German Journal of Agricultural Economics Vol. 73 (2024), No. 3, 1-21

Original Research Article

https://doi.org/10.52825/gjae.v73i3.1114

Submitted: 23 Feb. 2024 | Accepted: 21 Sep. 2024 | Published: 07 Nov. 2024

Of Innovators, Enablers and Change Agents: Disentangling Actors and Their Roles in Agri-Food Transition Processes

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Abstract: The urgent need for a fundamental change within agri-food systems, driven by the critical challenge of surpassing planetary boundaries, necessitates a comprehensive understanding of the actors and their roles in transition processes. This study addresses a significant knowledge gap by exploring the dynamics of actor interactions and the multifaceted roles they play in facilitating or hindering the transition towards more sustainable agri-food systems. Focusing on the *Bio-Musterregion Heidenheim plus* in Baden-Württemberg, Germany, as a case study, data were collected using the Social Ecological Inventory method. As a theoretical framework, the study was based on the multi-actor perspective. Altogether 157 actors and numerous roles were identified. Key findings refute the assumption that an actor inherently has a fixed role. We also show that roles are dynamic and can change over time. Furthermore, actors can take on multiple roles simultaneously. We conclude that a nuanced understanding of actor dynamics and their evolving roles is crucial for managing sustainability transitions. Efforts need to be directed towards supporting networking and knowledge sharing between niche actors. Equally important is the transfer of initiatives and knowledge from the niche level to the regime level, which may be achieved by empowering change agents in the political sphere.

Keywords: Transformation, Sustainability, Organic Agriculture, Organic Model Region, Multi-Actor Perspective, Social Ecological Inventory

1 Introduction

The *planetary boundaries* are being exceeded, and agriculture stands out as a major contributor to this overshoot (Campbell et al., 2017; Rockström et al., 2009; Steffen et al., 2015). However, agriculture not only contributes to this overshoot through factors such as high water consumption and excessive fertilization, but is also significantly impacted by the consequences. Crop cultivation faces increasing challenges due to human-induced climate changes, including extreme weather events such as intense heat, drought, and severe rains and floods (Campbell et al., 2017). This makes agriculture both a victim and a threat.

The importance of transitioning to sustainable agricultural and food systems is emphasized at both global and regional levels. The *Sustainable Development Goals* (SDGs) of 2015 provide a global framework for this shift, as further specified e.g. with SDG 2: Zero Hunger or SDG 15: Life on Land, and underlining the need for significant changes in agricultural practices and policies (Schaetzen, 2019; United Nations, 2015).

At European Union level, concrete steps include the reforms of the *Common Agricultural Policy 2023-2027* in 2021 (European Commission, 2021) and the *Farm to Fork* strategy in 2020 (European Commission, 2020), which aim to create fair, healthy, and environmentally-friendly food systems by reducing pesticide and fertilizer use, increasing organic farming, and reducing food waste.

At a national level, Germany's major initiatives, such as the *Ackerbaustrategie 2035* (German Farming Strategy 2035) (BMEL, 2021) and the *Deutsche Nachhaltigkeitsstrategie 2021* (German Sustainability Strategy 2021) (Deutsche Bundesregierung, 2021) drive the transition by focusing on reducing emissions, supporting farmers, and promoting sustainable practices. The *Zukunftskommission Landwirtschaft (*Commission on the Future of Agriculture) (Zukunftskommission Landwirtschaft, 2021) brings together major actor groups from the agri-food sector for finding consensus on the future of agriculture by integrating environmental sustainability with economic viability.

Furthermore, the federal states have set themselves ambitious targets, such as the action plan *Bio aus Baden-Württemberg* (Organic from Baden-Württemberg), which aims to increase the share of organic farming to 30-40% by 2030, thus significantly exceeding the threshold of 25% set by the European Union (MLR, 2020). These collective efforts of various actors underscore the pressing need for a comprehensive transition towards more sustainable agri-food systems.

