negativen Umwelteffekte abmildern kann wiederum, wenn man

den Entwicklungssprung bei E-Lastenrädern für den Paketversand auf der „letzten Meile“ nutzt (Kampffmeyer im Erscheinen). Apps für Fahrzeug-Sharing oder Fahrplanauskünfte mit Echtzeitinformation machen nachhaltige Verkehrsangebote attraktiver. Perspektivisch kann die Digitalisierung auch stärker zur nachhaltigen Verkehrslenkung und -überwachung genutzt werden (Heyen im Erscheinen).

Die Fallstudien zeigen zudem, dass neben technikbezogenen auch soziale Trends von Bedeutung sind. So steigen zum Beispiel im Verkehrsbereich die Radverkehrszahlen stetig an; im Ernäh-

ungsbereich nehmen die Forderungen nach höheren Tierwohlstandards zu und es wächst die Nachfrage nach entsprechenden Produkten. Für beide Felder relevant sind Trends wie das steigende Gesundheitsbewusstsein oder die Wiederentdeckung der Regionalität bei Essens- oder Urlaubswahl (Blanck und Hülsmann 2017, Quack 2019, Teufel im Erscheinen). Zu berücksichtigen ist allerdings, dass diese Trends in der Regel nur bestimmte Milieus erfassen.

Die Fallstudienautor(inn)en zu Mobilität und Fleisch halten es dennoch für sehr wichtig, die Dynamik solcher Trends zur Kommunikation und Legitimation politischer Maßnahmen zu nutzen, um überhaupt nachhaltige Transformationspfade einschlagen zu können. Dies gilt auch für eine nachhaltige Gestaltung des digitalen Wandels, allerdings macht das hohe Veränderungstempo die Identifikation, Bewertung und Beeinflussung von Trends besonders herausfordernd.

Soziale und systemische Innovationen sowie Experimente fördern

Transformationen brauchen selbstverständlich Innovationen – nicht nur technische, sondern auch soziale: also neue nachhaltige Praktiken, Konsummuster, Organisationsformen und Dienstleistungen (Rückert-John et al. 2016). Häufig hängen technische und soziale Innovationen zusammen und bieten gemeinsam größere Veränderungsspotenziale („System-Innovationen“). Daher sollte die bislang eher technologie- und effizienzorientierte Innovationsförderung entsprechend erweitert werden (Jacob et al. im Erscheinen). Da nicht von Anfang an klar ist, welche Innovationen sich durchsetzen oder in der Breite als nachhaltig erweisen werden, sollten sie in einem realweltlichen Kontext erprobt werden, etwa „Reallaboren“ (Jahn und Keil 2016, Schäpke et al. 2018). Auch neue rechtliche Regelungen ließen sich so testen (Bauknecht et al. 2015, im Erscheinen).

Den größten Anklang findet dieser Governance-Ansatz bei den Fallstudienautor(inn)en zur Verkehrswende: Sie halten niedrigschwellige Ausprobiermöglichkeiten alternativer Mobilitätsformen und das Testen neuer regulatorischer Rahmenbedingungen für sehr wichtig, um die in diesem Feld besonders hartnäckigen Routinen und Pfadabhängigkeiten aufzubrechen (Blanck im Erscheinen, Heyen im Erscheinen).

Der Verkehrsbereich mit seinen Planungsprozessen für infrastrukturelle Maßnahmen deutet aber auch den möglichen Aufwand von realweltlichen Experimentierräumen an. Einen Blick auf den Ernährungsbereich werfend, stellen auch scheinbar leichte Änderungen der Menügestaltung in der Gemeinschaftsverpflegung Anbieter schon vor Umsetzungs Herausforderungen (Teufel im Erscheinen).

Im Bereich der Digitalisierung ließe sich die Entwicklung nachhaltiger Alternativen zu den großen Akteuren unterstützen, etwa Tausch- oder alternative E-Book-Plattformen (Gensch im Erscheinen, Kampffmeyer im Erscheinen). In Anbetracht der durch Skalen- und Netzwerkeffekte verfestigten Marktstellung der derzeitigen Quasimonopolisten werden die Chancen für eine Durchsetzung jedoch als gering angesehen.

Letztlich sollen die geförderten Innovationen von der Nische in den Mainstream gelangen. Hier betonen die Fallstudien die Bedeutung rechtlicher Rahmenbedingungen.

Nichtnachhaltige Strukturen beenden (Exnovation)

Für Nachhaltigkeitstransformationen sind neben Innovationen auch „Exnovationen“ wichtig: der aktive Ausstieg aus etablierten, nichtnachhaltigen Technologien, Produkten und Praktiken (Heyen et al. 2017). Durch Pfadabhängigkeiten und Beharrungskräfte können die etablierten Strukturen oftmals nicht in der ökolo-

Diese Exnovationen voranzutreiben, wird vor allem in den ersten beiden Transformationsfeldern als außerordentlich wichtig und in ihrer Umsetzung zugleich als politische Herausforderung angesehen. Den Empfehlungen des Konzepts *Transformative Umweltpolitik* folgend, setzen die Autor(inn)en auf Planungssicherheit durch klare, frühzeitig kommunizierte und zeitlich gestreckte Ausstiegsfristen (Heyen im Erscheinen, Quack 2019) – trotz des Risikos späterer Fristverlängerungen, wie das Beispiel des kürzlich verschobenen Verbots der betäubungslosen Ferkelkastration zeigt.

Während der Governance-Ansatz sich ursprünglich vorrangig auf die Bundespolitik bezog, zeigen die Fallstudien auch die Handlungsmöglichkeiten von Kommunen, Handel und Verbraucher(inne)n auf. So zahlt die Stadt Tübingen 500 Euro „Abwrackprämie“ für die Abschaffung von Mopeds und den Umstieg auf ein E-Bike (Blanck im Erscheinen). Und in Sachen Tierhaltung hatten Handel und Verbraucher(innen) für die Auslistung von Eiern aus Käfighaltung schon vor der gesetzlichen Frist (2010) gesorgt. Ähnliches sei nun auch bei der klassischen Intensivhaltung von Schweinen denkbar (Quack 2019).

Mit neuen Akteuren vernetzen und verbünden

Innovationen und Transformationen werden letztlich von Akteuren vorangetrieben: Pionier(inn)en, die neue Ideen in die Tat umsetzen, und Promotor(inn)en, die deren Durchsetzung und Verbreitung fördern (Kristof 2010, Rogers 2003). Dabei kommt es auf Akteurskonstellationen an, in denen verschiedene Ressourcen und Kompetenzen kombiniert werden. Daher ist die Vernetzung relevanter Akteure ein weiterer wichtiger Governance-Ansatz. Zu berücksichtigen sind dabei auch solche, die weder klassische Umweltakteure sind noch sich als Akteur im Transformationsfeld empfinden müssen. Sie brauchen dort auch nicht unbedingt über

Für Nachhaltigkeitstransformationen sind neben Innovationen auch „Exnovationen“ wichtig: der aktive Ausstieg aus etablierten, nichtnachhaltigen Technologien, Produkten und Praktiken.

gisch notwendigen Geschwindigkeit ersetzt werden. Dann bedarf es zusätzlicher Exnovationsmaßnahmen. Um Konflikte und negative sozioökonomische Folgen zu mindern, ist der Strukturwandel politisch zu unterstützen und inklusiv zu gestalten (Heyen et al. 2017, Jacob et al. im Erscheinen).

Bei den Fallstudien geht es im Verkehrsbereich insbesondere um die Exnovation fossiler Verbrennungsmotoren (Heyen im Erscheinen) und im Agrarbereich um den Ausstieg aus verschiedenen tierwohl- und umweltschädlichen Produktions- oder Haltungspraktiken (Quack 2019). Im Onlinehandel wäre etwa an eine Beendigung bestimmter Liefer-, Retouren- oder Datennutzungspraktiken zu denken.

formale Macht verfügen und können dennoch Einfluss haben. Entscheidend ist, Perspektive und Handlungslogiken dieser Akteure zu verstehen und gemeinsame Interessen zu identifizieren (Jacob et al. im Erscheinen).

Alle Fallstudienautor(inn)en halten diesen Governance-Ansatz für wichtig und gut umsetzbar. Für die Transformationsfelder wird etwa die stärkere Vernetzung von Nachhaltigkeits- und Digitalisierungsakteuren (Kampffmeyer im Erscheinen), von lokalen Best-Practice-Initiativen wie dem Kölner *Ernährungsrat*, der seinerseits zahlreiche lokale Akteure vernetzt (Teufel im Erscheinen), oder ein Pendant zur *Nationalen Plattform Elektromobilität* für Zweiräder (Blanck im Erscheinen) empfohlen.

Im Hinblick auf neue Bündnispartner werden zum Beispiel Krankenkassen und Wohlfahrtsverbände für eine Verkehrswende in Städten (Heyen im Erscheinen), Erstere auch für die Förderung fleischreduzierter Ernährung vorgeschlagen (Teufel 2019). Um den Änderungsdruck auf die Automobilindustrie zu erhöhen, könnten Finanzmarktakteure als Partner gewonnen werden – ähnlich wie beim Kohle-Divestment (Heyen im Erscheinen).

Bei der Digitalisierung gibt es größere Fragezeichen, welche Akteure (derzeit) sowohl halbwegs wirkmächtig sein können als auch nachhaltigkeitsorientiert sind (Gensch im Erscheinen, Kampffmeyer im Erscheinen).

Weiterhin zentral: klassische Politikinstrumente

Während die Transition-(Management-)Literatur lange Zeit prozessuale und diskursive Ansätze in den Vordergrund gestellt hatte (Köhler et al. 2019), unterstreicht das Konzept *Transformative Umweltpolitik*, dass es der ganzen Palette klassischer Politikinstrumente bedarf, also auch regulativer und ökonomischer Instrumente. Nötig sind sowohl Instrumente, die nachhaltige Optionen unterstützen, als auch solche, die Nichtnachhaltiges erschweren. Neben Beförderung von Effizienz und Konsistenz, also umweltverträglichen Technologien, können Transformationen auch Suffizienzpolitik erfordern: Dabei werden Konsummuster wesentlich verändert, um den Umweltverbrauch absolut zu reduzieren – auch durch „harte“ Instrumente (Heyen et al. 2013, Schneidewind und Zahrt 2013). Der *policy mix* sollte zudem soziotechnische Systeme in ihrer Breite adressieren, also das Geflecht aus Infrastrukturen, Verhalten etc.

Alle Fallstudien bestätigen die hohe Bedeutung geeigneter politischer Rahmenbedingungen durch klassische Politikinstrumente – wie anspruchsvolle und besser kontrollierte Produktions- und Produktstandards, Verteuerung (oder Abschaffung der Subventionierung) umweltschädlicher Praktiken, verbesserte Transparenz oder auch eine vorbildliche öffentliche Beschaffung. Bei der Digitalisierung wird ihnen im Vergleich zu den sechs Governance-Ansätzen eine noch größere Rolle beigemessen, weil ein sehr dynamischer Prozess bereits voll im Gange sei und die Regulierung hinterherhinke (Kampffmeyer im Erscheinen).

Fazit

Der Aufsatz diskutierte auf Grundlage von Fallstudien, inwieweit die formulierten Governance-Ansätze zur Beförderung und nachhaltigen Gestaltung unterschiedlicher Transformationsprozesse genutzt werden könnten. Grundsätzlich konnten alle Ansätze auf die betrachteten Handlungsfelder angewendet werden, doch nach Ansicht der Fallstudienautor(inn)en mit unterschiedlich transformativem Potenzial.

Die Ansätze „systemische Analyse“, „Visionsbildung“ und „Akteursvernetzung“ wurden in allen Bereichen für (sehr) wichtig gehalten, wenngleich bei der Umsetzung auch Hürden bestehen,

vor allem für breit geteilte Zukunftsvisionen. Das Aufgreifen gesellschaftlicher Trends und die Förderung sozialer Innovationen und Experimente wurde bei den beiden stärker ökologisch getriebenen Transformationsprozessen („Fleischwende“, Verkehrswende) für wichtiger empfunden als bei der Digitalisierung. Ein Zusammenhang mit den unterschiedlichen Dynamiken und Triebkräften dieser Prozesse (siehe Tabelle 1) könnte darin liegen, dass die ersten beiden noch an Dynamik gewinnen müssen und hierzu Impulse brauchen können, während die technisch-ökonomisch getriebene Digitalisierung bereits eine enorme Dynamik hat.

Da sich Letztere derzeit kaum in eine sozial-ökologisch nachhaltige Richtung bewegt und ihre staatliche Steuerung hinterherhinkt, scheint sie in besonderem Maße klassischer Regulierung zu bedürfen. Generell bestätigen aber alle Fallstudien, dass sich die aus der Transformationsliteratur abgeleiteten Governance-Ansätze und klassische Politikinstrumente ergänzen müssen. Dies ist eine wichtige Botschaft für die Forschung zu *sustainability transitions*, die sich erst in letzter Zeit verstärkt klassischen Politikinstrumenten und *policy mixes* zugewendet hat (Köhler et al. 2019, Rogge et al. 2017) und dies nun konsequent weiterverfolgen sollte. Gleiches gilt für Exnovation, deren Bedeutung in den Fallstudien ebenfalls bestätigt wurde.

Das Konzept *Transformative Umweltpolitik* mahnt außerdem grundsätzlich an, angesichts widerstreitender Interessen, verteilter Macht und weiterer (in der Einleitung angesprochener) Hürden nicht zu steuerungsoptimistisch zu sein. Daher möchte es mit seinen Gestaltungsansätzen auch Hinweise geben, wie transformationswillige Politikakteure (insbesondere Umweltressorts) Impulse für nachhaltige Transformationen geben können, auch wenn es (noch) kein integriertes nachhaltigkeitsorientiertes Regierungshandeln gibt (was selbstverständlich von Nutzen wäre).

Hilfreich für die Umsetzung in der politisch-administrativen Praxis wäre – ergänzend zu den oben erwähnten Leitfäden – die Weiterbildung der zuständigen Personen, etwa mit Blick auf systemische Analysen, Trendbewertung oder Stakeholdermanagement. So wird im Projekt *Transformation wagen* derzeit ein Lernprogramm für den Geschäftsbereich des BMU entwickelt. Für die praktische Umsetzung braucht es zudem finanzielle und vor allem zeitliche Ressourcen sowie eine stärkere Zusammenarbeit auch innerhalb des Ressorts. Um dies jenseits eingefahrener Zuständigkeiten und Routinen zu erreichen, wäre ein entsprechendes „Commitment“ der Ressortleitung wertvoll. Schlussendlich gilt es darüber nachzudenken, ob Komplexität, Unsicherheiten und die Notwendigkeit von Experimenten („Versuch und Irrtum“) bei Transformationen soziotechnischer Systeme ein neues Leitbild für Verwaltungshandeln erfordern (Wolff et al. 2018).

Fallstudien und Aufsatz entstanden im Rahmen der Projekte *Erarbeitung zentraler Bausteine eines Konzepts transformativer Umweltpolitik* (FKZ 3715 11 106 0) und *Den ökologischen Wandel gestalten* (FKZ 3717 11 101 1), jeweils im Auftrag des Umweltbundesamts, sowie des Projekts *Trafo 3.0* (FKZ 01UT1426) mit Förderung vom Bundesministerium für Bildung und Forschung (BMBF) im Rahmen des Förderschwerpunkts *Sozial-ökologische Forschung (SÖF)* durch den Themenschwerpunkt *Nachhaltiges Wirtschaften*. Ich danke meinen Projektkolleg(inn)en Ruth Blanck, Carl-Otto Gensch, Klaus Jacob, Nele Kampffmeyer, Dietlinde Quack, Jenny Teufel und Franziska Wolff für Input und Hinweise zu diesem Aufsatz.

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Governance for the sustainable economy

Institutional innovation from the bottom up?

To achieve sustainable development, it is evident that new approaches to governance are required to govern the transformation of the economy and enable the replacement of unsustainable technologies and practices. Very much like new technologies and social innovation, institutional innovation emerges from the bottom up by non-state actors aiming to facilitate the governance of transformation. What is the potential of such institutional innovation?

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Governance for the sustainable economy. Institutional innovation from the bottom up?

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Abstract

A sustainable economy fulfills societal needs in a fundamentally different way to the current economic system. Improvements to the efficiency of existing technologies or practices appear insufficient for achieving sustainable development within the planetary boundaries. Disruptive, systemic and transformational changes appear necessary in order to replace existing technologies and practices to establish a sustainable economy. Such innovations often start out in niches; however, the scaling up and the ultimate replacement of current socio-technical systems requires governance to allow for the coordination of actors, the reorganization of socio-technical systems and the mobilization and allocation of resources. As governmental institutions are part of the current (non-sustainable) systems and thereby fail to provide coherent, integrated and transformative governance, we explore whether institutional innovation from non-state actors can step in to provide governance of transformation processes. Based on explorative qualitative case studies of networks in the food sector, city planning and reporting tools, we analyze the potential of bottom-up institutional innovations to coordinate actors in transformation processes.

Keywords

governance, infrastructures, innovation, institutions, networks, supply chains, sustainability, sustainable economy, transformation

A sustainable economy serves the needs of society without exceeding the planetary boundaries and in a way that can be generalized for future generations and other countries. It has been argued from both academia as well as policy makers that this goal cannot be achieved within the existing trajectories and through incremental improvements only (e.g., UNEP 2019, UN 2015). Instead, societal needs (e.g., for mobility, heating, housing, communication, or nutrition) have to be fulfilled fundamentally differently from today. This requires a disruptive, systemic and transformational change. Disruptive innovation implies a replacement of existing technologies and practices instead of their improvement (Christensen et al. 2015). Systemic change means that such innovation is not limited to technologies, but also implies changes of related infrastructures, institutions, products, markets, social practices and cultures, which in their combination provide services to society. For such systems, the term socio-technical or socio-economic systems was coined (Geels 2004). These changes are transformative in the sense that existing systems are replaced or fundamentally reconfigured. Transformative change starts in niches, that is, networks of actors demonstrating alternative system configurations and by this challenge existing socio-technical regimes (Jacob et al. forthcoming with additional references).

How are disruptive bottom-up innovations actually mainstreamed to ultimately replace socio-technical regimes? Given the scope of the of transformative change, this requires considerable coordination and (re-)allocation of resources as different parts of socio-technical systems are subject of change, there are many different actors involved, and resources necessary. The coordination of actors, systems, and the mobilization and allocation of resources are means of governance. Governance is understood as the establishment and enforcement of rules by governments, networks or markets to regulate the common affairs of different actors (Benz 2004, Mayntz 2008). The term governance is not limited to the instruments of enforcement of rules or incentivisation, but includes communicative aspects, objectives and institutions. Governance is typically attributed to governments: it is governments that are expected to aggregate differing interests, to find

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compromises, provide rules, coordinate and to (re-)allocate resources. This is because governments have the legitimacy to impose general and binding rules and the resources, administrations and means for their implementation. Transformations are subject of politics and power, given their redistributive character (Patterson et al. 2017).

Given the complexity of socio-technical regimes and their transformation, it has been argued that governance would need to be adaptive and reflexive: as transformations cannot possibly be planned, and responsibilities are widely distributed, a governance of transformation would need to be polycentric, experimental, continuously monitoring and learning and anticipatory (Koontz et al. 2015 with additional references).

A vital part of socio-technical systems are the (governmental) institutions that provide rules and stability for the functioning of such systems. This is why governmental actors often act as regime actors: instead of pursuing a strategy of disruptive change, they tend to prefer innovation within the systems. Governments are, however, not unitary actors; they pursue in their different branches and at different levels often competing goals. Governments explore options for renewables, efficiency and sufficiency, while at the same time they support a continuation of fossil technologies. They pursue a greening of agriculture, housing or transport, while protecting existing pathways. The lack of policy integration and coherence is a characteristic not only of transformation, but rooted in the functioning of governments and their public policies (Jacob et al. 2016).

A sustainability transformation requires changes in governance.

But these are often hard to pursue for governmental actors. Instead, companies, civil society or local governments develop new governance approaches from the bottom up to foster transformational change.

Since governments are part of system-regimes and public policies are often incoherent, they are unlikely to provide steering capacity of transformation. In principle, the pluralistic character of governments and an incremental policy process is compatible with concepts of adaptive, polycentric governance. Transformative policies can be developed from a sectoral perspective, using the dynamics of societal change and providing directions for ongoing transformation (Jacob et al. forthcoming, Wolff et al. 2018). However, a comprehensive, integrated and coherent governance of transformation towards sustainability cannot be expected from governments. Transformation as disruptive and systemic change does not result from a top-down steering by governments as it is suggested in ideas of a transition management (Berkhout et al. 2004).

Governance is not limited to government of societies for the common good, but entails rule making and enforcement by non-state actors and local actors (e. g., municipalities). Against the limited capacities of states for governing transformations, it can be

asked in how far not only new technologies and social practices emerge from the bottom up, but also institutional innovations that provide governance for a transformation towards sustainability.

To answer this question, we explore cases of institutional innovation. As institutional innovation, we understand new formal and informal rules (Raffaelli and Glynn 2015). This wide definition, inspired by the publications of North (1990), overlaps with social innovation – new social practices can also be interpreted as new rules (e. g., vegetarian lifestyle as an informal rule). However, the distinction is that governance has the intention to provide guidance while social innovations focus on the actual practices.

Examples for institutional sustainability innovations

The basis for our empirical analysis are projects that were funded in the program *Sustainable Economy* of the German Ministry for Science and Education (BMBF). The projects developed technological and social innovation in different sectors (agriculture, mobility, raw materials, etc.), using different approaches (living labs, life-cycle analysis, etc.). A common feature was the involvement of practitioners from business and civil society as well as policy makers. The innovation processes were subject of research to explore the requirements and potentials for their transfer and upscaling. In some of the projects, experimentation with institutional innovation was undertaken, although that was not neces-

sarily the primary focus of the projects. The institutional innovations were not developed following a common research protocol, but for the purposes of own research questions. They provide, however, a basis for assessing the potentials of bottom-up institutional innovation to the governance of transformation. The cases are analysed against requirements for a governance of transformation which are developed in the section after the following. Given the anecdotic character of the cases, we pursue a qualitative case study approach: the cases are relevant by providing insights to the functioning and the constraints of institutional innovation. The approach is explorative rather than testing of hypotheses, and we do not infer from the cases to a larger universe.