The need for fundamental change in today's agriculture and food system is widely recognized to achieve sustainable development. However, the greening that state governments are striving for in this context cannot be achieved simply by top-down introducing regulatory or funding measures. It requires a joint effort of the broad range of actors involved in the agri-food system, including cooperation and networking, but also deliberation and negotiation. However, until now, there has been only an insufficient understanding of who is to be considered an actor and what role they play in transition processes within agri-food systems (Avelino, Wittmayer, 2016; Farla et al., 2012; Newig, Fischer, 2016).

While current research provides a detailed understanding of how actors take specific decisions and interact to achieve outcomes, like policy decisions, it often neglects a broader view. We don't have a complete picture of the evolving roles these actors play, what activities they undertake, and how their relationships change over time, all of which indicate transitions (Wittmayer et al., 2017). This gap in the literature suggests that more attention should be given to exploring the shifting roles and interactions among different stakeholders, not just the outcomes of their actions.

Addressing this research gap and building on a local case study approach, the study aims to examine the following questions within the context of the *Bio-Musterregion Heidenheim plus* (Organic Model Region Heidenheim plus) in the state of Baden-Württemberg, Germany:

- R1 Which actors are involved in the transition process of the regional agri-food system?
- R2 How are the actors connected to each other?
- R3 What kind of activities that impact the agri-food system do the actors carry out?
- R4 What are the roles of these actors in the transition process?

As R1 to R3 have an analytical approach, they are examined and addressed in detail in the Results (Chapter 4). In a next step, they provide the foundation for the interpretive and concluding research question R4, which is focused on in the Discussion (Chapter 2).

By examining these research questions, the study aims to contribute to a deeper understanding of how actors influence the transition process of agricultural and food systems, either by stimulating or slowing it down. In addition, different paths that these actors may take will be explored to shed light on the complex interaction between the actors involved in the transition process.

2 Theoretical Background

For consistency, it was decided to use the terms ‘transition’ and ‘actors’ throughout. The authors are aware that other terms, such as ‘transformation’ instead of ‘transition’ or ‘stakeholder’ instead of ‘actor’, may also be appropriate. The paper “Transition versus Transformation: What’s the difference” served as the basis for the decision in favor of ‘transition’ (Hölscher et al., 2018b). The term ‘actor’ was chosen as a key reference of the paper is the multi-actor perspective (Avelino, Wittmayer, 2016).

2.1 Transition Process

A transition process is understood as a multi-actor process in which "social groups such as businesses or firms, different types of user groups, scientific communities, policy makers, social movements, and special interest groups" (Geels, Schot, 2010) interact with each other. Transitions are considered a "complex social phenomenon" (de Haan, Rotmans, 2011) and “outcomes of alignments between developments at multiple levels” (Geels, Schot, 2007). Furthermore, transition processes involve a high level of coevolution, complexity, and uncertainty (Geels, Schot, 2010).

In recent decades, a wide range of perspectives on transitions have emerged, building on and paralleling each other (Avelino, Wittmayer, 2016). In the following, the multi-level perspective (MLP) is discussed first, followed by an outline of the multi-actor perspective (MAP) that builds on it.

Multi-Level Perspective

The multi-level perspective (MLP) is a medium-range theory that identifies dynamic patterns in socio-technical transitions, emphasizing the interplay between technological, economic, political, and cultural changes (Geels, 2002). It is applied in various fields, including sustainability and agri-ecological transitions research (El Bilali, 2020; Geels, 2011). MLP posits that transitions occur through interactions within and between three levels: niches, socio-technical regimes, and a socio-technical landscape. Niches are spaces where innovations can develop with less external pressure. Early organic farming communities, which tested composting, crop rotation, and natural pest control, are an example. Socio-technical regimes are the established norms and practices within a system, such as conventional farming with its established supply chains and government support for large-scale monoculture. Socio-technical landscape is the broader environment with macro-level trends and forces, like societal values and climate change. An example is the global push for more sustainable food systems driven by climate concerns and increased demand for organic products.

This perspective highlights nested and bidirectional dynamics of change across multiple levels, emphasizing interactions among different sectors and actors (Barbanente, Grassini, 2022). One of the main criticisms is that the MLP does not sufficiently examine how actor interests influence the development of technologies (Genus, Coles, 2008; Loorbach, Rotmans, 2010).

Multi-Actor Perspective

The multi-actor perspective (MAP) is a heuristic framework that builds on the MLP. Specifying and nuancing the "regime" and "niche" actors identified by the MLP, the MAP addresses the complex variety of roles they occupy at different levels of aggregation (sector-level actors, organizational actors, individual actors). This involves understanding of how actors interact with each other and how their interests and values influence the development of innovations. Furthermore, the MAP is used as an interactive tool to identify actor groups in social systems and to connect actors in the formation of temporary transition networks (Avelino, Wittmayer, 2016; Loorbach et al., 2017).

Drawing on the welfare model (Pestoff, 1992), the MAP categorizes actors into four sectors: state, market, community, and third sector. These sectors are described along three axes: 1) informal–formal, 2) for-profit–non-profit, and 3) public–private.

- Informal–formal: this axis differentiates between activities that are structured and regulated (formal) and those that are more spontaneous or loosely organized (informal). In Table 1, the government (state sector) represents a formal structure with defined processes, while a neighborhood community (community sector) reflects an informal setup, often driven by local customs and unwritten norms.
- For-profit–non-profit: this axis distinguishes entities focused on generating revenue and profit (for-profit) from those that do not operate primarily for profit (non-profit). In Table 1, businesses and companies (market sector) fall into the for-profit category, while public service organizations and churches (state and community sectors) are non-profit.
- Public–private: this axis separates entities based on their ownership or control by the government (public) or by individuals or corporations (private). In Table 1, government departments (state sector) are public entities, while consulting firms (market sector) are private.

The third sector serves as an intermediate category, bridging these axes. It encompasses organizations that may have characteristics of both private and public, for-profit and non-profit, formal and informal. Examples from Table 1 include culture and arts organizations, which might be private but operate on a non-profit basis, or research institutes that may cross the boundary between public and private sectors.

These distinctions help to understand the complex roles and dynamics within the MAP framework, illustrating how transitions in social systems involve a wide range of actors with varying goals and structures. It's important to note that these sector classifications are not rigid. They are flexible, allowing for crossover between categories and adaptations to fit specific contexts (Avelino, Wittmayer, 2016). This flexibility acknowledges that actors may not always fit neatly into one category, and that boundaries between sectors are often fluid and subject to change.

Table 1. Sectors and aggregations in transition processes, illustrated with two examples for each category

		AGGREGATION		
		Sector Subtype	**Organizational Actors**	**Individual Actors**
SECTOR	**State** *Formal / non-profit*	Government Public service	Public authorities Government departments	Politician Citizen
	Market *Private / for-profit*	Marketing Consulting	Business Company	Entrepreneur Consumer
	Community *Informal / non-profit*	Neighborhood Church	Family Community	Neighbor Resident
	Third Sector *Private / public / non-profit / for-profit*	Culture and arts Sports and recreation	Association Research institutes	Member Volunteer

Source: authors' presentation based on Avelino, Wittmayer (2016); Wittmayer et al. (2021)

2.2 Actors in Transition Processes

In transition processes, companies, public authorities, associations, and research institutes are considered organizational actors. In addition, however, individuals appear as independent actors (e.g., residents) or as members of an organization (e.g., company owners, employees) (Farla et al., 2012).

Actors are not passive rule followers but active rule-users and rule shapers. They have different backgrounds and thus bring different strategies and resources to the table (Geels, 2011; Geels, Schot, 2007; Jørgensen, 2012; Rotmans, 2005). Depending on performance and capabilities, actors are involved in different levers for transition: for example, as 'policy makers', 'expertsC, 'consumers', 'business owners' (Farla et al., 2012) or 'policy entrepreneurs' (Brown et al., 2013). These levers can also be understood as roles at the same time, as will be explained in more detail in Section 2.3.

Newig, Fischer (2016) distinguish three types of actors in sustainability transitions: 1) niche actors, 2) regime actors, and 3) landscape actors. Niche actors are responsible for developing new technologies and practices that can be used to create sustainable systems. Regime actors are responsible for maintaining the existing system and ensuring that it continues to function effectively. Landscape actors are responsible for shaping the broader context in which the transition to sustainability occurs (Newig, Fischer, 2016).