Networks in the food movement

In the food sector, alternatives to global “Big Food” (Williams and Nestle 2016) are emerging that operate locally, ecologically, in a socially aware way, are small scale and based on solidarity (Gruch-



mann et al. 2019). Local networks of small farmers include sustainability aspects in their core business. However, further technological and logistics integration is vital for achieving a higher sustainability performance. The activation of people's own resources along with the production of local goods is a means of circumventing long-distance and complex value chains. Local food initiatives and enterprises that operate in a community-oriented, collaborative and grassroots-based democratic manner (Renting et al. 2012) are key contributors in this (Antoni-Komar et al. 2019). Rather than focusing on seeking more and more material opportunities for self-fulfilment, efforts are aimed at developing practices of provision and mutual care that change conventional patterns of consumption and, therefore, coexistence. Referred to as the grassroots movement (Seyfang and Smith 2007), urban gardening projects, Community Supported Agriculture (CSA), food co-ops and producer-consumer networks establish links between producers and consumers, promote "prosumerism" (Blättel-Mink et al. 2017) and create learning spaces to support processes of self- and group empowerment. In these newly developing transformative enterprises, a wide range of heterogeneous actors work together. This also poses challenges on organizing the supply chains in this sector: insufficient integration and coordination of decentralized production entities limit growth. This missing broad effect hinders the necessary investments in infrastructure and more innovative distribution channels, limiting competitiveness against conventional food supply chains.

Tools for supply chain management

The *Economy for the Common Good (ECG)* movement is an example for a new approach towards managing supply chains. It is a civil society movement that aims at aligning economic activity more strongly with values such as ecological sustainability, social justice and democracy (Felber 2015). Companies, which play an important role in the movement, assess the extent to which they contribute to these values by compiling a so-called *Common Good Balance Sheet (CGBS)*. It delivers an account of the degree to which a company acts in correspondence with the "core values" promoted by the *ECG* in relation to central stakeholders in the whole supply chain (such as suppliers, investors, employees, business owners, customers, business partners, and the "social environment"). Compared to other instruments of *Corporate Social Responsibility*, the *CGBS* focusses relatively strongly on the absolute reduction of resource consumption in the supply chain and as the only one explicitly promoting the objective of sufficiency (Sommer et al. 2016). With regard to ecological sustainability, *ECG* companies make use of social innovations and socio-technical innovations alike. However, the specific measures taken in companies are diverse. They not only address the management of supply chains, but also environmental management for the production, durability and reparability of products or support for sustainable staff mobility.

Another example of an institutional innovation to manage supply chains are private standards and certification tools in the field of conflict minerals and the globalized minerals markets, which feature high cost-pressure and complex supply chains which are

hard to manage and monitor (Brix-Asala et al. 2018, see also Hiete et al. 2019, in this issue). More than 20 voluntary sustainability standards and certification systems on minerals mining and their supply chains were developed. The supply chains for these minerals span the mining sector as well as multiple other industries (Sauer and Seuring forthcoming).

Planning for sustainable cities and regions

Cities are key players in the field of climate protection and sustainability as they provide the physical, cultural and institutional structures for economic activities (Engels et al. 2018). Many German local authorities and municipalities adopted environmental targets and created climate protection concepts. By now more than 887 local climate protection concepts have been created. This provides a framework for a sustainable economy by measures for cutting emissions, adapting to climate change, saving of energy, sustainable urban planning, etc. (Göpfert 2014). Despite these favourable circumstances local authorities and municipalities struggle in effectively implementing and prioritizing the measures, as well as in integrating and operationalizing the climate protection concept in the local and regional planning processes (Engels et al. 2018, Hiete et al. 2017). Additionally, concerning energy infrastructures and efficiency, many stakeholders with various conflicting interests interact (Hiete et al. 2017). Main challenges are the inter-departmental integration of sustainability targets and the respective coordination of activities and stakeholder networks. Those partly result from missing information and respective data exchange formats and, as described by Engels et al. (2018), from political agenda and other organizational barriers and inefficiencies. Besides these organizational challenges, other major shortcomings can be identified, for example, their lack of specifications, missing quantitative indicators or specific strategies and overall coordination. As a result, many measures remain intangible, difficult to communicate and manage (Bierwirth and Schuele 2012). Despite these shortcomings, they have proven to be a helpful tool to support the sustainable economy.

Analysis: bottom-up institutional innovation for the sustainable economy

How far do these bottom-up institutional innovations provide governance for a sustainable economy? Regardless of the specific technologies and practices, a sustainable economy would require a different supply of goods and services, a demand that prioritizes sustainability and according supply chains and adequate infrastructures to provide such supplies and meet the demand. Are the above-depicted institutional innovations supporting the development of markets of a sustainable economy? Smits and Kuhlmann (2004) suggested (more) systemic policy instruments to support innovation processes, including the management of interfaces across subsystems, building, reconstructing and deconstructing innovation systems, provision of platforms for learning and experimenting, provision of an infrastructure for strategic intelligence,

stimulation of demand articulation and facilitation of the search for possible applications. Such instruments – if designed properly – could provide functions for innovation systems and support technical and social innovation towards sustainable development (Hekkert et al. 2009). However, as shown in the following, also the bottom-up institutional innovations do contribute to such systemic change.

Not only new technologies and social practices emerge from the bottom up, but also institutional innovations for the scaling up of sustainable innovations. Non-state actors provide coordination of innovation systems by establishing networks or market mechanisms.

Building and coordinating innovation systems

The networks in the food movement demonstrate the value of an “enabler” to coordinate innovation activities within local networks. For example, an organic bakery shields itself and its partners from market pressures in sourcing its grains by means of round tables with farmers instead of relying on commodity markets. Bakeries and farmers agree on a price that guarantees that the grain can be grown according to the highest ecological and social standards and that the farmers are not caught in a quote-driven cutthroat competition (Stumpf et al. 2017). Such networks also evolve as joint enterprises with financial commitments of the regional partners. With regard to network advantages, coordinated networks increase competitiveness, particularly in market environments where larger companies are less successful (Moore and Manring 2009). Moreover, the relational leadership of the intermediary enterprises that govern the networks represents a driver of strategic sustainability (Kurucz et al. 2017). *ECG* companies in the sample also foster common good oriented business practices through cooperation and networking. They pursue long-term relationships with their suppliers based on dialogue, collective improvement measures and support the development of sustainable innovations within their branches and extended fields of activity (Stumpf et al. 2017). Establishing such networks can be supported by providing blueprints for their design and mechanisms for strengthening the commitment of its members (e. g., CSR Regio.Net 2014).

Secondly, the reporting and planning tools can help to coordinate sustainability innovations. The *CGBS* is such a tool. It helps companies to evaluate and reconfigure their business models, products and activities in terms of sustainability. According to the *CGBS* guidelines, companies that participate in the *ECG* are asked to offer “products and services which have a less significant negative impact on the environment through their use and disposal than existing alternatives” (*ECG* 2017, p. 56) as well as “contribute to a good life for all and satisfy the basic needs of as many people as possible, including disadvantaged and lower socio-economic groups” (*ECG* 2017, p. 63). Moreover, empirical evidence shows that the *CGBS* also stimulates companies to look at topics of cor-

porate responsibility, which were not in their focus before, and to improve their “common good performance” in these areas.

Another tool to provide supply of sustainability innovation are planning instruments for urban development. Energy-use plans alike land-use plans can be used for coordinating activities and determining formal resolutions in urban planning (WBGU 2016). The plans comprise of a data driven stock and potential analysis,

a concept development, identification of a bundle of measures and a plan of implementation of the suggested measures. A key feature of the plans is the spatial allocation of planning objectives. Additionally, outcomes from the technical plans can be converted to formal resolution, as in land-use planning (TUM 2011). The plans provide a basis for levelling their competitive disadvantages of sustainable businesses, for example, by sourcing and public tender processes.

Consumer demand articulation

Consumer preferences are not consistently in favor of sustainable goods and services. To date, only certain customer groups demand sustainable products and services, also partly due to their higher willingness-to-pay (Stumpf et al. 2017). However, they play an important role in developing a sustainable economy. For example, food businesses include additional environmental and social benefits at the core of their value proposition to attract additional customer segments (Schaltegger et al. 2016). By external communication of such sustainability benefits, business can achieve reputational effects. Lüdeke-Freund (2014, p. 311) showed that such effects were “the most important driver but also the most complex and hard to manage one”. To address this, Ruppert-Winkel et al. (2017) presented possible ways to communicate social and ecological measures. Among these are brands, sustainability reports, and the use of social media. Internal communication is similarly important: companies operating with sustainable business models need to reinforce the incorporated values and norms. The employees need to recognize the business model and reinforce its authenticity (see also Süßbauer et al. 2019, in this issue).

Another information tool is the *CGBS*. The reporting strengthens a company’s credibility and, consequently, influences consumer preferences. The *CGBS* is even seen as the “Mercedes of balance sheets”, as an interviewee puts it (Mischkowski et al. 2018, p. 127). Common good oriented companies consider the reporting as a “kind of stakeholder dialogue” (Stumpf 2018) that enables consumers to engage in the companies’ activities. In addition, the *CGBS* is a means of internal communication, showing pos-

itive effects on acquisition and retention of employees through participation in organizational governance and enhancing clarity about values (Mischkowski et al. 2018).

Conclusions

Innovations for sustainability often emerge in small-scale niches. To become mainstream, it is called for appropriate framework conditions provided by governments: by economic incentives, removal of subsidies, or regulation of market access, etc. However, the state is limited in its capacities to provide a comprehensive and consistent framework for a transformation to sustainability. The analysis demonstrates that not only technological and social innovations, but also institutional innovations for the scaling up of sustainable innovations are provided from the bottom up. Non-state actors provide coordination of innovation systems by establishing networks or market mechanisms. They support the articulation of demand by tools for supply chain management and reporting.

Does this imply bottom-up institutional innovations are superior to governmental institutions? For example, someone may argue that small and regional networks of food suppliers are based on mutual trust and reciprocity. This may have limitations as innovation systems grow out of their niches and become more complex. It would be open to discussion if a sustainable economy is necessarily regionalized (as it is argued for food, energy or mobility) and thereby such networks would be possible, or if large scale and possibly global supply chains are necessary and possibly other mechanisms for coordination are necessary.

Furthermore, it is questionable if market based institutional innovations are effective and efficient when it comes to a comparison with (potential) governmental instruments with similar functions. Given the large number of tools for supply chain management developed on private initiative, someone could argue a coordination of information management across value chain and certification by a central authority would be more efficient. It may also overcome possible disincentives to share information or to effectively change practices. However, a comparative assessment is hardly possible as there are – so far – few substantive governmental requirements for a sustainable supply chain management.

Furthermore, bottom-up institutional innovation may provide a coordination among actors, but fail to internalize external costs or solve zero-sum conflicts that may arise for example from the phaseout of unsustainable technologies. We do not have examples of bottom-up institutional innovation to provide (access to) infrastructures regardless of their importance for sustainable innovation, most likely because of spillover effects.

As the discussion points to (potential) shortcomings of bottom-up institutions while at the same time governmental policies fail to provide sufficient guidance and a robust framework for a transformation to sustainable development, it could be further explored in how far a meta-governance, that is, a combination of hierarchical, market and network governance could utilize complementarities and overcome failures (Meuleman 2018). In a similar vein,

the hybridization of governance, whereby binding rules provide a framework for the self-regulation of markets could be a strategy for a capacity saving governance (Hey et al. 2007). Local communities, in their hybrid role between civil society and governments could serve as a laboratory for such approaches.

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Employee roles in sustainability transformation processes

A move away from expertise and towards experience-driven sustainability management

Corporate sustainability management usually relies on innovation experts – that is, it relies on top-down and staff-unit approaches. Seeking out the involvement of employees from all company departments can substantially contribute to corporate greening. “Ordinary” employees are not trained as sustainability experts, yet it is precisely their experience within their own field and within the organisation that can give rise to knowledge that is essential for transforming the economy towards sustainability. Hence, employees need to be empowered by appropriate structures and organisational culture. Transferring practical experience to expertise can prove very helpful in assisting and stimulating sustainability transformations in various business fields.

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Abstract

Although ordinary employees are typically regarded as an important stakeholder group for enhancing corporate sustainability, they are seldom seriously addressed in business or research practice. To learn from the practical experience of what takes place at workplaces, we analysed four transdisciplinary research projects all aimed at initiating, accompanying and analysing processes of sustainability transformation within companies, but which focused on different sectors and organisational contexts. Based on the assumption that ordinary employees can hold three different roles in processes of sustainability transformations (implementers, ambassadors and recipients of corporate sustainability practices), we compared the findings from practices of employee involvement within the four projects. Based on these findings, we examined the implications for companies and highlighted future research needs.

Keywords

corporate sustainability practices, employee roles, obstacles to sustainable economy, sustainability transformation, worker participation

In organisational studies, there is a broad consensus that comprehensive corporate greening requires initiatives and engagement by employees at all levels of a company (Daily et al. 2009, Lamm et al. 2013, Lülfs and Hahn 2013). Human resource management is regarded as key for the successful implementation of corporate sustainability (Lam and Khare 2010, Sarvaiya et al. 2018). Although most workers are, according to their job descriptions, not explicitly considered responsible for developing sustainability innovations or realising sustainability activities (Kesting and Ulhøy 2010), “ordinary” employees certainly can contribute to corporate sustainability in at least three ways (Muster and Schrader 2014):

1. Through everyday experience with their employer’s technical operations and products, they gain valuable tacit knowledge, which can be used to *implement changes* within the organisation, such as through detecting sources of toxic emissions in the fabrication process (Wolf 2013, Becke 1998) or creating new eco-friendly products and services (Buhl et al. 2016, Ramus 2003).
2. Because employees interact and communicate with external stakeholder groups, including customers and suppliers, they can be ambassadors of the company’s products and services

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(Hasu et al. 2015). Through talking with colleagues, friends and acquaintances, they also influence the perception of the company within the communities where they live.

- Employees are at the same time recipients of internal corporate sustainability measures aimed at achieving good working conditions (Muster and Schrader 2011) and green workplaces (Süßbauer and Schäfer 2018, Ruppert-Winkel et al. forthcoming). These measures are important for matching a company's official sustainability strategy with appropriate organisational structures and culture (Harris and Crane 2002).

In sum, theoretically, integrating ordinary employees into corporate sustainability practices is regarded as crucial for sustainability transformation of the economy and even as a linking element between environmental and social aspects of sustainable labour (Becke and Warsewa 2018, Brandl and Hildebrandt 2002). However, in business as well as in research practice, ordinary employees are rarely seriously considered. For example, when it comes to their innovation activities, most companies still rely on top-down investments in their research and development departments (Birkingshaw and Duke 2013) and other innovation experts. This is why ordinary employees, for example, those working in contact with consumers, do not necessarily recognise the innovative potential of their practices (Hasu et al. 2015).

We argue that ignoring the potential of ordinary employees can be an obstacle to a sustainable economy. Thus, we present practical examples of how to address and involve workers in processes of sustainability transformations in different industry sectors and organisational contexts. We discuss the findings from these processes for corporate sustainability management and formulate recommendations for each employee role. Based on these insights, we point out future research questions as well as needs for future transdisciplinary projects.

Case studies

The examples presented in this paper stem from four transdisciplinary research projects that ran from 2015 to 2018 within the funding measure *Sustainable Economy* of the German Ministry of Research and Education (BMBF) (box 1). All projects involved practice partners from businesses and, in some cases, public institutions and business associations but focusing on different sectors (e.g., tourism, food service) and contexts (e.g., rural areas, eco-pioneers, small and medium-sized enterprises, SMEs). Thus, sustainability fields and specific research questions differed among the projects. However, all projects aimed at initiating, accompanying and analysing processes of sustainability transformation¹.

¹ With sustainability transformation we refer to "recent political, socio-economic, and cultural shifts resulting from attempts to address the social-ecological crisis [...] challenging not only existing technologies and market structures, but also the underlying patterns of production and consumption" (Brand and Wissen 2017, p. 1).

BOX 1: The four transdisciplinary projects and their research aims

A Model for an Integrated Transformation Process towards Sustainable Business Practices in Tourism (Green Travel Transformation)

Green Travel Transformation worked together with small, medium and large enterprises (travel agencies, tour operators) as well as travel associations to analyse how to more effectively use the potential of travel agencies as a distribution and communication channel for sustainable travel options.

Integrating Employees as Consumers in Sustainability Innovation Processes (IMKoN)

IMKoN involved large enterprises and several smaller eco-pioneers from diverse business-to-consumer sectors (cosmetics, energy supply, mail order, cleaning devices, publishing) to develop a method for integrating consumer-based employee knowledge into generation of sustainable product and workplace innovations (Muster et al. 2016).

Developing, Testing and Disseminating Concepts of Sustainable Production and Consumption in the Field of Out-of-Home Catering (NAHGAST)

NAHGAST aimed at initiating, supporting and distributing transformation processes within the hospitality and food service sector. Small, medium and large enterprises and several public institutions (schools, universities, hospitals, business canteens, event gastronomy) participated in the project. Different intervention types were implemented in canteens, including provision of information regarding the sustainability performance of meals (e.g., via a three-level label), participatory approaches wherein customers developed means to guide themselves and others towards more sustainable choices (e.g., assigning the role of food hero to older pupils who then acted as models for youngsters) as well as nudges that aimed to unconsciously lead customers towards choosing the most sustainable meals (e.g., descriptive food names).

Regional Transformation through Corporate Socio-Ecological Activities (RegioTransKMU)

RegioTransKMU focused on regional transformation through the social-ecological actions of companies, involving SMEs in rural areas from diverse sectors (e.g., energy supply, financial services, laboratory analysis and consulting, passenger transport, engineering) as well as associated universities and vocational schools. The main question was: how can SMEs in rural regions contribute to the attractiveness of these regions and enterprises as places to work and live?

In the four projects, different methods were used to analyse employees' knowledge and partially integrate it into the sustainability transformation process: staff surveys, innovation workshops, qualitative interviews, real experiments and focus groups (table 1, p. 212). These methods were either part of the original research design or were adopted during the transdisciplinary research process.

Furthermore, context-specific instruments were developed by the project teams to foster sustainability transformations within each project's respective business field (table 1). In some cases, the developed instruments were based on the expertise of ordinary employees (e.g., innovation toolbox, guideline for rural SMEs), whereas others were informative tools (e.g., sustainability infor-



TABLE 1: Overview of the four case study projects with regard to involved practice partners, involvement of employees, methods used to analyse and integrate (knowledge of) employees, and instruments for sustainability transformations. SMEs = small and medium-sized enterprises.

PROJECT	INVOLVED SECTORS AND TYPES OF ORGANISATIONS	ADDRESSED EMPLOYEE ROLE(S)	METHODS OF INTEGRATING EMPLOYEES DURING THE PROJECT	DEVELOPED INSTRUMENTS FOR CONTEXT-SPECIFIC SUSTAINABILITY TRANSFORMATIONS
<i>Green Travel Transformation</i>	small, medium-sized and large enterprises and business associations from tourism sector	ambassador	focus groups and qualitative interviews with travel agents; stakeholder workshops	<ul style="list-style-type: none"> ■ on- and off-line training for travel agents, source: https://green-counter.driv.de ■ database for sustainability information in booking systems, source: https://greentravelindex.com ■ familiarisation trips for tour operators
<i>IMKoN</i>	large enterprises and eco-pioneers from diverse business to customer sectors	recipient; implementer	focus groups; interviews; innovation workshops	innovation toolbox: <i>Design Thinking for Sustainability (DT^N)</i> , source: www.nachhaltigkeitsinnovation.de
<i>NAHGAST</i>	small, medium-sized and large enterprises and public institutions from hospitality and food service sector	implementer	real field experiments in transition labs; stakeholder workshops	tool for sustainability assessment of meals: <i>NAHGAST calculator</i> (Engelmann et al. 2017), source: www.nahgast.de/rechner
<i>RegioTransKMU</i>	SMEs in rural areas from diverse sectors, associated universities and vocational schools	recipient	online survey among employees in different rural SMEs	guidelines for rural SMEs on the implementation of social and ecological activities (Ruppert-Winkel et al. 2017)

mation in booking systems, *NAHGAST calculator*) not based on employee knowledge, but according to their experience and work environment.

Considering ordinary employees in sustainability transformation processes – a synthesis

In the following, we give examples of how ordinary employees have been addressed within the four research projects presented above. Based on Muster and Schrader (2014), we differentiate between employees' roles as implementers, ambassadors or recipients of corporate sustainable practices.

Employees as implementers

The *NAHGAST* project aimed at transforming practices in the German hospitality and food service sector. Initially, potential contributions of ordinary employees within this process were not considered but, rather, came to researchers' attention during the transdisciplinary study itself. For example, for interventions in canteens, it became clear that harmonised menus across all participating enterprises were necessary, to compare the effects of interventions in different settings. Menus had to be viable for all target groups of the participating canteens (e.g., school children or hospital patients) and should fit into the ongoing operations of companies. Thus, the project team decided to organise a joint workshop with workers from different areas of the involved companies. The project teams' aim was to, first, agree on a harmonised menu for the intervention period and, second, harmonise meal-optimisation means – including reducing portions and meat and relying on organic/regional ingredients and fairtrade spices – throughout the menu. In the following step, employees brought in their specific knowledge: kitchen managers revised recipes to optimise meals in favour of sustainable supply; the purchasing department or-

dered new products and even looked for new suppliers; the marketing department edited the (digital) menus; and workers at serving counters revamped communication with consumers. This intensive cooperation among different employee groups was a key ingredient in successfully improving meals, the effects of which lasted beyond the project period. This experience illustrated how heterogeneous knowledge from all areas of the companies was crucial for developing sustainable services, while also showing that it is possible to adapt research design towards employee integration.