According to Böröcz, Southworth (1998), ties between actors can be differentiated into formal and informal ties. Formal ties are defined as "explicit, impersonal, and function-specific" (Böröcz, Southworth, 1998) which means that actors are bound to each other, e.g., by contracts or agreements for a specific purpose. Informal ties, on the other hand, are "implicit, personal, and general" (Böröcz, Southworth, 1998) and refer to more loose personal affiliations.

2.3 Roles in Transition Processes

Wittmayer (2016) describes roles in transition processes as "a set of recognizable activities and attitudes used by an actor to address recurring situations". And, in addition, "the core of [these] activities and attitudes … [is] widely recognized and shared within a specific group of people or a social system" (Wittmayer, 2016). A role is a socially constructed element that is associated with expectations, rights, and also duties (Biddle, 1986). However, a role is not static and therefore open to negotiation and change over time (Turner, 1990; Wittmayer et al., 2017). People can take on roles or simply play them (Biddle, 1986). Whether or not a role is performed appropriately is decided by society and can also be associated with sanctions (Wittmayer et al., 2017). Roles can also be interrelated, meaning that a change in one role can affect others (Turner, 1990; Wittmayer et al., 2017).

There are different ontological perspectives on role concepts. The functionalist perspective views roles as essential for sustaining social order and stability. Roles are thus created and maintained by society (Biddle, 1986). The interactionist perspective focuses on the process of "role-making": How roles are adopted, adapted, performed, and made. Roles are viewed as socially constructed as they are created through interactions between individuals, and individuals have some freedom in "shaping" a particular role (Biddle, 1986). The constructivist perspective views roles as constructed by individuals based on their experiences and interactions with others (Biddle, 1986; Callero, 1994).

When discussing and analyzing roles, it is first determined whether the role is a single role or a network of roles (interaction of roles). Furthermore, it is differentiated whether the change of a role (transition) or the state of a role at a certain point in time (static) is to be considered. Furthermore, a distinction is made between whether the role is meant as a resource or as a boundary object (Wittmayer et al., 2017).

In transition processes, a multitude of roles emerge. Change agents, visionaries at the forefront, initiate change, guide, and motivate other actors throughout the process (Wittmayer, Schäpke, 2014). Innovators, particularly grassroots innovators, drive change by exploring and implementing new ideas, technologies, or practices on a small scale and strengthen local commitment (Bodenheimer, Dütschke, 2021; Fuchs, 2014; Hossain, 2016; Seyfang, Smith, 2007). Frontrunners, strong opinion leaders in specific fields, excel due to early adoption or exceptional performance on a larger scale (Loorbach, 2007; Loorbach, Rotmans, 2010). Gatekeepers control access to resources, influence the acceptance or rejection of innovations, and

shape the course of change (Felt et al., 2012). (Process) Facilitators promote dialogue and collaboration between different actors and facilitate the exchange of ideas and information to enable a seamless transition (Wittmayer, Schäpke, 2014). Intermediaries bridge the gap between different actors and contribute to the smooth flow of information and resources (Hargreaves et al., 2013; Hossain, 2016). Conversely, resistors, motivated by factors like uncertainty or conflicts of interest, resist change and aim to maintain the status quo (Bodenheimer, Dütschke, 2021). Although this description of roles is not exhaustive, it emphasizes the diversity of actors involved in transitions and highlights the interplay between visionaries, implementers, facilitators, and others dealing with change.

3 Methodology

3.1 Research Approach: Case Study

The present study is designed as a case study, taking the *Bio-Musterregion Heidenheim plus* (BMR) in the state of Baden-Württemberg in Germany as an exemplary case. *Bio-Musterregionen* (Organic Model Regions) are designated regions in which organic agriculture is particularly promoted (following the idea of greening) and regional value chains for organic food are to be strengthened (regionalization) (Landratsamt Heidenheim, n.d.). Furthermore, the goal is to raise awareness of organic farming and organic food among the local population (Landratsamt Heidenheim, n.d.).

The implementation of BMR is one of the elements of the action plan *Bio aus Baden-Württemberg* (Organic from Baden-Wuerttemberg) (MLR, 2020). This plan includes various measures to increase the share of organic agriculture in Baden-Württemberg to 30-40% by 2030, as defined by the state government in its key issues document of October 2019 (MLR, 2020). These include measures to improve conditions for organic farms and measures to promote conversion to organic. By now, there are 14 BMR in Baden-Württemberg (MLR, n.d.). They are part of the Agricultural Office of the District Office and are administered by a regional manager.

An overview of the main characteristics of the selected BMR is presented in Table 2.

Table 2. Characteristics of the case study area Bio-Musterregion Heidenheim plus in the Federal State of Baden-Württemberg, Germany

Start	2018 (MLR, n.d.)
Region	Heidenheim district (11 municipalities) together with five neighboring municipalities in the Ostalbkreis district (MLR, n.d.)
Landscape	Characterized by the Lineal and Swabian Alb, Härtsfeld Ries, and Albuch with typical juniper heaths (LEL, ULB Heidenheim, 2019)
Agriculture	Due to altitude and geographical conditions, cereal cultivation, especially spelt, and cultivation of permanent grassland are of great importance (LEL, ULB Heidenheim, 2022) Long tradition of sheep farming to maintain the heath landscape (Landratsamt Heidenheim, n.d.) In 2021: 66 organic farms (10,5% of all farms) manage 3509 ha (11,3% of total agricultural area) (Heidenheim district) (LEL, ULB Heidenheim, 2022); 4 organic farms manage 200 ha (municipalities in the Ostalbkreis district) (MLR, n.d.).
ongoing activities in the BMR (selection)	Gift basket with regional organic products Shelves with regional organic products in local supermarkets Initiative to promote traditional orchards Project on regional and organic food in communal catering

Source: authors' presentation

3.2 Applied Methodology to Collect Data

Social Ecological Inventory

As a starting point, the Social Ecological Inventory (SEI) method was utilized to identify actors involved in local transition processes and to get acquainted with the research area. Developed initially for conservation management, SEI systematically identifies local stewards, their values, motivations, activities, knowledge, experiences, and networks (Schultz et al., 2011). Subsequent to its original conception, Baird et al. (2014) further refined SEI, dividing it into six practical phases (Figure 1).

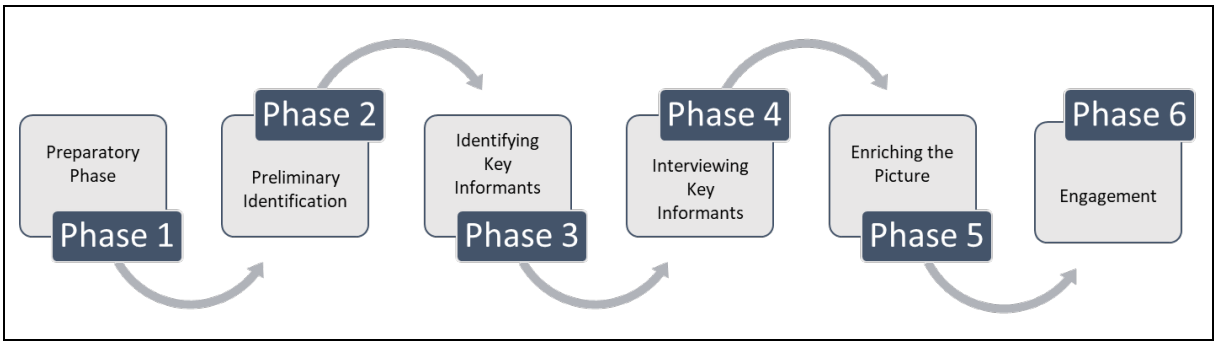

Figure 1. Six phases of the Social Ecological Inventory

Source: authors' representation based on Schultz et al. (2011)

In the preparatory phase (Phase 1), SEI objectives are defined and research principles established. The preliminary identification phase (Phase 2) involves sourcing information (e.g., internet, literature) to compile a list of potential actors. Subsequently, this list is refined (Phase 3) to identify key actors for interviews, often suggested by initial contacts. The selection is guided by actor frequency, highlighting critical individuals and organizations. Then interviews with these key actors are conducted (Phase 4). Following this, in Phase 5, reflection occurs, capturing emerging trends, insights, and knowledge gaps. Finally, Phase 6 engages actors, fostering dialogue to address shared concerns and ideas (Baird et al., 2014).