Another example from *NAHGAST* regarding employees as implementers occurred in one participating enterprise from the catering sector, where cashiers kept tally sheets of sold components for sustainable meals. Contrary to normal cash-register data, which is not examined by the cashiers themselves, these tally sheets enabled direct feedback about the effects of sustainable-meal changes made in the kitchen on sales and the popularity of particular meals. This experience reveals that workers value being able to directly modify workplace structures or working routines. Although such "small" adaptations on the ground level are limited in terms of their immediate benefits for a company, they can have a huge positive effect on employee perceptions of self-efficacy.

The *IMKoN* project, by contrast, concentrated from the beginning on employees as implementers (figure 1). It aimed at testing a method for developing sustainability innovations for various organisational contexts and sectors, based on employees' consumer knowledge (Muster et al. 2016, Buhl et al. 2019). During the research process, it turned out, that for most of the companies, involving employees in developing and implementing corporate sustainability measures is still far from being a matter of course. Moreover, various factors are relevant for whether and how employees can effectively contribute to innovation development. One important factor is the core business of the company. As the results suggest, in highly specific and technically sophisticated busi-

ness areas, employees can hardly contribute to the development of the product itself. For example, if the company produces natural cosmetics, employees can rarely implement changes, because the product's composition is highly regulated. In contrast, in companies with less complex products or as well with regard to workplace conditions and processes, it seemed to be easier for ordinary employees to contribute their ideas and experiences. These findings seem to reveal that, on the one hand, in their role as implementers ordinary employees are not sufficiently considered and integrated into business practice. On the other hand, ordinary employees have innovation potential which is suitable for some, but not all areas of innovation.

Employees as ambassadors

As experiences in the *Green Travel Transformation* project indicated, next to customer requests, budget and availability, personal convictions about products among employees is a central factor within travel-agency consultations. Travel agents tend to sell products they know and are convinced of, and focus groups with travel agency employees showed that they like to recommend products familiar to them or to their colleagues. Some travel agents were sceptical about sustainability in general and, thus, would not recommend corresponding products.

A central concern for travel agents was verification of sustainability standards: for labelling and promoting a product as sustainable, travel agents want assurance that standards and quality are met. Since many travel agents have returning customers who trust in them, they do not want to risk this relationship. This finding has been confirmed by a representative survey of customers (Kreilkamp et al. 2017): customers trust the expertise of travel agents, want to assign responsibility to a direct contact person, and even expect travel agents to be able to consult on sustainable travel, as they consider this part of the travel agent's expertise. Therefore, the project developed extensive on- and offline training for travel agents regarding sustainable tourism. Additionally, a database was developed, which through an interface enables sustainability information regarding products to be fed into informational and booking tools. As it is considered fruitful to let travel agents experience sustainable products in order to increase product conviction and, through that, increase recommendation rates for such products, so-called familiarisation trips ("fam trips") for tour operators are very common in the tourism industry. Within the project, exemplary concepts for sustainable fam trips were drafted.

In *IMKoN*, some companies enabled all kinds of employees to gain experience with the products and services of their own company, for example via discounts, an employee shop or ubiquitous opportunities for practical experience of the company's product (e.g., annual involvement as harvest workers or obligatory production internship during their first week of employment). Such experiences enhanced employee identification with their company and job satisfaction in general. Thus, employees gaining experience with products and services may not only be useful for convincing or advising clients about sustainable offers but may also indirectly positively affect the organisation itself and facilitate dif-

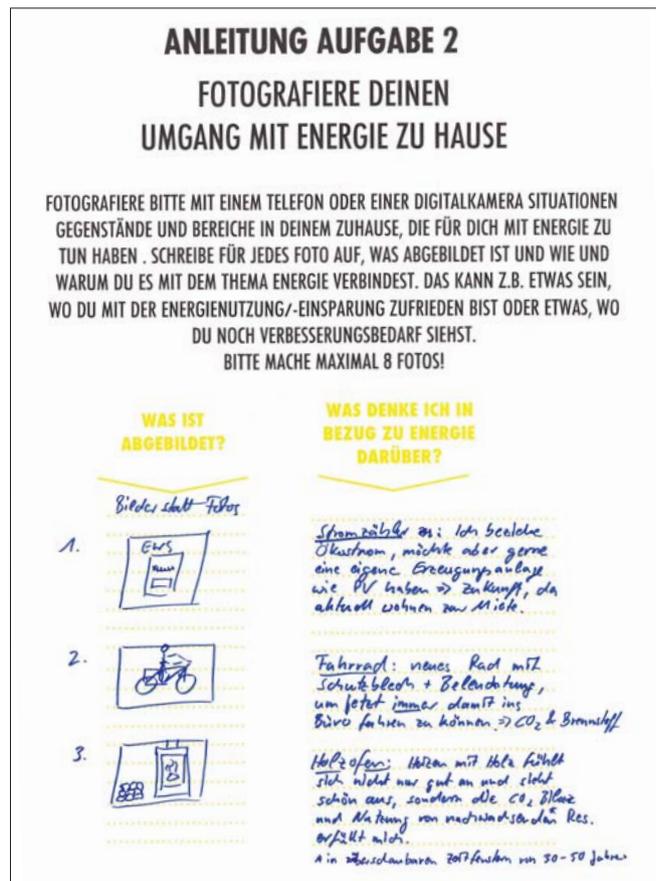


FIGURE 1: Design Thinking for Sustainability (DT^N) is a workshop method for involving employees in sustainability innovations. So-called cultural probes are one element of this method: observing oneself in everyday life. In the present case, the participant drew pictures of her electricity meter, her bicycle and her wood stove, and noted her associations with the theme of energy and sustainability.

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fusion of sustainable consumption patterns among employee milieus (e.g., family, friends).

Employees as recipients

In the *RegioTransKMU* project, employees of rural SMEs² were addressed via an online survey, which was also given to students at vocational schools and universities residing in the same region as the SME. Results of this survey suggest that socio-ecological measures (as one element of corporate sustainability practices) are less important to employees compared to other company characteristics, such as salary or job security (Ruppert-Winkel et al. forthcoming). Moreover, the employees valued social measures (e.g., flexible worktime models or measures against discrimination) much more than ecological measures (e.g., use of renewable energies or measures to reduce resource use). Perceiving an immediate benefit from measures seemed to be decisive to them – ei-

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² Those rural SMEs have no focus on sustainability in their core business and belong to diverse sectors, for example, energy supply, financial services, laboratory analysis and consulting.

ther directly as employees (e. g., flexible working models) or in their role as residents of the region or municipality (e. g., financial support for sports clubs or regional initiatives). Regarding ecological measures, the survey revealed that corporate sustainability practices affecting employees personally, such as offering bicycle parking spaces or promoting use of public transport, are more valued than those that seem more distant or abstract.

Employees' role as recipients has also been addressed in the *IMKoN* project. Company project leaders were allowed to choose whether they wanted to develop an eco-product innovation or enhance workplace conditions, within the scope of the project. For some companies, innovation workshops on enhancing workplace conditions were regarded as a chance to raise work quality and use the creativity of their own employees at the same time. Thus, they addressed employees in their roles as recipients as well as implementers. For other companies, sustainable workplace structures and behaviours (e. g., saving paper) were less important, since they were not part of the core business and its respective tasks. This implies that integration of employees in their role as recipients depends on the sustainability culture of the company (Süßbauer and Schäfer 2019).

Discussion

In the following, we first present the implications of the findings for corporate sustainability management. Second, we point out the limitations of our synthesis and formulate future research needs.

Implications for companies

As illustrated above, ordinary employees can significantly contribute to sustainability no matter if they were addressed a priori by the project design or if they only got involved in the course of the transdisciplinary process. Depending on the focus and context of the company, employees can disseminate sustainable products and services in the region, develop sustainable service innovations, create green workplaces or communicate sustainable values through face-to-face contact with customers. In the following, we discuss the implications of the findings for each employee role: *implementer*, *ambassador* and *recipient* of corporate sustainability practices.

If companies want to address employees as *implementers* for sustainability practices, they should carefully consider which areas within the company they want to change, for example, innovating their products and services or greening the workplace. Each modification may impose specific structural and personnel demands as well as entail different employee motivation. Furthermore, the area of change also depends on the practical knowledge of the employees. As results from *NAHGAST* and *IMKoN* projects suggest, employees can more easily act as implementers if they feel themselves to be "experts" in what they do (and like to do) in their daily lives – regardless of whether this knowledge is considered officially part of their core tasks. For example, they can be experts on technical issues even when working in a company that sells naturally produced products. Or, conversely, they can have in-

teresting ideas regarding the reduction of packaging while working in the IT department. Employees' innovative potential thus can be defined by the employees themselves and not by their job descriptions, the management or company-wide sustainability strategies. Companies are therefore well advised to regard their workers as multifaceted personalities with experiences and ideas from many different areas of life – regardless of their professional positions. To tap this "hidden" innovative potential of employees, companies may need to be open to allow for an iterative transformational process with uncertain outcomes (Süßbauer et al. forthcoming) and show flexible decision-making structures (Süßbauer and Schäfer 2019). These prerequisites are more likely to exist in SMEs with flat hierarchies.

As the synthesis showed, companies that want to address employees as *ambassadors* need to create opportunities for employees to engage with their products, even on the lower levels of the hierarchy. Possibilities for experimenting privately with sustainable consumption practices (e. g., local tourism) should be provided to employees to influence their daily habits and preferences (Süßbauer and Schäfer 2018). At the same time, incentive schemes, such as product-based commissions or sales targets of tourism operators, should not oppose to sustainable behaviour. Thus, a respective corporate culture and businesses practices can positively influence the identification of workers with company products and, thereby, indirectly stimulate the other two roles. Besides, the case studies have shown that informed, empowered and product-convinced employees are essential in the communication and distribution of sustainable services and products. Hence, for service companies, cultivating trust in frontline personnel can be used to overcome fears of greenwashing among consumers. In the digital age, it seems that some positive personal contact can enhance trust.

If companies want to primarily address employees as *recipients* of corporate sustainability activities, they should apply sustainability principles or targets also to their own organisations and aim at corporate greening. Corporate greening goes beyond external determinants such as legislation and market structures: corporate greening also considers company-internal determinants like the organisation's culture and structure as well as formal company-level initiatives such as the implementation of environmental management systems or the development of human resource programmes to improve employees' environmental competencies (Lülfes and Hahn 2013). Employees might appreciate this attitude and practices, which could then improve their satisfaction and productivity. This, in turn, could stimulate them to act as ambassadors for the company's products. Since the role of labour has changed and people want to find meaning in their work (Becke and Warsewa 2018), companies with holistic³ sustainability approaches that also involve employees as recipients might be regarded as more trustworthy. For SMEs in rural areas with limited financial resourc-

³ A holistic sustainability approach includes social components as well as working conditions. In addition, a company that claims to offer sustainable products should also act sustainably in its own business practices and solutions (keyword "green workplace").

es available for personnel and sustainability issues, the exploitation of this synergy between corporate sustainability practices and employee recruitment and retention seems particularly recommendable. Respective sustainability measures and engagement of employees can create synergies in terms of influencing the region positively as well as attracting more skilled workers. Furthermore, results from *RegioTransKMU* and *IMKoN* have shown that appropriate communication on the part of employers and opportunities for experimenting with sustainable practices (e. g., via trainings, competitions or practice manuals) appear to be crucial for positive evaluation of sustainability measures.

Limitations and future research needs

Based on the explorative findings from the four projects, we provided examples for methods and practices of addressing employees' roles within sustainability transformation. A limitation of our synthesis is that we could not zoom into the organisational structures and cultures of the participating companies and compare the prerequisites for employee participation and involvement in detail. However, we can draw some indications.

The involvement of ordinary employees in sustainability transformation processes is a chance for companies intending to move from a traditional hierarchical concept of labour where innovation experts are the main driver to a “subjectivist” one where work is regarded as meaningful for society, nature and politics – by both employers and employees.

Findings from *NAHGAST* and *IMKoN* indicate that the organisation and the culture of a company considerably influence the possibilities of individual employees to foster sustainable actions within their work and behave according to the normative idea of sustainable conduct and the company's sustainability norm. This room for manoeuvre depends on the unequally distributed responsibilities for certain aspects of sustainable conduct between different departments. Flat hierarchies and team-oriented working structures enable participation in the design of sustainable processes, products and services. Thus, more research is needed in particular on the possibilities of larger companies (with more complex company structures) to empower their employees. Based on other studies, we suggest that, in these kinds of companies, different sub-cultures (Linnenluecke and Griffiths 2010) and groups of employees with different practical knowledge, everyday needs, understandings of the organisation and perceptions of sustainability (Hargreaves 2008) co-exist within a single company. Future research could concentrate on existing conflicts between opposing logics, goals and interests within one company, such as conflicts between work quality and ecological innovation (Becke forthcoming), between different communities of practice (Hargreaves 2008) or between socio-ecological transformation and commodification of work (Barth et al. 2018).

Furthermore, regarding organisational culture, the comparison of findings from *IMKoN* and *RegioTransKMU* indicate that eco-pioneers might have a different, more holistic understanding of sustainability than conventional SMEs. While eco-companies in *IMKoN* regarded innovation workshops with workers as a chance for enhancing employee satisfaction and “workplace greening” (Süßbauer and Schäfer 2019), conventional SMEs participating in *RegioTransKMU* have not yet identified employees as a target group for sustainability practices (Ruppert-Winkel et al. 2017). Thus, future transdisciplinary research could concentrate on transferring lessons learned from eco-pioneers to conventional SMEs (located within one single region and/or within one sector).

Another aspect, which could be analysed in more detail, is employees' implicit or practical knowledge on sustainable consumption practices. There are many studies investigating formal management instruments and corporate practices for employee integration like idea management or trainings (e. g., Ramus 2003). However, implicit knowledge is often unconscious and requires specific noncognitive methods like narrative interviews or focus group discussions that stimulate workers to talk about their every-

day experiences and reveal perceptions of “normal behaviours”. In this regard, enterprises can learn from transdisciplinarity research – which explicitly aims at integrating different types of knowledge (Vilsmaier et al. 2015, Bunders et al. 2010, Lang et al. 2012) – how to involve employees better. If applied in the beginning of projects or organisational changes, transdisciplinary methods can demonstrate employees that their knowledge is valued and equally important as scientific or, in case of enterprises, expert knowledge. However, increased involvement of ordinary employees could lead to overload and resistance (Muster and Schradler 2011). It should be further investigated which forms, and which intensity of involvement are perceived as appropriate by employees and employers.

Furthermore, future research could concentrate on the role researchers could play within processes of employee integration. For example, researchers could act as intermediaries or “process facilitators” (Pohl et al. 2010) between different groups of employees or between management and workers. In order to become such intermediaries and hence to really understand rules, conventions and norms in the organisation and facilitate experience-based learning, we recommend an initial “praxis phase” where researchers gain hands-on experience of the organisation and can better understand employee interdependencies (Andresen et al. 2000). >

To support such transdisciplinary research on sustainability transformations of businesses, funding structures and rules should allow for more iterative research practices. For example, adaptation of a project's research design after an experimental "praxis phase" could be helpful. According to experiences from the NAHGAST project, it is possible to adapt methods during the research process: in the end, the spontaneous adaptation of working routines by cashiers led to feelings of self-efficacy, which increased their acceptance of the "sustainability calculator" developed by the researchers. Moreover, establishing research networks between researchers and businesses and long-term research projects in this field can help to build trust, which is necessary for acting as intermediaries or mediators.

Conclusions

The involvement of ordinary employees in sustainability transformation processes is a chance for companies intending to move from a traditional hierarchical concept of labour where innovation experts are the main driver to a "subjectivist" one (Becke and Warsewa 2018) where work is regarded as meaningful for society, nature and politics – by both employers and employees. By providing convenient tools and empowering employees through suitable structures, their experience can develop into expertise and thus enforce sustainability transformations.

However, more research is needed, first, to identify prerequisites for employee involvement regarding different transformational fields and organisational contexts (e.g., conventional vs. eco-enterprises, rural vs. urban companies, small vs. big companies) and, second, to transfer experiences with participative methods of knowledge integration from transdisciplinary research to corporate practice.

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The role of voluntary sustainability standards in governing the supply of mineral raw materials

Voluntary standards for mineral raw materials lack implementation. This calls for investigating the basis for their success and suggesting related transformation pathways. Consolidating and harmonizing voluntary standards, integrating more problem fields, and enlarging the stakeholder base promise to make standards more effective.

Michael Hiete, Philipp Christopher Sauer, Samuel Drempetic, Rasmus Tröster

The role of voluntary sustainability standards in governing the supply of mineral raw materials

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Abstract

Numerous voluntary standards for minerals have been developed as a reaction to social and environmental problems in mining. These vary considerably in their requirements and the design affecting their acceptance among stakeholders. As such, the voluntary standards play a subordinate role in sustainable finance compared with environment, social, and governance ratings; yet, they have been found to be effective for managing the supply chain of minerals and its single parts. Still, despite the heterogeneity of the voluntary standards, the goals pursued by applying them can be subsumed into the following structure: 1. solving focal sustainability issues to pave the way among global mining stakeholders to 2. a particular or 3. general common ground. This tripartite distinction is used to identify potential transformation paths to make voluntary standards even more effective, especially regarding sustainable finance and supply chain management. These components encompass harmonization and consolidation, (better) integration of (further) sustainability issues, and a broader involvement of stakeholder groups.

Keywords

certification, finance, institutional design, legitimacy, minerals, multi-stakeholder, raw materials, supply chain management, voluntary standard

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Since the early 2000s the perspective on mineral resources has changed dramatically: prices of raw minerals have seen unexpectedly high increases; secure supply and criticality of raw materials have attracted attention; and severe environmental impacts of mining and beneficiation, such as emissions to water, soil, and air, have become apparent, along with those of water and energy consumption, land use and transformation, and risks, for example, from the bursting of dams (Dudka and Adriano 1997, Murguía et al. 2016). Social effects, such as child labor and poor working conditions (figure 1), are further issues, along with the financing of weapons for armed conflicts by revenues from production and trade of minerals, such as has occurred in the Democratic Republic of Congo (Mancini and Sala 2018, Young 2018). However, mining may also contribute to socioeconomic development, for example, via greater employment, private income, or taxes and royalties (Fleury and Davies 2012).

Various voluntary sustainability initiatives for mining have been initiated by stakeholder groups. The initiatives strongly vary in terms of the number and type of stakeholder groups involved. These typically range from mining companies and processors, such as smelters or refiners, to civil society, especially nongovernmental organizations, supply chain actors, and governmental organizations (cf. Tröster 2018 for a literature analysis of stakeholders at the intercept of sustainability and mining). The initiatives are called “standards” in the following, the managing body a “standard organization,” and the rules describing what a company has to fulfil to adhere to the standard the “standard requirements.” The fact that there are far more than 20 voluntary sustainability standards for mineral resources (Kickler and Franken 2017), with further standards like *Responsible¹ Steel*, *Responsible Cobalt Initiative*, *Fairmagnet* and *Responsible Copper Initiative* in development, contrasts with a lack of implementation of these standards and raises the following research questions:

1. Why did standards for mining develop as we see them today?
2. What role does acceptance among stakeholders play for the success of a standard?
3. How may standards better achieve the goals pursued?

¹ Responsible mining is often preferred as extracting *depletable* resources cannot be sustainable.

To contribute to answering these questions, the remainder of the paper is divided into three sections. First, the development of voluntary sustainability standards for minerals is outlined; then, the factors regarded as driving the success of voluntary standards (success factors) and the role of stakeholder acceptance are reviewed to build a novel framework for mineral standards acceptance and success. Next, the article introduces three transformation pathways that show how voluntary mineral standards could evolve to become more effective in reaching their sustainability goals. These pathways depict beneficial developments for the future of mineral standards. Finally, conclusions are drawn.

Voluntary sustainability standards for mineral raw materials

A characteristic shared by virtually all mineral standards is that they are voluntary, which relates to the shift of mining activities to resource-rich developing countries. In these countries, regulation or its enforcement is often lacking, less stringent, or ineffective, resulting in sustainability problems (Hofmann et al. 2018). Although, in principle, multinational mining companies with headquarters in industrialized countries could be held responsible for

their activities in developing countries, this is typically not (yet) the case, presumably because this would mean interfering in these countries' internal affairs and negatively affecting the companies' competitiveness. Voluntary standards aim to fill this gap (Vermeulen 2015). An example showing that Western governments can very well influence the sustainability situation elsewhere via regulation is the US *Dodd Frank Wall Street Reform and Consumer Protection Act* (Ochoa and Keenan 2011), which requires companies listed on US stock exchanges to ensure that minerals from the Democratic Republic of Congo and its neighbor countries are conflict free, that is, the revenues from mining are not used to finance armed groups. Oddly, it is this act that stimulated the development of numerous voluntary standards, such as the *Conflict-Free Smelter Program*, helping companies fulfilling these obligations for the so-called conflict minerals – tin, tantalum, tungsten, and gold. However, voluntary standards can have further functions, also in industrialized countries. They can be a means to help companies improve their sustainability performance, especially for front-runners. They can be used (but also misused if the sustainability performance is poor and not improving) as a communication instrument in an industry sector and for the wider public and policymakers to keep or regain the social license to operate (community approval, Owen 2016) and possibly to avoid strict regulation. >

FIGURE 1: Artisanal mining for the conflict minerals tungsten and tin in the Kailo mine in the Democratic Republic of Congo. Conflict mineral standards such as the *Regional Certification Mechanism* typically focus on ensuring conflict freeness of the minerals but largely ignore occupational health and safety.



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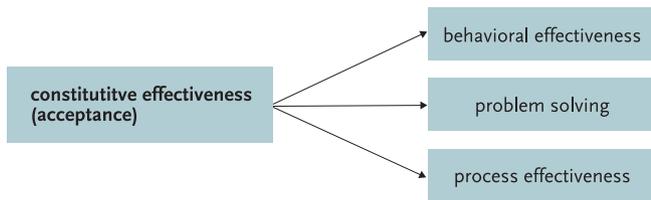


FIGURE 2: Sequencing the factors driving a voluntary standard's success.

For Owen (2016), the social license to operate in mining is a concept resulting from the fear of having to interrupt mining activities if disapproval becomes too strong. Interestingly, it is sometimes the government that prefers voluntary agreements and standards over regulation (Vermeulen 2015), as seen in the *German Textile Partnership*, standards in the German food industry, and so on.

A key factor for the development of the large number of standards is the heterogeneity of mineral raw materials and their deposits, influencing the sustainability issues associated with their mining. The mineral influences, inter alia, the amounts of raw materials and tailings extracted, their toxicity, and the mining and beneficiation techniques as well as the water, energy, and chemical demands. The geographic distribution of deposits may be relevant, too. Financing of armed conflicts is above all an issue for tantalum, tin, tungsten and gold as well as diamond mining; cyanide use is relevant for gold and silver mining; and problems related to open pit mining are important for lignite and bauxite mining. There are also differences in terms of processing of raw materials and industrial buyers and uses, such as for gemstones in the jewelry industry and cobalt in electric vehicles, and supply chains and stakeholder groups differ greatly among minerals.

The differences related to mineral extraction have driven a specialization of the standards, as the requirements prescribed for one mineral may not be applicable to another. For example, the requirements for the use of cyanide in gold and silver mining by the *Cyanide Code* certainly do not apply to any iron or coal mine.

Largely independent of the mineral, the standards differ in what they monitor. In standards for conflict minerals, information about the origin of a mineral raw material may be sufficient, but other standards require establishing management systems or commitments and self-reporting for a number of sustainability issues or the achievement of performance levels. However, a broad coverage of sustainability issues alone is not a value: the broad standard *Bettercoal*, for example, is criticized for greenwashing by nongovernmental organizations, since transparency and sustainability performance improvements are largely absent, ambitions in the standard document are low, and the managing body comprises only coal industry representatives (e.g., Ganswindt et al. 2013).

Therefore, it is not surprising that so many standards have been developed, most of them mineral specific and with strong differences on the issue(s) covered and how they are addressed (see Kickler and Franken 2017 for a comparative overview). This richness also has its drawbacks, as it lessens the ability of third parties and companies purchasing several raw materials to un-

derstand the strengths and weaknesses of the single standards compared with others (Tröster 2018). If several standards exist for the same mineral, they compete with each other and the production volume produced under a certain standard is reduced, which is even more relevant as standards are not yet that widespread in use. This has negative effects on visibility and possibilities to distribute fixed costs among participants. Consequently, questions arise about how the standards could evolve and become more effective. To address them, it is essential to understand what is driving the success of mineral standards, as investigated in the next section.

Stakeholder expectations and success of voluntary mineral standards

A standard's success can be defined as the extent it can fulfill the goals it relates to, which may differ and be partly hidden, for example, the goal to reduce sustainability pressure on mining companies exerted from stakeholders by demonstrating activity.

Accordingly, in a literature review on voluntary sustainability standards in general, Tröster and Hiete (2018) identified external and internal factors for success, expressed by the success dimensions of *problem solving*, *behavioral effectiveness* (the ability to change the behaviors of the adopting entities, Tikina and Innes 2008), *process effectiveness* (dispersal in target groups), and *constitutive effectiveness* (acceptance among stakeholders). For example, the quality of standard requirements is the most important internal factor for the *problem solving* success dimension. Standards' success has been found to have a multidimensional perspective, but the investigation of interrelations or sequences among the identified dimensions suggested by Fisher and Aguinis (2017) is still lacking. Since voluntary standards depend on the approval by stakeholders (Bernstein and Cashore 2007), acceptance among stakeholders can be seen as an essential prerequisite. Thus, it can be assumed that the four factors identified by Tröster and Hiete (2018) must be sequenced, as shown in figure 2. Moreover, it is debatable whether the three factors to the right should also be ordered sequentially: *problem solving* can be regarded as strongly influenced by *behavioral* and *process effectiveness*.

Given the key role that acceptance plays for the success of voluntary standards, Tröster and Hiete (2019) first identified major design characteristics of standards, then tested the effects of different realizations on the acceptance. The data were gathered from a factorial survey among eight stakeholder groups encompassing mining companies, supply chain actors, civil society, governmental organizations, (sustainable) finance, organizations managing voluntary mineral standards, academia, and others. They found that four main factors drove the acceptance of standards among stakeholders:

1. traceability in the supply chain established by a standard (relevant for all stakeholders);
2. high transparency of a standard's implementation and institutional design;

- 3. the standard’s wide reach; and
- 4. progressiveness of performance requirements.

These findings enable an extension of figure 2, developed in the next section.

Analytical framework for voluntary mineral standard’s acceptance and success

As individual differences can limit the applicability of single standards to certain fields of application, it is important to propose a framework that enables a comprehensive mapping of standards against the success factors that have been found to drive their acceptance, and thus, a standard’s success. Adding to figure 2, this mapping can be guided by the four characteristics significant for most stakeholders’ acceptance, as Tröster and Hiete (2018) identified. This results in the analytical framework shown in figure 3 and characteristics presented below.

Reach: A standard’s reach can be seen as a driver for acceptance and indicator of its success, although this characteristic alone is not sufficient. Beyond the mineral focus (most standards focus on a certain mineral or group of minerals if these share common characteristics, for example, conflict freeness for tantalum, tin, tungsten, and gold or cyanide use in gold and silver production), firm size needs to be considered for reach, since sustainability effects and requirements differ between large-scale mining and artisanal and small-scale mining, such that most standards focus on specific firm sizes and only a few standards are size independent. For medium-sized companies there are only specific standards for natural stone and conflict minerals available (Kickler and Franken 2017). Despite this and the strong importance of artisanal and small-scale mining (which has about 13 million workers worldwide, ILO no date), few standards are explicitly dedicated to this context (Kickler and Franken 2017).

Supply chain coverage: The term supply chain typically encompasses all actors involved in the flow of materials and goods from

the raw material to the end user (Carter et al. 2015). Standards differ as to whether they cover mining and beneficiation or the upstream part, just smelters/refiners, or the entire supply chain, partly including recycling (Kickler and Franken 2017). The management body of the standard decides on the coverage, but there are also factors influencing this decision. The supply chain of metals, for example, is typically divided at the smelter/refiner into upstream and downstream parts; this position represents a bottleneck, as the number of smelters is low compared with the number of mines supplying them and downstream customers. Moreover, the chemical fingerprint of the source is typically lost during smelting due to mixing of materials from different origins (Young 2018). If the goal of a standard is to ensure only conflict freeness, it may be sufficient to integrate just the supply chain down to the smelters, as long as all the relevant smelters are involved. Further factors are the number of actors involved in a supply chain, and thus, its complexity; the amount of a mineral produced; and whether the (more) responsibly mined mineral obtains a higher price or is granted access to a particular market. In the former two cases it is reasonable to integrate supply chain actors down to the end consumers and ensure physical separation of the minerals from conventionally mined mineral streams to reduce the risk of fraud.

Progressiveness of performance requirements: Performance requirements can be low and stringent, but they can also progress in a stepwise manner (see Kickler and Franken 2017 for details). Progressing requirements allow lower entrance barriers for companies not yet performing highly, especially artisanal and small-scale mines. They have the possibility to join and improve their performance over time, supported by the capacity building measures offered by the standard, among other things. Overall, this may lead to a higher implementation rate, and thus, greater effect (Stetter 2015), enhancing the acceptance among mining stakeholders (Tröster 2018). Progressive performance levels can also be misused, for example, if powerful companies deliberately orient their sustainability efforts towards the reduced entrance barriers instead of aiming for a high performance or companies with insufficient progress are not forced to leave. This may be why progressing performance requirements do not increase the acceptance of sup-

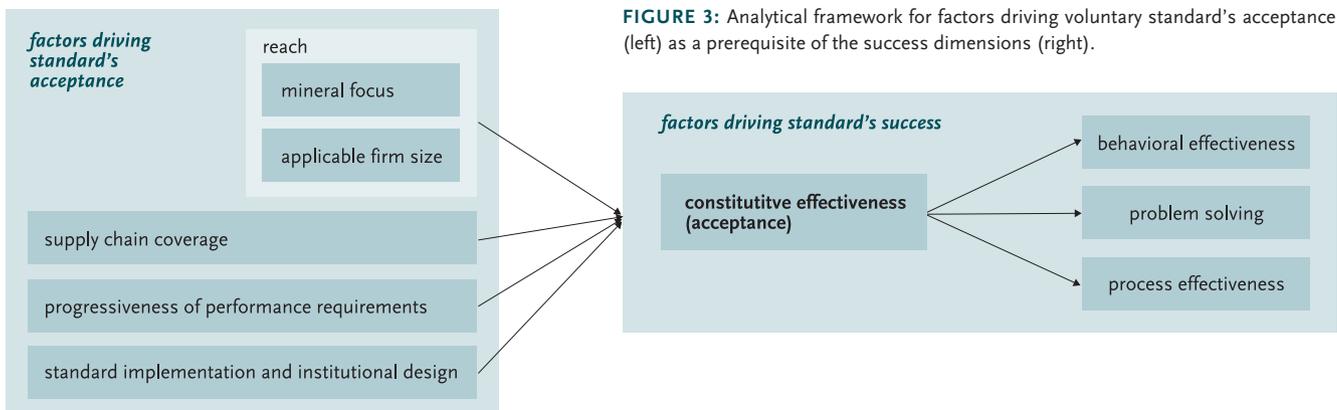


FIGURE 3: Analytical framework for factors driving voluntary standard’s acceptance (left) as a prerequisite of the success dimensions (right).

ply chain and finance stakeholders (Tröster 2018). Overall, performance requirements represent an important lever for which a compromise between credibility, for instance, for supply chain actors and attractiveness for mining companies affecting reach must be found. Overly ambitious performance requirements are as unattractive as overly weak ones as the little credibility induced by other stakeholders reduces the value for the mining companies. Moreover, management standards can be misused; these standards implement a plan-do-check-act mechanism in the company aiming at continuous improvement which is highly effective if the company follows it seriously. However, as there are often no minimum performance levels defined in a management standard, companies can give the impression of mining responsibly without any efforts in reality, representing greenwashing.

Standard implementation and institutional design: These two interlinked factors refer to how the standard ensures the application of its requirements on site and the (internal) governance of the standard and its organization (Tröster 2018). A core issue affecting trust in the implementation is the quality and frequency of the audits and assessed elements, ranging from self-assessment and document analysis to site inspection and interviews with workers (Kickler and Franken 2017). Complaint mechanisms for auditor decisions and opportunities for whistle blowing (cf. Marx 2013) are also relevant. Tröster (2018) shows that standard organizations perceive transparency as the most important acceptance factor. Coverage of a certain aspect is an insufficient criterion, as the question how an aspect is implemented is at least similarly important. An impractical whistle-blowing mechanism does not help.

Having outlined the single parts of the analytical framework in figure 3, transformation paths of the diverse standards into more coherent and successful ones are explored below.

Suggesting transformation of voluntary mineral standards

Transformation paths

To organize the wide variety of minerals standards, we adopt a framework suggested by Drempetic et al. (2018); the framework outlines the three types of standards presented in table 1 and three transformation paths. We then further develop the transformation paths based on the analytical framework developed in this paper (figure 3).

As shown in the descriptions in table 1, the distinction of the standard types is driven by the standards' focus and the stakeholder involvement. While the focal issue standards center on a narrow field of action and affected stakeholders, the other standards aim to build a consensus in either a certain industry sector (particular common ground standard) or across different sectors (general common ground standard).

Linking this tripartite distinction to the framework in figure 3, it becomes clear that the focal issue standards can be distinguished

by a low reach, while the common ground standards generally feature a higher reach (varieties of minerals, supply chain actors, and stakeholders) by covering a larger scope. The reach of a standard is used to derive three transformation paths across the three groups of standards, as described below.

Path 1: "best in class"

Systematic overviews and comparisons, such that by Kickler and Franken (2017), allow stakeholders to better overlook and understand the standards – currently, even experts have problems doing this (Drempetic et al. 2018). Organizations like the International Social and Environmental Accreditation and Labelling Alliance or the International Institute for Sustainable Development (cf. Potts et al. 2018) catalyze improvements and harmonization via transparency, exchange of information and best practices. The stakeholders are pointed to strengths and weaknesses of single standards and receive the information they need to put pressure on standards to adopt, for example, more stringent requirements from other standards or a better internal design. This allows identifying the standards performing and fitting best to the stakeholders' needs. It can be guided by the factors *supply chain transparency*, *progressiveness of performance requirements*, and *standard implementation and institutional design*. The transformation path is labelled "best in class," as it aims to achieve the highest acceptance in the covered portion of the minerals market. Overall, this fosters harmonization and consolidation of the standards.

Path 2: "integrating more problem fields"

Particular and common ground standards are often considered too general or weak, or as ignoring specific sustainability issues relevant for a certain mineral, as they try to be widely applicable, and therefore, build on general requirements compared with the specific ones in focal-issue standards (Kickler and Franken 2017). From figure 3, it becomes clear that focal-issue standards lack *reach*, while common ground standards have a wider *reach* and *supply chain coverage*. This guides the way for the second transformation path "integrating more problem fields", which suggests establishing the modularity and interoperability of standards, that is, mutual acceptance between them. Doing so would allow both covering specific sustainability issues, as the focal-issue standards do, and attaining the large *reach* and *supply chain coverage* typical for common ground standards. Such an integration would bring the problem to a wider stakeholder audience, thereby driving the acceptance of the standard that might benefit the problem solving, and thus, the standard's success (figure 3).

Path 3: "enlarging the stakeholder base"

Finally, standards could account for requirements of previously not (well) targeted stakeholder groups. This forms the core of "enlarging the stakeholder base" transformation path, and it is especially interesting for focal-issue standards, as it allows increasing acceptance and has the potential to transform focal-issue standards into particular common ground ones. Upcoming revisions represent good opportunities to integrate further stakeholders and their

TABLE 1: Distinction of standard types (Drempetic et al. 2018).

STANDARD TYPE	DESCRIPTION	EXAMPLES
1. focal issue	focus: region, mineral, or a specific sustainability issue like cyanide use involvement: limited to stakeholders affected by the focal issue goal: solve a concrete problem at hand	<ul style="list-style-type: none"> ■ <i>Regional Certification Mechanism of the International Conference on the Great Lakes Region</i> (sustainability issue and region) ■ <i>Bettercoal</i> (mineral) ■ <i>Cyanide Code</i> (sustainability issue and mineral) ■ <i>Fairtrade Gold</i> (mineral and firm size)
2. particular common ground	focus: entire industry sector involvement: stakeholder groups from the focal sector goal: build a common understanding and consensus on an issue like responsible mining; participants likely to benefit from reputation gains	<ul style="list-style-type: none"> ■ <i>Global Reporting Initiative</i> ■ <i>Aluminum Stewardship Initiative</i> ■ <i>Initiative for Responsible Mining Assurance</i>
3. general common ground	focus: issues concerning all society involvement: stakeholder groups from multiple sectors goal: establish a bottom line on the focal issues; ignorance or infringements may not only lead to reputation losses but also financial risks	<ul style="list-style-type: none"> ■ <i>Core Labour Standards</i> (International Labour Organization) ■ <i>Due Diligence Guidelines</i> (Organisation for Economic Co-operation and Development)

views on the factors in the left box in figure 3. Ultimately, following path 3 may result in common ground and internationally accepted framework documents, as well as regulation like the *Dodd Frank Act*, representing a level playing field for all. Such documents also put pressure on all producers, traders, and users of mineral raw materials regardless of whether the documents are backed by regulations. Especially, the *Dodd Frank Act* proved to be beneficial for behavioral effectiveness, as it defines widely accepted guidelines that have shaped the minerals sector, management of minerals in supply chains, and financing of mining, as discussed below.

We want to underline that none of the paths is superior to the others, and all the paths can currently be observed in the field of voluntary mineral standards, as underlined by the examples. As these also try to reach out to actors from the supply chain and finance sector, the standards are reflected from these perspectives next.

Transformation paths from a supply chain management perspective

Voluntary sustainability standards for minerals have been found to be valuable tools for establishing transparency along supply chains (Sauer and Seuring forthcoming) that may center on focal issues like tracing conflict minerals in supply chains (Hofmann et al. 2018, Young 2018). Based on the transparency provided by standards, more proactive supply chain management practices like process upgrading and stakeholder management along an entire mineral supply chain (Sauer and Seuring 2017) can be achieved, as supported by a particular common ground standard like the *Aluminum Stewardship Initiative*. This initiative integrates the focal issues of realizing more responsible provision, use and recycling of aluminum products that were previously addressed separately. It does so by systematically integrating all parts of the aluminum supply chain and their individual challenges in a particular common ground. Thus, it is an example of path 3 “enlarging the stakeholder base” by systematically enlarging the *reach* and *supply chain coverage* as depicted in figure 3. This contrasts with the classical

split of mineral supply chains at the intersection of mineral and preproduct producers that typically belong to different markets and industries (Young 2018), which in turn, hinders effective supply chain management (Busse et al. 2016, Sauer and Seuring 2018).

Building on general common ground standards, such as the International Labour Organization’s *Core Labour Standards*, could help to level differences in working conditions along a supply chain that often incorporates multiple minerals. Such differences have been found to be sources of stakeholder criticism in electronic supply chains (Brix-Asala et al. 2018). Viewing this against figure 3 underlines the benefits of a comprehensive supply chain coverage if a standard is to address multiple industries, such as the combination of the mining sector and its customers from the electronics or automotive industry.

Transformation paths from a sustainable finance perspective

Financing is the Achilles’ heel of most companies, especially in the capital-intensive mining sector. As mining companies are often large multinational companies, and thus, listed on the stock exchange, impact investing can be an important lever. Impact investing aims at creating a positive sustainability “impact” via an investment. Methods of sustainable and responsible investment include, inter alia, exclusion, best in class, divest, and shareholder engagement approaches. Environment, social, and governance rating agencies are well established in the finance sector for assessing the sustainability performance of firms. Contrastingly, voluntary mineral standards are only rarely used to make investment decisions. Turning to the rating agencies, large companies and companies from the extractive industry sector are better rated than the average of all rated companies, independent of sector and size. Drempetic et al. (2019) explain this by the fact that larger companies have more resources for reporting. Finally, this underlines that, if the standards are to be relevant for the finance sector, their *reach* needs to include large-scale firms. Furthermore, Tröster and Hiete (2019) found that *supply chain coverage* is a core driver of acceptance among finance stakeholders.



The outlined characteristics of the finance sector make it especially hard for focal-issue standards to become a decision basis. This is again driven by the heterogeneity of the standards and the issues addressed. Thus, it is beneficial for standards that target the finance sector to establish a particular or even general common ground by adopting path 3 “enlarging the stakeholder base”. Such standards can also engage a wider set of shareholders, and thus, steer more capital in the minerals sector, thereby enhancing their success in driving behavioral change, gaining reach in the industry, and solving the problems focused on by a standard, as proposed in figure 3.

Conclusion

The analysis of voluntary sustainability standards for mineral raw materials has several implications both for academia and practitioners, that can help improve the standards’ contribution to sustainability in mining. These are as follows:

- The current mineral standards have been shaped by the interests of single stakeholder groups, and thus, developed in a way that is overly complex. A systematic, regularly updated overview and comparison is needed, including guidance for users on which standard(s) would best fit their needs. This would foster harmonization and consolidation of the standards (best in class), which is suggested to increase the effectiveness of voluntary mineral standards. It would also leave room for niches with their particular requirements.
- Standards should undergo continuous development for both the standard requirements and institutional design. Focal-issue standards should enlarge their stakeholder base to increase acceptance and shape their standard. For particular and general common ground standards, more and better integration of problem fields is relevant. Modularity of the standard requirements can help retain flexibility to different needs.
- Standards may compensate for deficiencies in regulations, but they are unable to replace it as the *Dodd Frank Act* example shows. Standards are valuable in bringing stakeholder groups together, developing a common ground, and laying the foundations for a level playing field. From this point onwards, however, regulation might be more effective and even more efficient.

In summary, the voluntary mineral standards have proven to be a valuable forum for stakeholder dialogue that identifies gaps in governance, builds consensus on potential tools and measures to fill them, provides guidance and support for realizing concrete sustainability improvements, and eventually, builds a general common ground by having wide stakeholder acceptance. With this paper, we hope to shed light on the factors driving these developments and enhancing the success of voluntary standards for minerals.

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Drivers and barriers of sustainability transformations

A comparison of the “Energiewende” and the attempted transformation to organic agriculture in Germany

Why has the German energy transformation been more successful than the attempted transformation to organic agriculture? Through an analysis of the drivers and barriers of both processes, this article identifies key factors that explain the difference in outcome. It becomes clear: transformation strategies should aim to create regulatory frameworks that make it attractive to invest in sustainable alternatives.