In this case study, SEI was utilized up to Phase 5, leaving out Phase 6. Although iteration and feedback are typically valuable for refining results and adapting to complex systems, constraints such as limited time and financial resources prevented the inclusion of Phase 6. The study's focus was primarily on data collection rather than extended engagement or iterative feedback processes. This involved an initial review of the literature and media leading to the identification of (key) actors, in line with Phases 2 and 3. Furthermore, semi-structured interviews were conducted as part of Phase 4. Phase 5 involves the discussion of the results and thus the enrichment of the overall picture.

Literature and Media Analysis

The literature and media analysis were used to better understand the connections between the actors and their roles in the transition process and divided into two phases (Figure 2). In doing so, a semi-structured literature review approach was applied (Snyder, 2019).

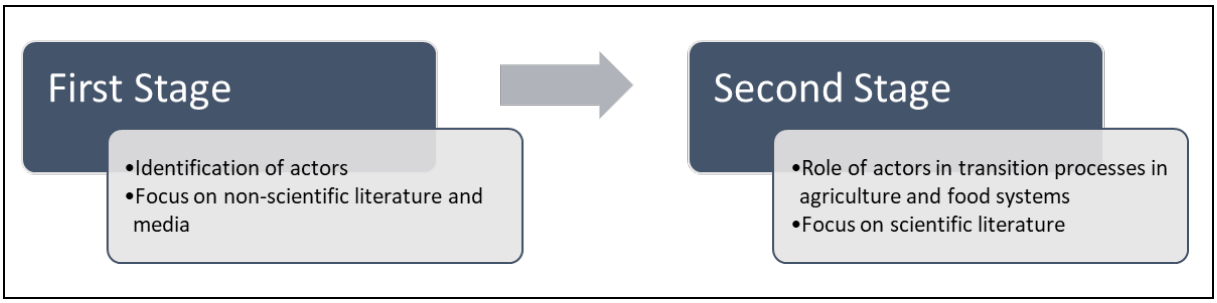

Figure 2. Two stages of literature and media analysis

Source: authors' representation

In the First Stage, a list of potential actors involved in the agriculture and food system was compiled, guiding the identification of individual actors within documents. The literature review commenced with the proposal from local municipalities of Heidenheim to become a BMR, marking the conceptual inception of the initiative. All contributors to the proposal, along with mentioned actors, were cataloged, and existing as well as projected activities were noted in the application.

Official documents scrutinized included those from participating municipalities, districts, the city of Heidenheim, and the state of Baden-Württemberg. Notably, documents from the Department of Agriculture at involved District Offices were prioritized, being the headquarter of the BMR and a hub for local agriculture and food system activities and information dissemination. Examples include annual brochures from direct marketers and the BMR newsletter published periodically. Additionally, articles from the local newspaper*, Heidenheimer Zeitung*, concerning agricultural and food system topics were analyzed for actors and their connections to pertinent activities. A total of around 120 documents were analyzed, including official documents, brochures and media reports. The review of these documents was guided by content analysis, which focused on key terms, mentions of actors and activities. In order to organize and analyze the available data, the software tool MAXQDA was used (VERBI Software, 2021).

In the Second Stage, a comprehensive literature review on transition processes within agriculture and food systems, and the roles of actors within these processes, was conducted. The theoretical framework draws from Frank Geels' work on transitions, particularly the multi-level perspective (Geels, 2002; Geels, Schot, 2010). On the basis of this, the multi-actor perspective serves as the core of this work. Here, the works of Flor Avelino and Julia M. Wittmayer are of great influence (Avelino, Wittmayer, 2016, 2018, 2019). The contents of this Second Stage form the basis for the chapter "Theoretical background" (Chapter 2).