Dirk Arne Heyen, Franziska Wolff

Drivers and barriers of sustainability transformations.
A comparison of the “Energiewende” and the attempted transformation to organic agriculture in Germany
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Abstract

This article compares the drivers and barriers of two sustainability transformations in Germany: the energy transformation (“Energiewende”) and the attempted transformation towards organic agriculture which has, so far, been less successful. It is based on two case studies rooted in transformation research. While there is rapidly growing literature on energy, there are far fewer analyses of agricultural transformations. Moreover, single case studies dominate. The cross-case comparison presented in this article is a step towards filling this gap. Particularly in their initial stages, the two transformation processes shared similarities: both systems had been coming under pressure due to environmental crises, grassroots movements and niche developments of sustainable alternatives. However, changes to the regulatory system framework made investments in renewable energy more attractive than in organic agriculture, where the profitability of the transformation is still reduced by significant subsidies for conventional agriculture. Moreover, the energy transformation has benefitted from technological improvements and falling costs, an early coalition of supporters, including business actors, and more recently from a broader societal and political consensus.

Keywords

energy transition, organic agriculture, renewable energy, sustainability transformation, transition

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Research on sustainability transformations (or transitions)¹ examines how persistent environmental problems can be addressed when small-scale improvements turn out to be insufficient. In line with international transformation literature (see Köhler et al. 2019 for an overview), we conceptualise transformations as profound shifts in sociotechnical systems in which societal needs (for energy, nutrition, etc.) are satisfied. The shifts include technological, economic and cultural changes which are mutually reinforcing (“co-evolution”) (Geels 2005, Geels et al. 2017). Sociotechnical systems are characterised by a number of elements – technologies, infrastructures, products, behaviour, etc. – and by the interrelations between them (figure 1). Their characteristics and interaction also determine the impact on the ecological system. Sustainability transformations imply that a new system configuration performs significantly better in environmental and social terms.

Usually, sociotechnical systems are relatively stable with permanent but only incremental change. Path dependencies and lock-ins reinforce the dominance of a “regime” of specific technologies, practices, regulations and related actors. According to the multi-level perspective (Geels 2002), transformations occur from radical niche innovations which evolve over time into alternative system configurations. System change can be supported by developments and windows of opportunity on a macro level but still include conflicts and power struggles.

This article compares the drivers and barriers of two different sustainability transformations in Germany: the ongoing energy transformation (“Energiewende”) and the attempted agricultural transformation (“Agrarwende”). In the first case, we focus on renewable energy in the power sector², in the second case on the shift towards organic agriculture³.

While the transformation of the fossil-nuclear energy system towards a renewable energy system has considerably progressed, the transformation towards organic agriculture occurs only gradually (see schematisation in figure 2). In 2018, renewable energies already provided about 38 percent of gross electricity consumption in Germany (UBA 2019), and have led to a much more decen-

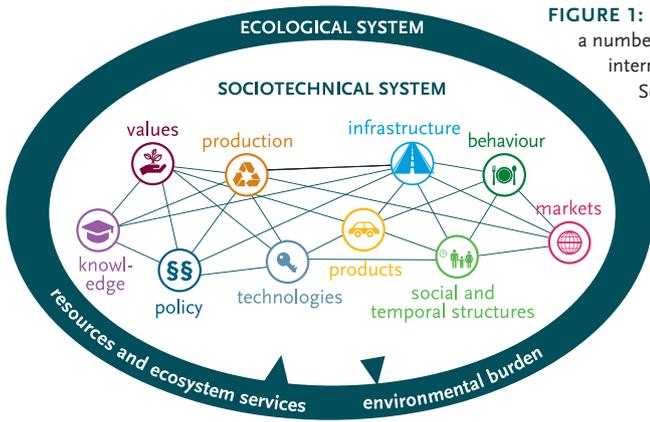


FIGURE 1: Sociotechnical systems like the energy or the agrarian system are characterised by a number of system elements – like technologies, behaviour and infrastructures – and their interrelations. They are embedded in ecological systems through inputs and outputs. Source: Jacob et al. (forthcoming).

Problem pressure and crises as windows of opportunities

A common driver at the beginning of both processes has been increasing problem pressure deriving from existing production patterns, sometimes cumulated in crises and catastrophes. The oil crisis of the 1970s provided a shock to the energy system. It resulted in the strategy of greater independence from imported energy – through alternative energy sources and energy efficiency. In the 1980s, air and water pollution as well as acid rain became central issues. From the mid 1980s, the threat of climate change was increasingly discussed and it continues to exert pressure on the energy system as the single greatest contributor of greenhouse gas emissions. However, the greatest mobilisation resulted from the nuclear disasters in Chernobyl in 1986 and Fukushima in 2011 (figure 3, p. 230). The latter led to the retraction of a recently approved extension of nuclear plant lifetimes by the German federal government and accelerated the nuclear phase-out (see Morris and Jungjohann 2016 for all these events).

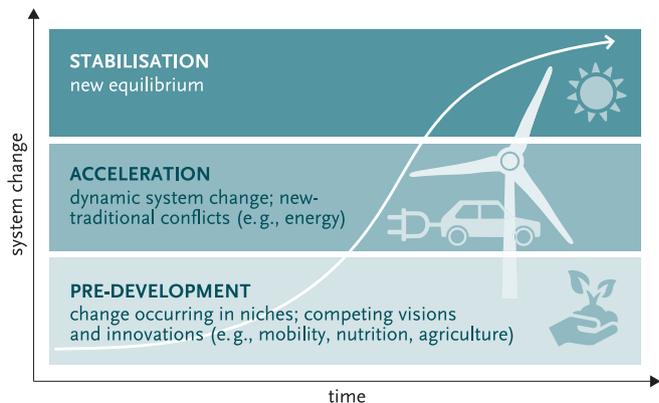
tralised generation as well as ownership. In comparison, only 9.1 percent of agricultural land was farmed organically (by twelve percent of all German farms).⁴ On the consumer side, the market share of green power tariffs (with differently stringent standards) is at about 24 percent (Bundesnetzagentur and Bundeskartellamt 2019). The market share of organic products bought by consumers, despite significant growth rates over the past years, remains at around eleven per cent (BÖLW 2019); this includes a substantial share of imports.

The cases lend themselves to a cross-case comparison, with shared national framework conditions but different sociotechnical systems and dynamics: which factors have driven or hampered the two processes? In particular, how can we explain the advances – especially on the production side – in the energy transformation compared with those of organic agriculture?

The article is based on two in-depth case studies conducted within the project *Trafo 3.0*. Both case studies used the same analytical approach based on transformation literature, complemented by our own conceptual and empirical work on transformations (Grießhammer and Brohmann 2016, Heyen and Brohmann 2017, Jacob et al. forthcoming, Wolff et al. 2018). Both drew on existing literature and expert interviews. In the following we compare six different drivers and barriers.

Compared with energy issues, the German population has been less receptive to the risks related to unsustainable agricultural land use. While Rachel Carson’s *Silent Spring* (1962) raised some early public concerns about the effects of pesticide use in agriculture, a fundamental critique of agriculture’s impact on the environment by the German Advisory Council on the Environment (SRU 1985) largely went unnoticed. In the 1990s, a series of agricultural and food related scandals regularly made it into the media but did not induce substantial political reactions. This changed with the outbreak of the BSE crisis (“mad cow disease”) – with daily media coverage of culled cattle, spongy cow brains and the fear of a global spread and transmission to humans. In early 2001, two ministers resigned over BSE. The new Minister of Food and Agriculture, >

FIGURE 2: Phases of system change: while the German energy system experiences accelerated change, organic agriculture remains in a pre-development phase. Source: Jacob et al. (forthcoming), based on SRU (2016).



1 There is no consistent distinction in the literature between the terms *transformation* and *transition*. We use the term *transformation* to denote deep sociotechnical change (often labeled *transition* in English literature).
 2 In a broad sense, an energy transformation should encompass the decarbonisation of power, heating and mobility. For each sector, renewable energy sources and reduced energy consumption are complementary strategies. Our focus here is on the power sector’s transformation towards renewable energies.
 3 “Agrarwende” is the German equivalent of the term “Energiewende”, denoting the sustainability transformation of agriculture. It encompasses a shift towards a more environmental-friendly and multifunctional agriculture, specifically toward organic agriculture, but also toward greater animal welfare, strengthened rural development and new consumer-producer relations (e.g., community-supported agriculture). Further aspects include a reduction of meat nutrition, more seasonal and regional food, less food waste, improved food sovereignty and consumer protection.
 4 www.oekolandbau.de/service/zahlen-daten-fakten/strukturdaten-zum-oekolandbau

Renate Künast of the Green Party, then linked the crises to fundamental flaws in the agro-industrial system and proclaimed the “Agrarwende” (agricultural transformation). Soon after, environmental as well as economic pressures also opened up a window of opportunity to strengthen rural development, ecology and animal welfare as part of the 2003 reform of the EU *Common Agricultural Policy (CAP)* (Sanders 2016, Weingarten and Rudloff 2018).

Grassroots movements and pioneers

In reaction to increasing problem pressure, societal values and priorities also changed. Backed by grassroots movements demanding change, visionaries and pioneers advanced sustainable alternatives, provided the “proof of principle” and lay the foundations for their scaling-up.

With regard to power supply, societal resistance developed in the second half of the 1970s vis-à-vis nuclear facilities. Greater independence from large corporations was also an issue. The anti-nuclear movement was initiated by local resistance to individual projects but developed into a broad movement including farmers and religious groups. It gained media and political attention through protest marches and occupations. The Chernobyl disaster gave a boost to the movement and led to numerous local, non-partisan “Energiewende committees” (Fuchs 2014, Griefshammer and Brohmann 2016). Grassroots mobilisation interacted with (conceptual as well as technological) pioneer work on alternatives. In 1980, the book *Energiewende* (Krause et al. 1980) provided an early vision of a more sustainable energy system (though still including domestic coal). Technologically, the engagement and investment of individuals and new small firms triggered the greatest advancements in renewable energies – rather than large research projects and corporations (Morris and Jungjohann 2016).

In the agricultural field, different grassroots movements and pioneers also paved the way for a sustainable transformation. Influenced by new agricultural and soil sciences of the 19th and early 20th centuries (Vogt 2000), advocates of organic and biodynamic agriculture started in the 1920s to take umbrage with some aspects of the emerging “modern” agriculture. Often stigmatised by conventional farmers and rural communities (Moschitz 2012), organic farmers and scientists over time road-tested and disseminated a multitude of innovations – from alternative processes to maintain soil fertility and control weeds and pests, via the breeding of robust farm animals and regionally adapted seed varieties to a more animal-friendly livestock keeping (Lockeretz 2007). A joint identity, common standards and learning were fostered by establishing umbrella associations of organic producers. Innovation also occurred in the processing and distribution of organic products: the limited-assortment organic food stores of the 1970s were gradually diversified and professionalised.

These pioneers were strengthened with the emergence of the environmental movement as of the 1970s. Since the 1980s, various environmental groups campaigned on the impacts of conventional agriculture, supporting the organic agriculture concept and

starting to network with organic farmers. Simultaneously, the “new social movements” buttressed the animal welfare and animal rights issues which were (only then) taken up by the organic movement (Niggli 2007). With the Green Party’s entry into German Parliament in 1983, national agricultural policy debates gained a new flavour.

Resistance from regime actors and adverse political frameworks

A common barrier in both transformation processes has been the resistance from regime actors and political frameworks that put the sustainable alternatives at a disadvantage. Renewable energies were forced to operate within an unaccommodating energy market for quite some time. The market was dominated by a few large generators in legally protected regional monopolies, based on large fossil-nuclear facilities with guaranteed profits (Morris and Jungjohann 2016). These companies were well connected with both conservative and social-democratic governments at national and federal state level to influence regulation. Even the mere connection of a wind turbine or solar cells by private individuals to the electricity grid remained legally challenging for many years. The energy sector and energy-intensive industries regularly took legal action and embarked on PR strategies against renewable energies and their supporting policies (Morris and Jungjohann 2016).

Similarly, the development of more sustainable agriculture was – and still is – hampered by regime actors and an adverse policy framework which subsidises an unecological production system instead of internalising its environmental costs. The German Farmers’ Association, supported by the agribusiness, has long operated under the productionist paradigm “grow or go”. Consequently, they rejected stronger ecological standards for farming and discredited organic farming as not being productive enough to feed the world, as too costly for consumers and even as “expropriating” farmers (Niemann 2017). For decades, the agro-industrial lobby had almost exclusive access to agricultural policy-making at national and EU level (Nischwitz and Chojnowski 2019). Only during the red-green coalition of the Social Democrats and Greens (1998 to 2005) did organic producers and non-governmental organisations (NGOs) become much better involved and more influential in Germany (Niemann 2003). However, even then it was not possible to sufficiently alter the overall agricultural policy framework.

Policy support for sustainable alternatives

Over time, public pressure led to policy support for renewable energies and organic agriculture – in particular during the red-green coalition. However, its extent differed decisively. In the 1980s, the federal government began funding renewable energies research on a small scale. Towards the end of the decade, some federal states and municipalities started providing financial support for the construction of renewable energy facilities. In 1990, an unlikely coali-

tion of parliamentary backbenchers from the Christian Democrats, Social Democrats and the Greens drafted the 1991 *Feed-in Act* which passed without much attention in the late night of the final parliamentary session of West Germany. The act stipulated a feed-in priority and financial compensation for renewable energies. It mainly boosted wind and small hydro-power plants but not solar energy generation, for which compensation was too low (Morris and Jungjohann 2016).

In 1998, the new red-green coalition passed the *Renewable Energy Act (Erneuerbare-Energien-Gesetz, EEG)* which laid the foundation for a boom in renewable energies including solar. It did so with technology-specific feed-in tariffs based on different technology costs and guaranteed for 20 years, resulting in full cost compensation and a profit. Thus, the regulatory framework made it financially attractive to invest in renewable energies. While the *European Renewable Energy Directive* and emissions trading system influenced the German energy market only to a limited degree, the EU liberalisation of energy markets in 1998 was more critical: it opened the market for new players with cheaper and/or green power tariffs (Morris and Jungjohann 2016). Finally, the phase-out decisions in 2001 and 2011 on nuclear power (agreed on for 2022) and in 2019 on coal power (targeted for 2038 at the latest) have been decisive steps for the energy transformation.

The situation differs markedly in agriculture, where policy-makers at the federal level have limited competences between the making of the European *CAP* in a supranational context and its subnational implementation by the federal states. Policies supporting organic agriculture started at EU level in 1991, when the European Commission sought to protect consumers from misuse of the terms “bio” and “organic”. At national level, the promoters of the “Agrarwende” proclaimed ambitious targets, notably to increase the share of organically farmed land and of organic food both to 20 percent by 2010.⁵ However, beyond a funding priority for (co-)supporting organic agriculture, the government introduced relatively soft and voluntary instruments to achieve these: a national label and image campaign for organic products and a programme to raise awareness and support research and cultivation (Feindt and Ratschow 2003).

Though these measures had an impact, they did not bring about a substantial transformation. The same holds for measures taken by subsequent governments, such as the establishment of emissions standards for livestock facilities. The big screws – that is, the cost relation between conventional and organic agriculture – were not adequately addressed: only a few EU countries supported a substantial change of the *CAP* subsidy regime, and the German government did not sufficiently drive up the costs of harmful farming practices.

Technological improvements and business cases

Technological advances as well as rapidly dropping prices and investment costs for renewable energies have further driven the energy transformation. Improvements in efficiency and economies

of scale in production led to a significant drop in costs per kilowatt-hour. The prices for photovoltaic (PV) dropped much more and faster than expected in the end of the 2000s, among others due to state-supported PV mass production in China. Return on investment in PV at times skyrocketed despite compensation sinking by five percent annually (Morris and Jungjohann 2016). This development attracted new investors and increasing demand triggered additional economies of scale in production. Increasing divestment from fossil fuel industries sent a complementary signal to the market. Today, renewable energies are on their way to surpass conventional power plants as the cheapest energy source for new installations (Kost et al. 2018) – which will make the energy transformation less dependent of regulatory regimes in the future.

This contrasts with the realm of agriculture where, under present conditions, organic agriculture is still less competitive than conventional agriculture. While it also requires innovation – which is much less supported by R&D subsidies than conventional agriculture or the “bioeconomy” –, its transformation benefits much less from scale effects and sinking technology costs than the transformation towards renewable energy.⁶ Organic agriculture characteristics such as lower crop and animal yields per unit or greater labour intensity play a role in its lower competitiveness, but can partly be counterbalanced by lower input costs and price premiums (Crowder and Reganold 2015). Ultimately, it is the distortion created by EU subsidies supporting conventional agriculture that handicaps: 70 percent of the 60 million Euro annually paid to European farmers are not tied to any environmental or animal welfare requirements (Heinrich-Böll-Stiftung et al. 2019, p. 8). The EU funding for organic agriculture is minor in comparison. Furthermore, it requires co-financing by the German federal states.

Access to funding for organic farmers and for converting to organic agriculture is also difficult. During conversion, the lack of price premiums limits profitability. While small private initiatives have emerged which buy up land and lease it to organic farmers, there is neither sufficient ecological investment in organic agriculture nor relevant divestment from factory farming. In contrast to national energy markets, passing on additional costs to consumers has become more difficult in internationalised (organic) agricultural markets with competition from cheap labour countries and dynamics from financial speculation. Over the years, the profitability of organic agriculture market segments has fluctuated both with political (*CAP*) and market conditions (Sanders et al. 2012). The motivation to run a profitable farm has become more

5 Renate Künast, former Minister of Food and Agriculture, in a government statement on February 8, 2001: <http://dip21.bundestag.de/dip21/btp/14/14149.pdf>.

6 The sustainability performance of agriculture does not depend on a handful of technologies (such as PV or wind turbines), but on a multitude of practices embedded in complex biological systems. These range from tillage via weeding to feeding and housing. Moreover, many technological developments – such as precision farming – benefit different farming systems and hence do not improve the competitiveness of organic agriculture vis-à-vis conventional agriculture.

important for conversions than among the organic agriculture pioneers, leading to an incipient “conventionalisation” (Best 2007).

The energy transformation also put a damper on organic agriculture: as feed-in tariffs for biogas made it attractive to grow energy crops, fewer farmers converted their farms to organic agriculture and some even returned to conventional farming (Kuhnert et al. 2013). Moreover, the biogas funding contributed to driving up the costs of buying or leasing land, which affects organic farms in particular (Schmidtner et al. 2014). On the other hand, the organic consumer market experiences a more positive development: products have been mainstreamed in conventional supermarkets and discounters, and bio-supermarket chains have been propagating. The willingness of consumers to pay price premiums has triggered impressive growth rates (BÖLW 2019). Demand for numerous products exceeds domestic production, necessitating imports.

Actor coalitions and degree of societal consensus

The energy transformation also benefited from an increasingly broad coalition of supporters. Early on, this included environmentalists, farmers and religious groups in the anti-nuclear movement. Over time, economic interests – and narratives – started to play a role: firstly, a growing number of investors emerged, from private households and energy cooperatives to small businesses, project developers and financial investors. Secondly, a manufacturer-supplier industry developed for wind turbines and solar panels – although the German solar industry mostly vanished

later on due to cheaper panels from China. These stakeholders also supported the energy transformation and the EEG after the red-green government was voted out of office in 2005 (Meckling et al. 2015).

Since the Fukushima disaster and the official proclamation of the “Energiewende” by Chancellor Angela Merkel, a broad political and societal consensus in Germany has developed in favour of a nuclear phase-out (Hermwille 2016). Acceptance for an energy transformation has been further facilitated by (inter)national discourses on climate change, the attractive narrative of a “clean energy” future enabled by pioneering engineering (Hermwille 2016) and an increasing number of credible scenario studies on 100 percent renewable energy systems. Dropping costs and reduced feed-in tariffs as well as the latter’s increasing conversion to auctions have been important for generating support among economic and politically liberal actors. Despite a lively debate on the transformation’s precise governance and speed, in particular a coal phase-out, the fundamental goal of an emission-free electricity system by 2050 is no longer seriously questioned within the political and societal mainstream.

The same does not apply for the transformation towards organic agriculture. On the one hand, alternative agricultural organisations together with environmental, consumer, development and religious groups have called for an agricultural transformation since the late 1980s, cooperating on issues such as genetic modified organisms, food risks, factory farming, agricultural trade and bioenergy. As of 2011, this coalition started to mobilise a broader civil-society movement with annual protest marches (figure 4).⁷

On the other hand, the agricultural, agribusiness and food sectors as well as most major political parties still widely support conventional production. The 20 percent target relating to organic agriculture has been maintained, but governmental support is weak. Unlike in the energy transformation, analyses exploring the environmental relief effect and scenario studies modelling pathways, costs and benefits of a transformation to 20 percent (or even 100 percent) organic agriculture are rare (an exemption is Wirz et al. 2017). Despite the fact that the initial “Agrarwende” for the first time contested the narratives legitimising conventional agriculture at government-level (Gerlach et al. 2005, Boschert 2005), its legitimisation through images of “Heidi”-style farming is still dominant in marketing. And while more and more farms surrender, the German Farmers’ Association still exerts a cul-

FIGURE 3: Two experts of the International Atomic Energy Agency examine recovery work on Fukushima Daiichi Nuclear Power Station on April 17, 2013 as part of a mission to review Japan’s plans to decommission the facility. The Fukushima disaster in 2011 has been a key accelerator of the German energy transformation.



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⁷ www.wir-haben-es-satt.de

tural and discursive hegemony within the sector. Regime actors like the Federal Ministry of Food and Agriculture or the German agricultural society DLG concede that the agricultural system selectively needs to become more “sustainable”. However, the guiding vision is not organic agriculture in small rural structures. Rather, these protagonists aim at a highly capitalised, efficient and digitalised “precision agriculture”. This lack of a shared vision and its concretisation seriously hampers a long-term transformation.

Conclusions

With regard to their early transformation phases, the two cases resemble each other more than one might expect. Both the conventional energy and the agri-food system came under pressure by three developments: environmental crises and catastrophes, changing societal values and grassroots movements as well as pioneers with niche developments that offered more sustainable solutions. The two cases also share a long-term fundamental barrier: resistance from regime actors in business and politics and policy frameworks (including subsidy regimes) hampering the sustainable alternative.

With the red-green government elected in 1998, both attempted transformations were politically advanced. While this seems to be like another similarity, the details reveal key differences in the kind and extent of policy support – which may explain much of the different progress. The regulatory framework for investment in renewable energies became highly attractive

through a legal regime of priority feed-in with technology-specific tariffs guaranteed for 20 years, allowing for planning security and full cost compensation for investors. In comparison, organic agriculture was mainly supported by soft instruments (labelling, marketing, research funding). The limited policy support can partly be explained by bounded national competences which have impeded significant altering of the subsidy regime.

After the termination of the red-green government in 2005, the two processes increasingly differed. The “Agrarwende” mostly stagnated: the influence of the regime actors resurged, their overall rejection of organic agriculture unimpaired. The “Energiewende”, however, progressed. We can trace this back to heavily falling technology costs and attractive investment opportunities, strong narratives and concrete transformation scenarios as well as the Fukushima disaster and the prominence of climate change concerns. These factors contributed to forging a broad actor coalition with strong normative motives but also powerful economic interests.

While our analysis is generally in line with transformation research insights, it particularly emphasises the role of economics – in turn influenced by policy – as a decisive factor between the predevelopment of transformations and their breakthrough. Transformation strategies should thus aim to create regulatory frameworks that do not hamper the profitability of the sustainable alternatives and rather make it attractive to invest in these. For instance, profitability of organic agriculture can only be achieved by ending subsidies for harmful practices of conventional agriculture and by internalising its environmental costs

consequently. Moreover, our analysis shows that one should be aware of unintended negative side effects of one sustainability transformation to another (in this case, the promotion of bio-energy).

A caveat for learning from our study is, however, that the analysed transformations depend(ed) substantially on changes in the cost structures of producers and investors rather than behavioural changes of consumers: their main contribution is to substitute green power for conventional tariffs, or organic food for conventional products. As a consequence, insights from the outlined cases can best be transferred to other transformations which halt due to the lack of investment incentives. A case in point is the energy transformation of the building sector where energy-related modernisation and renewable energies investments to date remain often financially unattractive. Within the agricultural realm, animal-friendly farming in many cases also re-

FIGURE 4: Since 2011, a coalition of NGOs organises the annual protest march *Wir haben es satt!* (*We are fed up!*) in Berlin, calling for a transformation of agriculture. In 2019, this farmer escorts the protesters with his tractor and demands “Systems change, not climate change”.



quires substantial investments and running costs for farmers with uncertain payback from retailers and consumers. Subsidising the cost difference or providing a level playing field through regulatory standards can promote the breakthrough. In contrast, insights from our cases seem less applicable to transformations where fundamental changes in consumer behaviour are required.

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Cohousing – social impacts and major implementation challenges

Local social networks are in decline, and housing is growing increasingly expensive. These are but a few of the current challenges in the field of housing. One possible solution is cohousing projects: these form local communities, create affordable housing, and contribute to a sustainable economy. Nevertheless, diffusion of cohousing remains slow. Transforming the housing sector is possible only as part of a larger political or social movement.

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Cohousing – social impacts and major implementation challenges

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Abstract

This paper builds on outcomes of the *TransNIK* project which analysed sustainable innovations in the fields of energy, water and housing. The focus here is on innovative cohousing initiatives contributing to a supportive environment for seniors and families and providing social mixing and rent reduction in the long term. The case study of four multi-generation and two *50plus* projects through document analysis, interviews, expert workshops and a survey has highlighted social benefits, economic and ecologic above-standard-solutions, but has also demonstrated that the implementation of such projects is full of preconditions. The implementation rate of cohousing projects shows little dynamics. Therefore, a systematic presentation of success factors, barriers and difficulties to transformation processes is given. However, cohousing projects are dependent on support, and there are indications that politics and sections of the housing industry are gradually becoming more open to these ideas. In addition, we are witnessing the slow growth of a consulting infrastructure.

Keywords

case study, cohousing projects, housing for the elderly, neighbourhood, social innovation

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Potential pathways towards sustainability call for a change of practices in many areas of life. This paper explores innovative initiatives in the field of housing. Cohousing projects are promising experiments in building local social networks. Some of them show how low-cost housing is possible in the long term. However, their diffusion faces a range of obstacles.

The paper builds on research from the project *Transitionsgestaltung für nachhaltige Innovationen – Initiativen in den kommunal geprägten Handlungsfeldern Energie, Wasser, Bauen & Wohnen (TransNIK)* – one of the projects exploring a sustainable economy funded by the German Federal Ministry of Education and Research (BMBF). *TransNIK* considered sustainable innovations in the domains of energy, water and housing – all closely connected with the municipal level (Dütschke et al. 2019). In the following, we outline the main challenges in the housing sector and introduce cohousing as a social innovation. We provide more detail on six cohousing projects and examine their effects, especially with regard to the desired social networking. We analyse and discuss the factors affecting their diffusion, and draw conclusions.

Current challenges in the field of housing

The housing market in growth regions, in particular in the bigger cities, is affected by above-average new and re-letting rents. In the period from 2005 to 2011, the number of districts with rising rents increased from 25 percent to 77 percent (BBSR 2012). The development of the real estate market is similar: it became more expensive by about one fifth between 2010 and 2015 for both residential real estate and building land – again with strong regional variation (price index of the Federal Statistical Office). These price developments, together with the development of incomes, are making it increasingly difficult for certain populations to acquire adequate housing on the open market. According to calculations by the German Institute for Economic Research (DIW), income has fallen in real terms in the lower 40 percent of the income distribution between 2000 and 2012, while it has stagnated in the middle, and has risen by more than 15 percent in the top tenth of the income distribution (Goebel et al. 2015).

TABLE 1: Overview of the six cohousing projects.

PROJECT	LEGAL FORM	INITIATION	FLATS	AGE MIX	SUPPORTING ORGANISATION/PROJECT DEVELOPER AND ITS MOTIVATION
<i>Generationenhof Landau</i>	one-house cooperative	bottom-up	37 rental flats	young + old	small consulting firm specialised in consulting project initiatives
<i>Torfwiesen-Au Heikendorf</i>	one-house cooperative + homeowners association	bottom-up	30 owner-occupied, rental and subsidised rental flats	young + old	wohnprojekt+ beratung und entwicklung GmbH conplan Betriebs- und Projektberatungsgesellschaft mbH
<i>Haus Mobile Stuttgart</i>	umbrella cooperative + homeowners association	bottom-up	24 owner-occupied, rental and subsidised rental flats	young + old	small cooperative, offers itself to existing groups as a service provider, primarily property development business, rental apartments are "loss-making business"
<i>Ginkgo 1 Langen</i>	homeowners association in cooperation with a housing company	bottom-up	26 owner-occupied and rental flats	50+	pro... gemeinsam bauen und leben eG Gemeinnütziges Siedlungswerk GmbH
<i>Wogeno-Haus Caroline-Herschel-Straße München</i>	umbrella cooperative	top-down	28 rental and subsidised rental flats	young + old	small cooperative with expansive business model for a speculation-free and welfare-oriented housing management
<i>Gemeinsam älter werden und Wohnen unter einem Dach Wilhelmshaven</i>	traditional cooperative	top-down	11 subsidised rental flats	60+	Bauverein Rüstingen eG traditional cooperative with strong neighbourhood reference, senior project was "experiment", currently no repetition planned

Societal development is characterised by individualisation and pluralisation of lifestyles. The change brings with it an older resident population, smaller households and a declining number of multi-generation households (Statistisches Bundesamt 2015, 2016).

Kinship networks are getting thinner and make, together with a changed role of women and dispersed living, everyday support through the family more difficult (Schubert 1990). At the same time, other traditional relationships are losing their importance. This also applies to neighbourhoods; urban relationships are increasingly built on friendship and spatially dispersed (Friedrichs 1995). Both increase the lack of locally available relationship networks.

New forms of housing intend to fill that gap (Häußermann 2009). Cohousing projects have developed since the 1970s (Brecht 1999), but they currently only constitute a small share in Germany, with an estimated 2,000 to 3,000 projects (Wohnbund 2015).

Cohousing projects are characterised by separate flats as well as shared space, a certain degree of self-organisation and the intention to foster neighbourly relationships (Ginski et al. 2012). The respective motivation of such initiatives may vary, but they can be understood as experiments for the conscious construction of local networks. In light of an ageing society we focus on projects (also) addressing people over the age of 50. The interest of the elderly in new forms of living increased in the last years (Hugentobler and Otto 2017). This trend could continue due to an increasing proportion of milieus with higher openness and willingness to engage (Hallenberg 2017).

Case selection and methodological approach

The six projects studied represent different types with specific organisational and implementation requirements (Hacke et al. 2017) (table 1). They were selected from a list of 104 identified multi-generation projects and 38 50plus projects. They should have been inhabited for at least three years and needed to be of a certain size (20 respectively ten flats) in order to allow for a certain degree of social dynamics. Integrating income groups who are not able to acquire property seems to be important for a wider diffusion. Therefore, projects were chosen that also include rental flats. Furthermore, the extent to which professional partners are involved and the legal form chosen play a role in coping with implementation problems. Hence, the choice fell on two autonomous civic projects (Landau, Heikendorf) and two projects initiated by citizens, but realised in cooperation with housing providers (Stuttgart, Langen) as well as two top-down projects initiated and realised by housing cooperatives (Munich, Wilhelmshaven).

For each case study, two to three guided interviews were conducted on the motives, obstacles and success factors in the planning, realisation and use phase. Interview partners were groups of founding members, other residents and external cooperation partners involved.

The reported obstacles to implementation were compared with an expert report on cohousing projects from Denmark (Tornow 2017). In addition, case selection and results were discussed with consultants of projects (Müller et al. 2017).

A written survey of the residents' expectations before and experiences after moving in was conducted for all the projects (Baumann

et al. 2018), with a response rate of 20 to 50 percent per project. The total of 103 participants lived in the projects for seven years on average. Almost two-thirds were already involved in the implementation phase. 61 percent were retired and 13 percent had children under 18.

Short history of the cohousing projects

Landau, Rhineland-Palatinate

The citizens' initiative took more than ten years to move into the facility with privately financed cooperative flats and a shared flat for those requiring care. The financing concept and the land were major obstacles that were finally overcome with the help of a difficult-to-find project manager and the city council.

Heikendorf, Schleswig-Holstein

Over the course of its eight-year implementation process, the initiative changed concept from a "pure" cooperative to a mixed legal form. The success of the project is attributed to the support of a consultancy office specialised in group-housing projects. A project-related development plan of the municipality protected the group from competitors for the property.

Stuttgart, Baden-Wuerttemberg

Immediately after its creation, the citizens' initiative joined a small cooperative set up to help implement cohousing projects in the region. The city provided the land at low cost. In the rental flats public funding from the city and state could be combined. As a property developer, the cooperative mainly builds owner-occupied flats, but also manages the subsidised rental flats of various mixed projects.

Munich, Bavaria

The small umbrella cooperative (see below) initiated and moderated the group in obtaining a leasehold property from the city based on a binding reduction of car ownership. The first members of the project, which is located in an initially negatively rated new development area, came from a project initiative that had already failed once. Most of the flats are subsidised by different funding programmes in Munich.

Wilhelmshaven, Lower Saxony

The cooperative initiated and supervised the project group in the context of the refurbishment of an existing building in cooperation with the city council's representative of senior citizens. The project group decided on cohousing for elderly instead of a multi-generation project. It is not planned to repeat the experiment because of the extremely complicated implementation process, especially due to the high turnover of the interested parties.

Langen, Hesse

The citizens' initiative took seven years to move into the first building that includes a shared flat for persons with dementia. In the

course it changed its concept from a multi-generation to a 50plus project. The search for a developer and land that could be purchased through the church proved difficult. The property developer, a large, formerly not-for-profit housing company had already carried out the construction for six residential initiatives.

Cohousing projects as a potential solution to social challenges

The six case studies are innovative compared to "conventional housing" (see figures 1 and 2, pp. 236f.), especially in social matters (Hacke et al. 2018). Self-organisation and collective decision-making, which even played a role in the *60plus* project, brings residents together. As the residents' survey showed, the opportunity to participate was a frequent expectation of living in a cohousing project, which was fulfilled in most cases. Large shares of respondents reported taking on tasks and responsibilities in the projects (such as caretaker, property management, neighbourhood assistance) and confirmed that the majority of residents also contribute to the community. For instance, establishing rules for living together was a matter of course for most respondents. All projects have created a network of neighbourly relationships and genuine friendships. Almost all the respondents are in contact with their housemates in some form or other. Low-threshold help and support are available in everyday life and take many forms. This was – regardless of age or family situation when moving in – an important hope of respondents, which was essentially fulfilled. If conflicts arise, a common approach is to find a solution together. Most respondents did not believe that such conflicts – which are quite frequent – imply the failure of the idea of cohousing.

90 percent of the respondents would move into a cohousing project again – mainly due to the contacts in the project, followed by the possibility of active contribution and the feeling of being in good hands. The most important motives for moving in varied by age: those younger than 50 wanted to live in a community of like-minded people; those older wanted to avoid loneliness in old age. The desire to live together with people with similar attitudes was a universal motive for living in all the projects considered.

One contribution that cohousing can make in terms of social as well as economic sustainability is the commitment to keep housing costs stable and low in the long term compared to the commercial housing market by avoiding speculative profits and market-level rent increases. The represented cooperatives are guided by the principle of cost rent, that is, rents are calculated so that they cover the costs for maintaining the building and forming reserves, but not to generate profits. In particular, the surveyed tenants were satisfied with the development of housing costs. In the projects, a dampening of resale and rental prices compared to the market depends on the good will of the owner, but the prices of the cooperative flats are controlled by the members. In addition, operating costs were reduced through in-house services. With the exception of Wilhelmshaven, all projects were characterised by a sharing culture (see below).

Wider impacts of cohousing projects

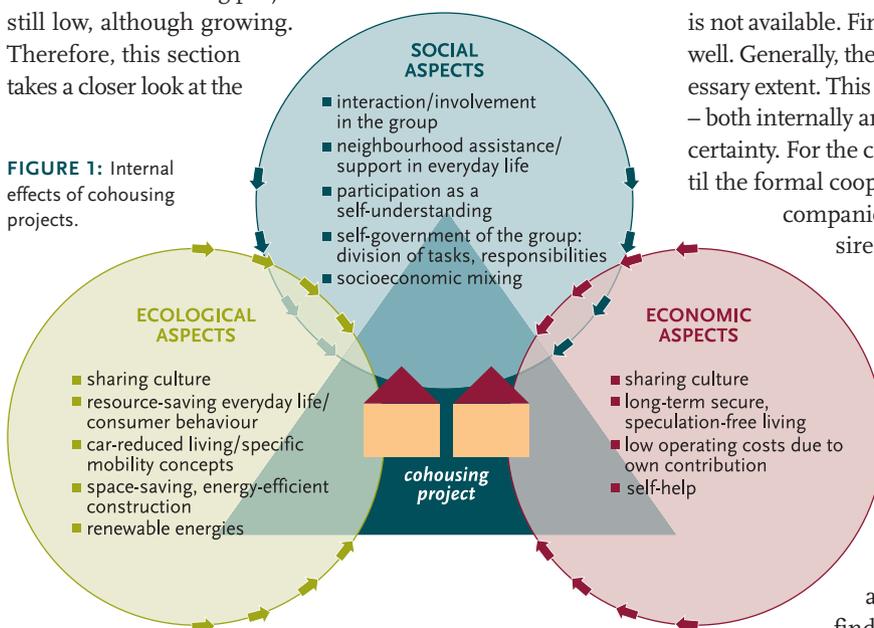
According to the experiences of the housing companies or project managers involved, the projects are characterised by very careful handling of the building and low expenses for the caretaker service. Interviewees reported that residents are sending impulses to the outside world (figure 2) – providing information and initiating follow-up projects, through volunteer work in the neighbourhood, but also through concrete offers (e.g., cultural events) to the immediate vicinity. In Munich, the commitment of the group contributed to the fact that the initially unpopular development area became an active and attractive neighbourhood. The high interest of this group in their district is a good example of projects acting as “door openers” to integrate residents. Housing groups can be more easily addressed due to their self-organisation and often bring together a “critical mass” of committed people. This includes the potential for “docking” with other sustainability innovations, such as energy or water infrastructure systems. The two cases featuring a flat-sharing group of dementia patients or care-dependent persons (Langen and Landau) also show that a combination with neighbourhood-based facilities is possible, such as a housing-related outpatient care infrastructure; they also show the possible pitfalls due to planning errors.

From an ecological point of view, all six projects were built in an energy-efficient manner, and in some cases they use regenerative energy sources. One project has committed itself to reducing the number of cars. In most projects, inhabitants share appliances like washing machines, garden tools, drills or other tools, bicycle trailers, and also consumer goods like newspapers.

Diffusion of cohousing projects

In spite of the individual and societal benefits outlined so far, the number of cohousing projects is still low, although growing. Therefore, this section takes a closer look at the

FIGURE 1: Internal effects of cohousing projects.



factors influencing the (faster) diffusion of cohousing projects in Germany. Within the framework of the analyses, various factors could be identified that have an inhibiting or a beneficial influence on the emergence of cohousing. Key issues that housing projects face include:

- finding and fostering a group of interested people,
- solving financing issues and, closely related to this, agreeing on a legal form appropriate to the group’s objectives (e.g., cooperative or homeowners’ association),
- acquiring a property, and
- if applicable, acting as a collective actor.

The challenges are particularly high when rental flats are part of the concept. Important obstacles to implementation result from the fact that laypeople have to set up companies and function as such on the market. When they set out, their organisations have neither a clear organisational or administrative structure nor equity. The latter must first be collected from members and supporters, which requires considerable confidence-building and clear perspectives.

Barriers

Establishing an initiative group: Intrinsically motivated people able to attract, inspire and moderate a group of interested individuals are required at the beginning. Since very few people have experience with neighbourhood projects, they are often not in people’s mind as an option. Thus, the initiators not only have to organise the group, but also make efforts in public to present and promote their cohousing idea as distinct from shared housing and “communes”.

Vague performance perspective: The long lasting uncertain implementation horizon is another obstacle. Usually, a suitable object is not available. Financing and the legal form must be clarified as well. Generally, the knowledge required is not available to the necessary extent. This lack of know-how hinders confidence building – both internally and externally – and leads to long periods of uncertainty. For the considered projects, this phase did not end until the formal cooperation with external consultants or housing companies – sometimes with consequences for the desired legal form.

Lack of professional partners: In addition, suitable cooperation partners were often found only by chance. A professional consulting scene with advice on financing and legal issues and project management offers has so far developed only to a limited extent. There is a lack of professionally competent advisors especially outside larger towns and cities. The projects in Heikendorf, but especially in Langen and Landau, had huge problems finding the relevant competent advice. Housing

companies have little incentive to cooperate with initiatives. The Langen group started with a long unsuccessful search for a cooperating housing company. The Stuttgart cooperative was founded because housing initiatives did not find any partner.

Lack of equity: Without a cooperating housing company to take over the (pre-)financing of the property, providing sufficient equity/creditworthiness also represents a major hurdle. This is especially the case if the group wants to integrate parties with few assets. The formation of community property (e.g., in a cooperative) may be a solution, because one person’s insufficient equity can be offset by higher contributions from the others. However, currently, there are no ways to compensate for the benefits of investing in individual home ownership and to increase the motivation to participate in community ownership. New cooperatives often do not see any possibility of paying off the redemption payments members have made (which exceed depreciation) until they want to move out, or of compensating inflation for the capital injected. In contrast to the gain on the sale of home ownership, such payments must also be taxed. Therefore, legal forms are often chosen that allow private use of the contributed capital. This is why only one of the four bottom-up projects (Landau) formed cooperative property; the others combined a cooperative for subsidised rented housing with private residential property.

Difficult inclusion of low-income households: Due to the credit burden, rents of a young cooperative without subsidies are too high for low-income members. Therefore in Landau and Heikendorf, the project members offered some financial benefits for families by shifting costs internally. The

housing company in Langen faced the same problem: rents were not affordable for low-income households. Since the financing burden was not much lower than in ownership formation, the share of rented housing in this mixed project decreased significantly. However, only a few federal states have tailored funding programmes in place to include low-income households.

Competing for land or housing property: Gaining access to a building plot is one of the main problems of cohousing projects. In competition with financially stronger and faster acting investors, they stand little chance of winning, or fail due to high prices.

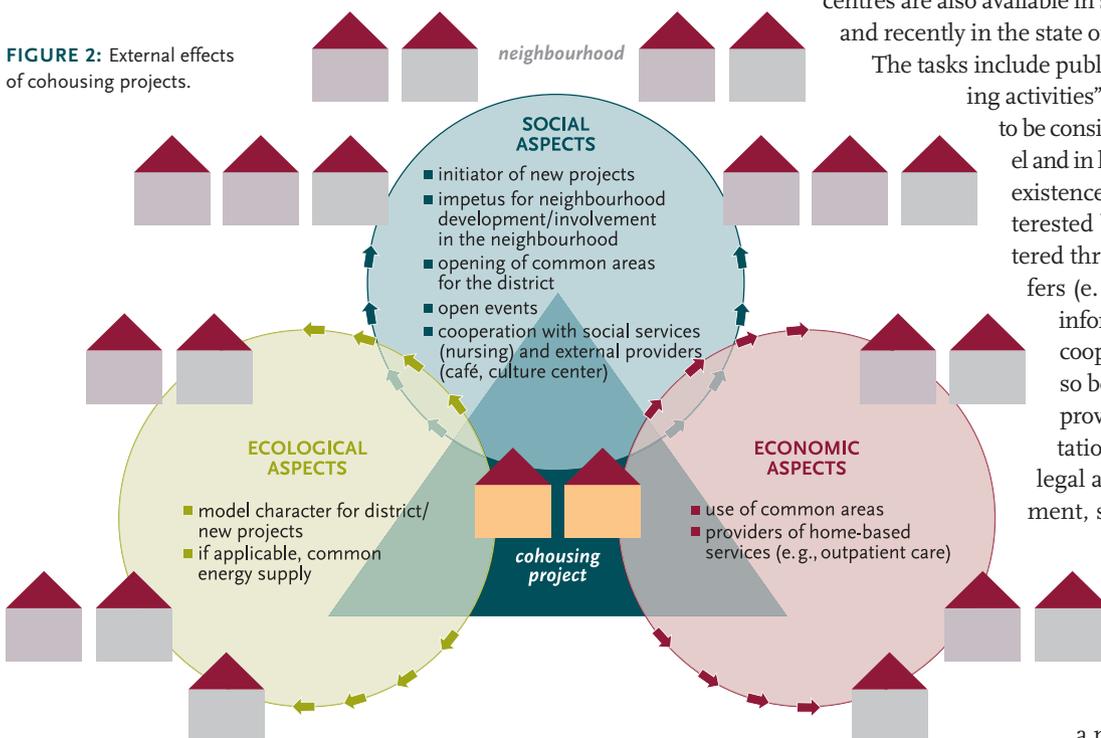
The implementation rate of cohousing projects shows little dynamics, due to the problems mentioned. In addition, the projects are usually not geared towards enlargement or repetition, so that the hard-earned knowledge and the potential for trust are usually not passed on. However, there are some indications that politics and the housing industry are gradually opening up to new ideas. Moreover, in some regions professional, supportive counselling options and alternative providers have become established. This development can be used to derive favourable conditions for the increased implementation of cohousing projects. There are other pointers available from alternative development paths taken, for example, in Denmark (Tornow 2017).

Success factors

Consulting infrastructure: Public start-up financing enabled a consulting infrastructure for cohousing projects to be set up in Hamburg and Berlin as well as in the states of North Rhine-Westphalia and Schleswig-Holstein. Publicly-funded information centres are also available in some other major cities and recently in the state of Rhineland-Palatinate.

The tasks include public relations and “lobbying activities” for cohousing projects to be considered at the political level and in housing companies. The existence of a fundamentally interested basis must also be fostered through low-threshold offers (e.g., initial consultation, information events). Ideally, cooperation partners will also be recruited and services provided for the implementation phase (financial and legal advice, project management, structuring of communication). The latter are paid by the projects as part of the construction costs. Promoting the establishment of such a municipal or state-level

FIGURE 2: External effects of cohousing projects.



advisory infrastructure could be part of a wider, more open consultation, for example for models of retirement living. Without basic and start-up financing, the threshold to self-supporting professional counselling offers is usually too high. Greater standardisation of procedures and the necessary know-how could also help to promote such infrastructure.

Land allocation: Four of the five new construction projects (Landau, Heikendorf, Stuttgart, Munich) received municipal support in the search for land. The fifth group (Langen) was able to acquire a church-owned property after a lengthy search.

In Hamburg and Munich, all urban development projects reserve a share of the available building land area for communities and cooperatives and allocate the land according to criteria-based award procedures (“concept”) at the market value or a politically determined price. The concept also determines the rental mix to be achieved (e.g., proportion of subsidised flats). If real estate is principally allocated according to concept in tight markets, traditional investors will also comply with. The allocation of land associated with a concept thus promotes urban development geared to urban needs and, cohousing projects are part of this.

Part of a forward-looking property policy would be municipal authorities purchasing land to have “in stock” and granting leasehold rights instead of selling it. Increasingly tight municipal budgets and the debt relief policy of German states have led to this path becoming increasingly difficult for municipalities to take.

State and municipal funded housing promotion: Residential development programmes suitable for housing projects exist in the states of Hamburg, Schleswig-Holstein, North Rhine-Westphalia and the city of Munich. Of particular importance are support paths with income limits above those of the *Housing Support Act*. In Hamburg and Munich, this is done through a housing subsidy with different income limits and land allocation at reduced prices. In return, there is a long-term ban on privatisation and a binding rental price or reduced prices without income limits, but with specifications for flat and household sizes and long occupancy commitments with regard to privatisation and rental prices. Without support, access for middle-income households is often difficult, and home ownership is more attractive for higher-income households, especially for younger households. Channelling funds from wealthy interested parties into cooperative projects (e.g., by supporting the acquisition of cooperative shares) would facilitate the implementation of socially mixed rental projects. Very beneficial would be cheap loans with low repayment instalments, such as those offered in Switzerland by central financing institutions to non-profit housing developers. In the case studies examined, price reductions (also for flats without income limits) offered by the city played an important role in Munich and Stuttgart.

Cooperation with traditional housing companies: Private landlords are the main suppliers of dwellings in Germany. Just one third of the whole housing stock is held (by nearly equal shares) by private professional companies, public companies and cooperatives. The

two latter ones – together with a small stock held by the Catholic and the Protestant churches – are the desirable partners for cohousing initiatives as social corporate responsibility and a lower profit margin allow for such a not-for-profit cooperation. But cohousing project initiatives challenge housing companies with unfamiliar demands and communication requirements that are not matched by any clear benefits. The project groups are often weakly formalised and companies are not focused on user participation. Regularly cooperating companies with experience in planning participation such as the company in Langen are an exception, and even this required a stable group structure as a starting point. The availability of consultants who act as “interpreters”, qualify the group for cooperation, structure communication and thus reduce the burden on the company can contribute to the opening up of traditional companies. Establishing allocation criteria for land that favour companies providing rental housing for cohousing projects serves as further incentive, as consultants report from Hamburg and Munich. Such boundary conditions are more likely to exist in the major cities.

Supporting organisations: Instead of cooperating with housing companies, forming their own organisations seems to be the more promising route for cohousing projects in Germany. They offer greater opportunities to cultivate participation forms in the long term and to influence rent development. Since the 1980s, a number of so-called umbrella cooperatives have been set up, which provide project initiatives with a legal and administrative framework, contribute to trust building and sometimes accompany them professionally during the phase of implementation. Entrepreneurial umbrella cooperatives – which are able to expand on their own initiative and can also provide the necessary pre-financing – have so far only developed in the Munich area. One of them was one of our case studies. Even if they do not build for nonmembers, they contribute to the dissemination of the cohousing idea by offering their residents shared spaces and “a voice” at house and cooperative level, and by promoting neighbourhood activities. In addition, there are improved chances of success for a management approach that uses asset accumulation to support further projects. It remains unclear how such forward-looking companies could be established on a larger scale. Committed actors have to make a living from their work in a foreseeable future and, if possible, cooperate with capital-intensive institutions during the initiation phase.

Outlook

The analysed projects have developed forms of participation that can be adapted to changing needs and create a social network for their residents with many opportunities for contact. Often they include highly dedicated members who join activities in the neighbourhood, thus contributing to a supportive environment especially for families and seniors. This is even more important in the context of demographic change. The self-organisation of the projects also increases the opportunities for a reduction in resource

consumption through sharing facilities and objects as well as for the use of ecological innovations (e. g., mobility concepts). Projects with housing for renters and a corresponding legal form (e. g., cooperative) also make a contribution to rent reduction and social mixing.

However, cohousing projects often have to survive a long search and development process – there is a shortage of equity, know-how and “entrepreneurial” persons. As long as every new project in some ways needs to be “newly” invented the innovation will not spread. Due to their structurally related problems, the projects are dependent on compensation for these disadvantages through public support and nonprofit housing investors like existing larger housing cooperatives or residential property developers with a public mandate. A dissemination of basic principles of cohousing is promoted by housing companies such as Wogeno eG Munich which offers its residents planning participation, common areas and self-administration elements. Public awareness and acceptance are increased by successful flagship projects. If they are in line with public policy objectives (e. g., affordable housing, neighbourhood spaces) they can also gain political attention and support for cohousing. Promising public support strategies include means of funding, land allocation and assistance for empowering during the planning, financing and construction process. Such support could be part of an urban development strategy that combines housing with environmental goals and the strengthening of social networks.

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Increasing sustainability in clothing production and consumption – opportunities and constraints

The rapidly rising consumption level of clothing makes it imperative to transform unsustainable consumption and production patterns. Which are the factors that could support or impede a transition to more sustainability? Based on representative empirical results, we discuss attitudes and behaviour related to clothing consumption, and experts' forecasts of developments in clothing production and market.

Silke Kleinhüchelkotten, Horst-Peter Neitzke

Increasing sustainability in clothing production and consumption – opportunities and constraints

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Abstract

The provision and consumption of goods and services are determined by a multitude of economic, technical, social and personal factors as well as by the regulatory framework. In this article it is discussed which factors impede or support a change towards more sustainability in the mass market, using the example of clothing. The spectrum of methods used in the underlying investigations comprises amongst others a representative and an expert survey, focus groups, dialogue boards, and expert interviews. For the consumers, relatively high levels of problem awareness concerning the production conditions for conventional clothing and the desire for environmentally and socially compliant clothing offer opportunities for changes in consumption patterns. However, there are clear differences between the social milieus, and widespread reservations with respect to more sustainable alternatives. The latter, along with many competing factors relevant to purchase decisions, could inhibit the increase in demand for more sustainably produced clothing as predicted in the expert survey. For industry, changes in the fibre materials used and new technologies will allow more sustainable production. However, the necessary rearrangements along the textile chain are hindered by a severe lack of transparency. There is an essential need for generally binding conducive political and legal frame settings.

Keywords

clothing, social milieus, sustainable consumption, sustainable production

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Assuming a more or less steady development, the global population will increase from today 7.7 billion to 9.8 billion by the year 2050 (UN DESA 2017). All these people will not only need water, food, clothing, shelter, and energy but also the demands for consumer goods in general will increase. However, the growth of the global population is not the real problem (figure 1). More people are expected to join the middle class over the next two decades, and they will demand their share in products and services that make life easier and more comfortable. Over the past years the demands for consumer goods, such as clothing, increased much faster than the global population and the need for food and energy.

A rising consumption level implies increasing demands for already constrained natural resources and, with the usual methods of production, serious environmental impacts. Changes in consumption and production patterns are therefore essential – for ecological as well as for social reasons (UN 2018, ILO 2018).

The ways goods are produced, and services are provided, are determined by a multitude of economic, organisational, and technical drivers as well as by the political and regulatory framework (Graham 2004, Osuagwu 2016, Omarli 2017). Clothing is an example of a field of action posing especially big challenges for a transformation process towards more sustainability. On the supply side these arise from an extreme division of labour and a high degree of globalisation of the value-added chains. This results in a high diversity of actors, acting in very different legal, social, and economic contexts. The demand side is characterised by a high complexity of attitudes and behavioural patterns. The question what determines the buying behaviour of consumers has been the subject of basic as well as marketing related research since the 1940s (see, e.g., Bivens 1960, Fullerton 2013, Kleinhüchelkotten 2011, Rani 2014, Ramya and Ali 2016).

While the great transformations in history, for example, the industrial revolutions in the 18th and the 19th century, have not been planned, it is nowadays assumed that a purposeful control and acceleration of intentional transformation processes towards more sustainability is possible – albeit not in detail (Grießhammer and Brohmann 2015). Controlling interventions requires

amongst others the knowledge of the frame conditions of the intended transformation and of the factors with strongest impact on relevant actors' decisions in favour or to the disadvantage of more sustainable alternatives.

Conceptual background and research questions

In the project *Slow Fashion* of the research and praxis cooperation *Innovations for Sustainable Clothing (InNaBe)* the question was asked, how more sustainability can be achieved in the mass market for clothing and what could be done to improve the chances for diffusion of the necessary innovations in technologies, products, services, and behaviour.¹ On the supply side “more sustainability” stands for high levels of environmental and social compatibility of the garment production process. The clothing should be designed to be wearable for a long time and an efficient and high-quality recovery should be possible after its expected useful life. With respect to clothing consumption sustainability as a goal has been described as follows: voluntary restraint in the buying of clothing, conscious decisions in favour of high-quality clothing, produced under ecologically and socially acceptable conditions, use of all possibilities to extend the useful life of clothing and the materials used, for example by repair, upcycling, buying of second-hand products, or the use of return systems. In the representative survey (see below) the term “sustainably produced clothing” was used after clarifying that it refers to environmentally and socially responsible clothing manufacturing processes.

In the present paper the focus is on two research questions:

1. Which factors affect decisions in favour or to the disadvantage of more sustainable alternatives in clothing production and consumption?
2. How likely are changes towards more sustainability in clothing production and consumption?

Methods

A broad spectrum of complementary methodical approaches was applied:

- twelve in-depth personal interviews with experts from enterprises, commercial and consumer protection organisations as well as from authorities noted for their expertise;
- five dialogue boards each with around 40 participants, about one half personally invited by means of the same selection criterion;
- an online survey *Clothing 2030* with 80 experts from industry, science, and nongovernmental organisations (NGOs) selected on the basis of a comprehensive actor analysis (for the method see, e.g., Hermans and Thissen 2008);
- six focus groups with totally 36 participants from different social milieus (see below) singled out by means of a screening questionnaire (Gardemin and Kleinhüchelkotten 2017);

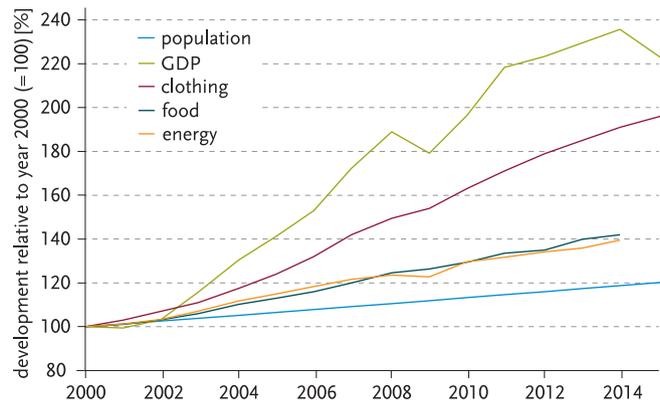


FIGURE 1: Development of the global population, the gross domestic product (GDP), and the consumption respectively production of clothing, food, and energy relative to the year 2000 (= 100). Sources: Ellen MacArthur Foundation (2017): clothing, UN DESA (2017): population, World Bank (2018): GDP (current US \$), food production index, and energy use (kg of oil equivalent per capita) times population.

- a representative survey conducted by an acknowledged survey institute with computer assisted personal interviews of 2,000 adults, German-speaking participants taken from the ADM (Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute) master sample and controlled for representativity with respect to age, gender, educational level, household size, and region of the place of residence.

The expert online survey was conducted to determine for the time horizon 2030 the probabilities for sustainability supporting changes in production conditions and consumption trends.

The focus groups, as a qualitative method, provided, on the one hand, input for the conceptual design of the representative survey. On the other hand, deeper insights into mindsets and reasonings of consumers have been obtained. These were useful for the interpretation of the statistical data from the survey.

The representative survey was conducted to determine the spread of attitudes and behavioural patterns related to clothing in different sociodemographic and sociocultural population segments. A second goal was the determination of factors with high relevance for consumption behaviour and the willingness of consumers to switch to more sustainable modes of behaviour. The questionnaire for the representative survey covered the following topics:

- personal importance of fashion and clothing;
- buying, duration of use, reasons for the sorting of clothes;
- motives and reasons for purchase decisions;
- attractiveness of consumption alternatives;
- attitudes towards more sustainably produced and secondhand clothing;
- problem awareness related to clothing production and consumption.

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¹ www.innabe.de/index.php?id=177

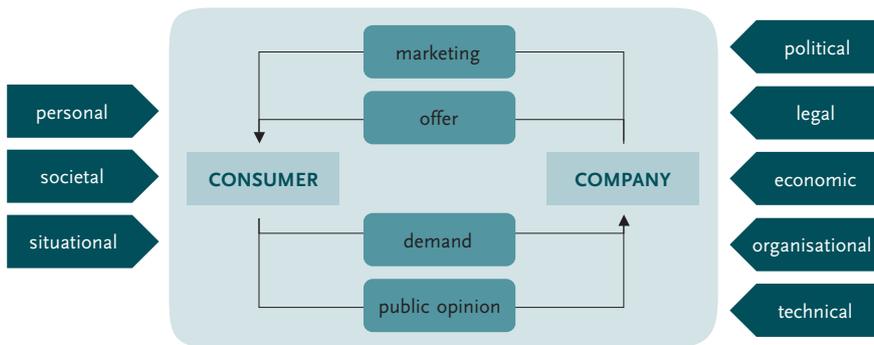


FIGURE 2: Factors influencing the decision-making of companies and the purchase decisions as well as the buying behaviour of consumers.

Furthermore, the standard sociodemographic data have been collected and a tested battery of questions was integrated for the assignment of the interviewees to six social milieu segments. The concept of the societal segmentation by social milieus traces back to the work of Bourdieu (1992) (see also Vester et al. 2001). People from a certain social milieu show strong similarities with respect to their views of life, their priorities in values, their attitudes, and their everyday aesthetic styles and preferences. Social milieus are characterised by a high degree of conformity with respect to educational level, income, and professional status among the members. The social milieu segments, used in this study, and the assignment method are described elsewhere (BMU and UBA 2015, Kleinhüchelkotten et al. 2016).

Standard descriptive statistical methods, correlation and regression analyses have been used in order to analyse the statistical data.

Results

Figure 2 shows in a simplified representation the factor groups that influence the decision making of companies and the purchase decisions as well as the buying behaviour of consumers. The interaction between supplier and consumer proceeds via demand and offer, marketing and public opinion, that is, the perceptible merged attitudes of (potential) consumers towards a product or the offering company. The other factor groups comprise among others the following factors (based on Kleinhüchelkotten 2011):

- *personal factors*: income, perceived personal and social norms, attitudes, knowledge, habits, emotions;
- *societal factors*: social conventions, public opinion regarding for instance the “right” consumer behaviour;
- *situational factors*: information, emotions, and advice of accompanying persons of trust or sales staff in the purchase situation;
- *political factors*: economic, environmental, fiscal, and consumer policy, development cooperation;
- *legal factors*: financial, environmental, and consumer protection legislation, codified norms and standards;
- *economic factors*: costs, subsidies, taxes, market structure;

- *organisational factors*: availability of resources, information, and qualifications, supply relationships;
- *technical factors*: availability and diffusion of environmentally sound and socially acceptable techniques.

In the following, selected results will be presented for factors of general importance, not depending on the specific buying situation or the organisational structure or dynamics of companies. These specific aspects as well as design-related and technical aspects have been investigated by other partners of the *InNaBe* consortium (see foot-

note 1). Only a few results with respect to expected technical developments will be described. The first result section is devoted to drivers acting on commercial enterprises, the second deals with consumption-relevant factors.

Results 1: factors relevant to business decisions

Based on statistical results from the representative and the expert survey as well as findings from the in-depth interviews and the dialogue fora, we exemplify expected technical and legal developments as well as societal factors influencing the decision making of manufacturers and suppliers of clothing. Results for the factors “demand”, “public opinion”, and “political and legal frame conditions”, as well as for organisational and technical drivers (“management and supply chain organisation”, “resources and manufacturing engineering”) are shown.

Demand

For almost half of the interviewees in the representative survey it is very important or at least important that the clothing they buy has been produced in an environmentally safe manner and under fair labour conditions. Figure 3 (p. 244) illustrates the differences in the importance of environmental and social buying criteria in the social milieus. In the critical-creative milieus ecological and social buying criteria are particularly important. In the traditional and the well-established milieus their significance is also above average. However, for an appraisal of the 50 percent approval in the total population it is important to know that the approval rate is clearly higher for several other buying criteria, for example:

- comfort and correct fit: 84 percent;
- good price-performance ratio: 79 percent;
- good workmanship: 78 percent;
- no toxic chemicals: 73 percent.

By their own account, nearly ten percent of the interviewees often buy environmentally safe produced clothes, and for clothes produced under fair labour conditions the percentage is twelve percent.

The experts predict an increasing demand for more sustainable clothing as well as for secondhand clothing in the high price

TABLE 1: Developments along the textile chain and in the regulatory framework until 2030 as expected by experts: **A:** demands for clothing, **B:** changes in public opinion, **C:** tightening of legal restrictions for the clothing production, **D:** percentages of fibres for clothing, **E:** application of chemicals and processes in the finishing of clothes, and **F:** improvements in the recycling of clothes. Scales for the rating of *changes* (A and D) from 1 (strong decrease) to 5 (strong increase); scales for the rating of *probabilities* (B, C, E, and F) from 1 (very low) to 5 (very high). mean: arithmetic mean, SD: standard deviation, var: variance.

EXPECTED DEVELOPMENTS ALONG THE TEXTILE CHAIN/IN THE REGULATORY FRAMEWORK UNTIL 2030	MEAN	SD	VAR
A. demand for ...			
... high quality clothing	3.42	0.74	0.55
... clothing from environmentally and socially acceptable production	3.70	0.77	0.60
... high price secondhand clothing	3.78	0.72	0.52
... medium price secondhand clothing	3.09	0.75	0.56
... low price secondhand clothing	2.41	1.02	1.04
B1. The percentage of customers dealing with the issue “sustainability” will strongly increase.	3.94	0.95	0.91
B2. The public pressure on enterprises to produce in an environmentally and socially acceptable way will strongly increase.	3.90	0.98	0.96
C. The demands on the production of clothing will be tightened by European regulations with respect to ...			
... environmental and climate protection.	3.73	1.00	0.99
... employment rights.	3.35	1.14	1.31
... health protection.	3.51	1.10	1.20
D. Percentage of fabrics made from ...			
... natural fibres	3.05	0.92	0.85
... synthetic fibres	3.68	0.86	0.73
... fibre blends	3.73	0.89	0.79
... plant fibres, conventional production	2.60	0.82	0.66
... plant fibres, sustainable production	3.91	0.75	0.56
... plant fibres, genetically modified plants	3.41	0.87	0.76
... synthetic fibres based on cellulose	4.19	0.67	0.45
... fibres from bio-degradable synthetics	3.99	0.76	0.57
E. In the finishing of clothes mainly chemicals and procedures will be used that are uncritical with respect to ...			
... environment.	3.55	0.92	0.85
... worker’s health.	3.53	0.96	0.93
... recyclability.	3.49	0.93	0.87
F1. Many clothes will be equipped with RFID chips allowing a high-quality sorting of materials.	3.55	1.11	1.22
F2. More and more fashion companies will take back their products after use for recycling.	3.54	1.00	0.99
F3. New sorting methods will allow the provision of large quantities of the same used garments for upcycling.	3.55	1.05	1.11
F4. The recyclability of chemical-synthetic fibres will be improved significantly.	3.99	0.88	0.77

segment till 2030, but not for medium-priced or low-priced clothing (table 1: A). They are sceptical that the total volume of sold clothes will decrease. On the contrary: in their view the present trend of buying more clothes at decreasing costs per article of clothing will continue. At present the consumption level is highest in the well-established milieus, and above the total population average in the critical-creative and the young milieus (figure 4, p. 244). It is higher for women than for men. Moreover, the willingness to keep and wear clothing longer in the future is lowest in the well-established and young milieus. It is highest in the critical-creative milieus.

Public opinion

The consumers do not have trust in the clothing industry. As the representative survey shows, nearly 82 percent of the participants are rather sceptical whether the information on the production conditions of clothes is trustworthy. According to the consulted experts, the importance of the issue “sustainability” for consumers as well as the public pressure on enterprises to produce in an environmentally and socially acceptable way will strongly increase till 2030 (table 1: B1, B2).

Political and legal frame conditions

Overall, more than two-thirds of the participants in the representative survey agree more or less with the statement “The government should make sure that only sustainably produced clothing is going to be on the market.” The consulted experts expect a tightening of the legal restraints on the production of clothing by European regulations till 2030 with respect to health protection, and the compliance with employment rights, environmental and climate protection (table 1: C). They also predict statutory provisions for a more sustainable public procurement.

In the dialogue boards not only representatives of NGOs but also of small to large enterprises in the clothing industry argued for a reliable and obligatory legal framework for the clothing industry. Another approach, also discussed in the fora, are financial reliefs for more sustainable products and services, for example reduced VAT rates.

Management and supply chain organisation

The lack of transparency is one of the greatest challenges for retailers and suppliers along the textile chain. This was a key issue in the dialogue fora and was also thematised in the interviews

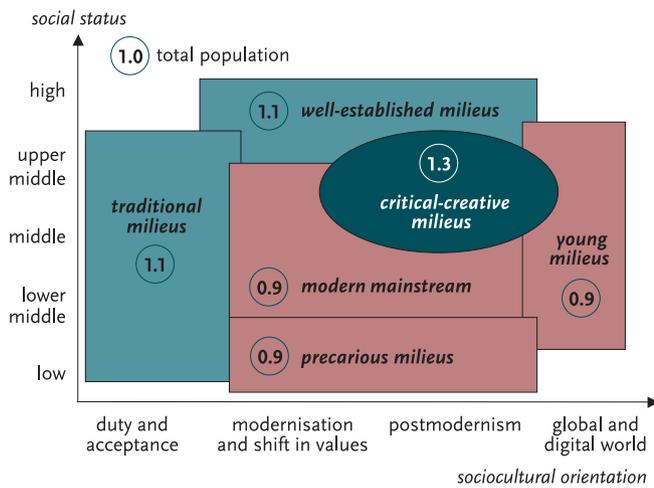


FIGURE 3: Importance of environmental and social buying criteria in the social milieu. Colours show whether a finding is positive (green) or negative (red) from a sustainability point of view. (The indices were calculated for each milieu segment by taking the average of the approval rates at the two highest of six responding levels for two sustainability related statements in this social milieu segment and dividing this by the average in the total population.)

with representatives of the fashion industry. Different approaches are under way to tackle this problem, such as data banks for component suppliers or materials and electronic labelling.

Another important factor is the assignment of sustainability issues in the management hierarchy of companies, reflecting the importance attributed to these issues by the company board. Also, the deficits in the qualification of the employees, especially those working in design and product development, emerged as a central theme in the dialogue fora.

Resources and manufacturing engineering

The present trend of increasing shares of synthetic fibres and fibre blends in the production of clothing fabrics will continue. Nevertheless, significant changes can be expected in the kind of materials used in the clothing industry as the expert survey shows (table 1: D). Strong increases are predicted for the use of plant fibres from sustainable production, fibres based on cellulose, and fibres from bio-degradable synthetics. Increasing importance is also expected for synthetic fibres in general and fibre blends.

For the finishing of clothes, a production step so far characterised by high burdens for workers and the environment, the experts think improvements are likely. According to their prediction, mainly chemicals and processes will be used by 2030 that are uncritical with respect to the environment, workers' health, and recyclability (table 1: E).

Significant improvements in recycling technology and organisation can be expected till 2030 (table 1: F1 to F4). One drawback in the recycling of clothes, the limited recyclability of chemical-synthetic fibres, will be widely overcome. More specialised and differentiated redemption systems as well as new sorting methods, based for example on RFID chips, will allow the provision of high-quality secondary raw materials.

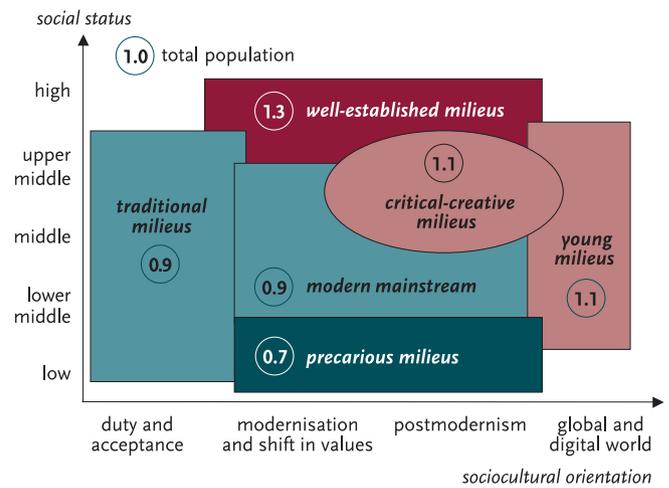


FIGURE 4: Clothing consumption in the social milieu (average number of outerwear items bought in the last year weighted by the resource input per item in the respective social milieu segment relative to the consumption in the total population). Colours show whether a finding is positive (green) or negative (red) from a sustainability point of view.

Summary: factors relevant to business decisions

In the clothing industry some developments are on the horizon that at least could result in reductions of the release of hazardous substances. Improvements can also be expected in recycling technology. These developments are and will be driven by increasing criticism passed on the negative environmental and social impacts of the conventional production of raw materials and garments. The growing public scepticism is also a strong reason for the predicted strengthening of legal regulations.

Results 2: factors relevant to consumer behaviour

In this section mainly results of the representative survey are reported. The focus is on the importance of personal and social factors, like social status, norms and attitudes, as well as of information and advice for consumption preferences and buying behaviour. Particular attention is given to the quantitative consumption level and to more sustainable consumption options, the buying of sustainably produced and of secondhand clothing.

Social status

As already explicated, the consumption level is above average in the well-established, the critical-creative, and the young milieu (figure 4). The first two milieu segments are characterised by high incomes and an above average level of education. An analysis of the data from the representative survey shows a clear correlation between income and number of bought items, weighted by the resource input per item ($R^2 = 0,62$). However, not only the quantitative level of consumption but also the percentage of interviewees, who state to often buy clothes produced under fair labour conditions and/or in a less ecologically damaging way, increases with income (figure 5). There is also a, albeit weaker, correlation with educational level.

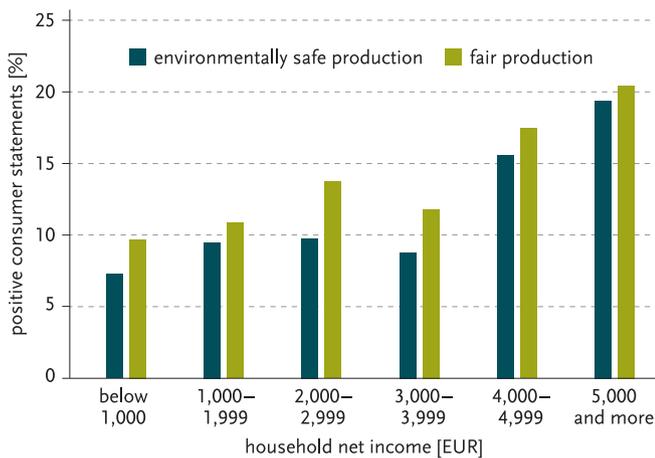


FIGURE 5: Percentage of consumers who according to their statements often buy eco clothing and/or fair clothing (i. e., production under fair labour conditions) in the income segments.

Norms and attitudes

The purchase of clothing is potentially determined by many factors, be it sustainably produced or secondhand clothing. The list in figure 6 (p. 246) includes attitudes directly related to fashion, the purchase and the function of clothing, as well as social norms and more general attitudes, namely the general sustainability awareness and the problem awareness (see below). The importance of these factors has been tested by correlation and regression analyses. Each factor of the list is represented by a meta-variable that comprises several items. For example, the meta-variable “consumption hedonism” comprises these five statements of the representative survey:

- The buying of clothes is a great fun for me.
- I like it to go on shopping-tour with others.
- I regularly clear out my wardrobe to make room for new things.
- I often buy clothes that I practically do not wear afterwards.
- I often buy clothing without thinking about it in advance.

Social norms are informal rules in groups and societies that govern individual behaviour. The “social norms” meta-variables used in the analysis are the result of the merging of items used to test the importance of descriptive (“Most people who are important for me wear sustainably produced/secondhand clothing.”) as well as of injunctive norms (“Most people who are important for me would like it if I wear sustainably produced/secondhand clothing.”). Social norms supporting the purchase of more sustainably produced clothing have a somewhat higher importance in the well-established and the critical-creative milieus compared to the population average. In the traditional and the precarious milieus their relevance is slightly lower. With respect to secondhand clothing the average rating in the traditional milieus is below the value for the total population. In the critical-creative and the young milieus there is a somewhat stronger support by the social reference groups for this purchase alternative compared to the other milieus.

The variable “problem awareness” comprises the perception of the negative implications of the mass production of clothing for the environment and the workers as well as of poisonous substances in clothes for health. The problem awareness is especially pronounced in the critical creative milieus, as is the general sustainability awareness based on two items related to environmental and to social aspects respectively.

Figure 6 shows the coefficients for zero-order correlations between the variables representing the different attitudes and norms and the purchase of sustainably produced clothing on the one hand and secondhand clothing on the other hand. As for the importance of attitudes and norms there are clear differences between the two options. While there are relatively strong correlations between general sustainability awareness, problem awareness, and quality orientation on the one side and the purchase of sustainably produced clothing on the other side, these attitudes have practically no relevance for the purchase of secondhand clothing. In the latter case, the correlation is strongest for social norms. Regression analyses for both purchase options, taking into account all factors with correlation coefficients larger than 0.1 for at least one of the options, yielded in both cases the greatest standardised regression coefficients for the respective social norm (sustainably produced clothing: $\beta = 0.24$; secondhand clothing: $\beta = 0.45$). Followed in the first case by general sustainability awareness ($\beta = 0.20$) and in the second case by individuality ($\beta = 0.11$).

The representative survey showed prevalent more or less strong reservations with respect to sustainably produced and secondhand clothing (table 2). 48 percent of the interviewees expressed discomfort with the thought to wear secondhand clothing.

Information and advice

According to the results of the representative survey only 18 percent of the consumers inform themselves before they buy clothing. Nearly 80 percent of all interviewees state that it is difficult for them to judge whether or not clothing was produced under sustainable conditions. 45 percent of the interviewees wish a state-controlled label that guarantees an environmentally compatible and fair production of clothing. Another 32 percent tend at least to a positive appraisal of such a label. However, the consulted experts are rather sceptical that such a label or a common standard label of the textile industry will be established till 2030.

Summary: factors relevant to consumer behaviour

A high income is a strong predictor for a high level of clothing consumption but also for an above average preference for more sustainably produced clothing. An above average consumption of more sustainably produced clothing is attended by higher levels of general sustainability and problem awareness as well as a stronger quality orientation. Respective social norms are conducive to purchase decisions in favour of more sustainable clothing alternatives. Uncertainty about the actual quality of clothing, offered as sustainable, is widespread and there is a strong desire for a high credibility label, which guarantees environmentally and socially compatible production conditions.

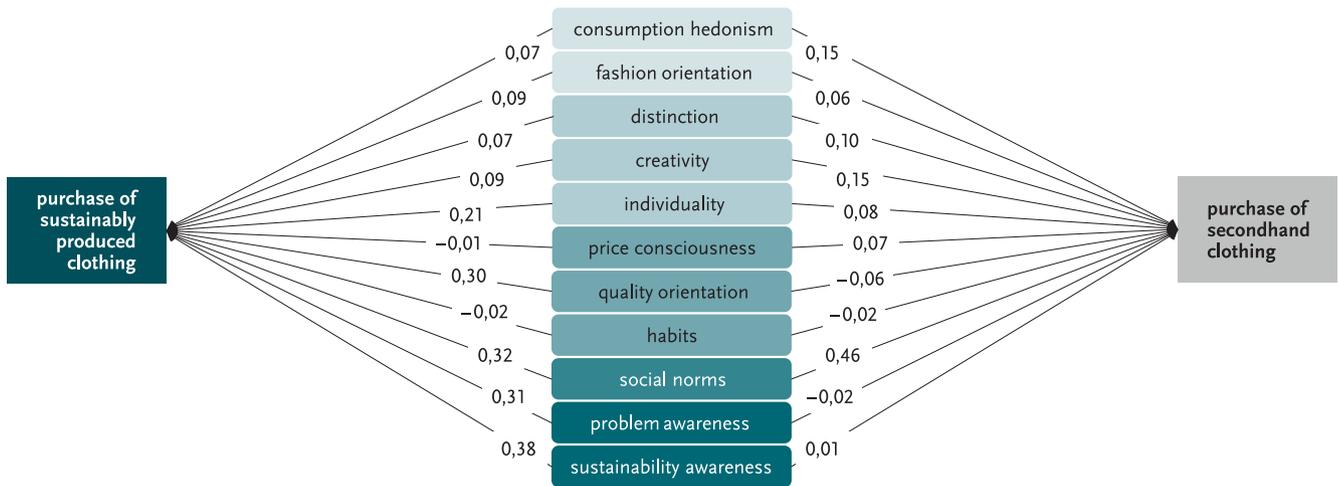


FIGURE 6: Coefficients for the correlations between attitudes and norms and two purchase options – “sustainably produced clothing” and “secondhand clothing”. For all correlations the level of significance is better than one percent except price consciousness (“sustainably produced clothing”), problem and sustainability awareness (“secondhand clothing”), and habits (both purchase options).

Discussion and conclusions

The present study is not the first one dealing with the chances for more sustainability in clothing consumption (see, e.g., Geiger et al. 2017, Wahnbaeck et al. 2015). Also, studies on changes towards more sustainability in the fashion industry are available (see, e.g., Bodenheimer 2018, Lehmann et al. 2019, McKinsey and BoF 2017). However, it is the first one where different methods for the investigation of attitudes and buying behaviour were combined and which is based on a nationwide, representative database of a size (N = 2,000) allowing detailed analyses even for smaller societal segments. Moreover, it was designed to render possible the examination of social-cultural aspects, such as differences between social milieus, as well as detailed analyses of consumption driving factors. A mix of methods and a broad empirical base are also strengths of the fashion supplier related research. The results of the production, vendor, and consumer related research in the *Slow Fashion* project, presented above, show that there are opportunities but also strong constraints for more sustainability in clothing production and consumption.

Clothing production

In the clothing industry already some efforts towards the implementation of less ecologically damaging production methods have been made. The consulted experts expect substantial progress in this respect in the next decade (see also, e.g., McKinsey and BoF 2017, Lehmann et al. 2019), for instance regarding the raw materials used in fibre production. Today, the share of sustainably produced fibres in the textile market is low (TextileExchange 2018 b), but their share is expected to rise. This prediction from the expert survey is backed by a strong growth of the global organic cotton production over the last years (TextileExchange 2018 a). At present, it is difficult to answer the question, whether an also predicted increase of the use of synthetic fibres based on cellulose taken as a

whole can be rated positive from a sustainability point of view, as the environmental and social impacts strongly depend on the source of the raw material and the kind of practices and technologies applied on the industrial stages of fibre production (Freitas and Matthews 2017). This applies also to bio-degradable synthetics, because sustainability assessments are widely lacking for this class of materials. Under today’s conditions, the growth of the shares of synthetic fibres, fibre blends, and fibres from genetically modified plants in fabrics for clothing could be problematic. The production of synthetic fibres requires a high energy input and their recycling is difficult due to sorting problems. At least for the latter problem, which is even worse for fibre blends, technical solutions are under progress, as the results of another *InNaBe* working group show.

So far, the efforts of the clothing industry are rather tentative, at least as regards the market-dominating companies, and the rate of improvement of the social and environmental performance of the fashion industry has slowed down in the last year (Lehmann et al. 2019). One great hindrance for effective sustainability strategies in the fashion industry is the lack of transparency, as discussed in the dialogue fora. It is a huge challenge for retailers in

TABLE 2: Reservations with respect to sustainably produced and secondhand clothing (percentage of interviewees who fully agree, agree or rather agree).

	RESERVATION OF INTERVIEWEES [%]	
	SUSTAINABLY PRODUCED	SECONDHAND
not fashionable	44	36
assortment too small	75	57
too expensive	67	./.
quality not so good	./.	40
something for needy persons	./.	39

the fashion market, to get an overview of their supply chains and to determine the environmental and social impacts along these chains. The reluctance of many big players in the clothing market to provide customers with the information they need to make informed choices has also to do with the fact that very often the big players themselves lack this information. There is a widespread opposition to one standard sustainability label for clothing. Small and medium-sized enterprises, even those offering more sustainably produced clothing, are put off by the costs of certification, as the discussions in the dialogue fora showed. Others rely on the marketing effect of graphically attractive, albeit not very meaningful labels.

Political and legal frame settings

The problems outlined above suggest the conclusion that the process towards a more sustainable production of clothes must be controlled by suitable political and legal frame settings. Most of the consumers support stricter regulations. Since the demand for binding legal provisions is shared by many companies, as became apparent in the dialogue fora, their implementation could merely be a matter of a few years, at least for companies based in Europe and for the European clothing market. The list of measures to be taken ranges from lower VAT rates to legal rules for duties of social and environmental care, it comprises the obligation to disclosure of information on the production conditions as well as a state-controlled sustainability label for clothing.

A trustworthy, self-explanatory sustainability label would be a useful means to support the decision-making of customers at the point of sale, since only a small minority is willing to inform themselves adequately. But such a label could only be one instrument to support buying decisions in favour of more sustainably produced clothing. Environmental and social compatibility of the production process are of concern to many consumers (figure 3). This applies especially to consumers from the critical-creative milieus and, to a lesser extent, to those from the traditional and the well-established milieus, where the general sustainability and the clothing related problem awareness are relatively high. These findings are of some importance, since the milieus with high social status represent role models for other social milieus in many respects (Wippermann et al. 2009). However, as stated above, other buying criteria are just as important as or even more important than sustainability criteria. Nevertheless, a strengthening of the general sustainability awareness and an activation of social norms could have positive effects on buying decisions in favour of more sustainable products (figure 6).

Clothing consumption

Due to its pull-effect on the clothing industry, the predicted increase of demand for clothing produced under environmentally and socially acceptable conditions would be a valuable contribution to more sustainability in the clothing sector. But it would not at all be sufficient. The main problem to be tackled is the quantitative volume of clothing consumption. The results of the actual study confirm the findings of other research (e. g., Moser and Kleinhü-

ckelkotten 2018, Wahnbaeck et al. 2015) that income is a strong driver for clothing consumption. An above average sustainability awareness does not necessarily go along with buying resistance when the income allows a high level of consumption, as evidenced by the findings for the critical-creative and the well-established milieus.

The majority of consumers advocated a turn to more environmental and social compatibility in clothing production. It poses a great challenge for the companies that dominate the fast fashion market, but also a manageable one. In contrast, a substantial reduction of clothing consumption would question their whole business model. It is also not easy to make sufficiency in clothing consumption attractive for consumers. Clothing is not only a material functional good, but social, cultural, and emotional aspects are crucial for the buying and wearing of clothes (Simmel 1995, Bourdieu 1992, Esposito 2014). Generally binding conducive political and legal frame settings are necessary to achieve more sustainability in clothing production. But for a real transition in the clothing sector, which goes beyond environmental and social consistency and resource efficiency, a cultural shift is necessary.

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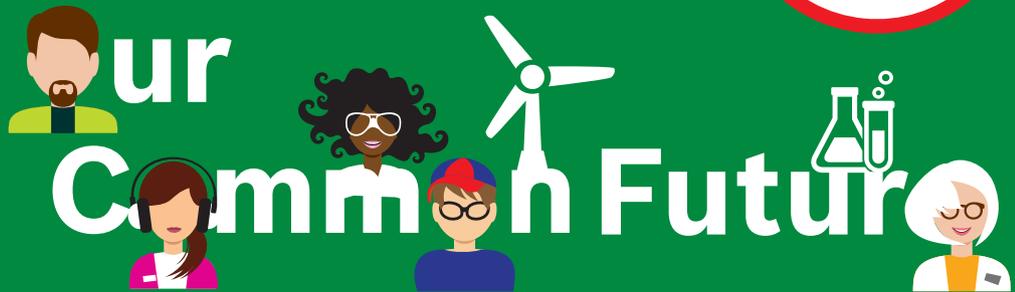
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