Interviews

Based on the literature review (First Stage), semi-structured interviews were conducted with actors from the BMR. The first interview was with the BMR regional manager, assumed to offer a comprehensive regional perspective. Subsequently, interviews targeted persons who had already participated in a workshop on values and norms in transition processes in agriculture. This was held during a six-months preparatory phase of the project Öko-Valuation in which this study is embedded in (*Öko-Valuation*, n.d.). The snowball method was employed to reach potential interviewees through existing contacts. Some actors were approached directly, assuming their significant involvement in the transition process. The interviews aimed to validate literature research findings regarding key actors and identify any new actors mentioned by interviewees. Additionally, motivations for engagement in the agricultural and food system, as well as perspectives on agricultural greening and regionalized value chains, were explored. Each interview was conducted individually, preceded by a project introduction. Interviewees were provided with background information on the interview topic and a summary of the questions shown in Figure 3 by e-mail a few days before the interview. Guiding questions were

visible only to the interviewer (Figure 3). Key guiding questions for interviews with local key actors), with flexibility in question order based on interviewee responses, ensuring all sections were addressed while maintaining a smooth flow.

Between January and June 2021, 16 key actors from the BMR were interviewed. Due to the restrictions in the course of the Covid pandemic at the time, all interviews were conducted online via video call or telephone. The focus was on interviewing people from as many different areas of the agri-food system as possible, including farmers, politicians, government officials, business people and volunteers. Interviews, lasting 30 to 98 minutes, were recorded and transcribed in simplified manner according to Dresing, Pehl (2018), or directly transcribed from the notes if recording was not agreed upon. The interview campaign was ended when no new information emerged and saturation of the data was reached.

- How are you involved in agriculture and food in the region?
- What motivates your interest and commitment to agriculture and food?
- Why should agriculture in the region become more organic, with increased local production and marketing of food? Are there any arguments against such development?
- In which areas of agriculture, food production, and marketing do you see a need for improvement in the BMR? Where should more be done for sustainability?
- What changes have occurred in the region due to the BMR?

Figure 3. Key guiding questions for interviews with local key actors

Source: authors' representation

3.3 Applied Data Analysis

The research questions R1-R4 described in Chapter 1 formed the overarching framework for the systematic analysis of the data. The qualitative content-based analysis process followed an approach which combined inductive and deductive coding. It was carried out in four different steps, which are explained in more detail below.

In the **first step**, actors were identified through a comprehensive literature and media analysis (Chapter 3.2). A preliminary list of actors was drawn, which formed the basis for identifying potential interview partners. This preliminary list was reviewed in the subsequent interview phases and compared with the actors mentioned in the interviews. Consequently, new actors not yet mentioned were added to make the analysis as complete as possible (Chapter 3.2). For the analysis itself, codes were created using an inductive approach. A list of all codes and sub-codes is provided in the appendix. For this step, the software tool MAXQDA was used as the primary instrument (VERBI Software, 2021).

In the **second step**, the identified actors were analyzed according to their levels of aggregation, specifically sectors, organizational actors, and individual actors (R1). Furthermore, the actors were categorized by sector, namely state, market, community, and third sector (R1). To this end, the list of identified actors was reviewed and each actor was systematically assigned to a corresponding category. This categorization involved a deductive approach, grounded in the multi-actor perspective elucidated in Chapter 2.1 (Avelino, Wittmayer, 2016; Wittmayer et al., 2021).

The **third step** focused on identifying existing interactions and connections between actors (deductive coding, refined by inductive approach). This step enabled a better understanding of the networks and relationships within the agri-food system (R2).

In this **fourth step**, roles were assigned to the actors (R4) based on the findings about the actors' activities (R3). The dimensions, effects and potentials of these roles were also systematically documented (R4).

4 Results

In the following chapters, Research Questions R1 to R3 are examined in more detail. Each chapter is organized thematically according to one of the questions. In chapter 4.1 the individual actors and their motivations are addressed (R1), in Chapter 4.2 the connection between the actors (R2) and in Chapter 4.3 the activities of the actors are analyzed (R3).

4.1 Actors and Their Motivations

In the first phase of the literature and media research, 152 different individual actors and organizations from the agricultural and food sector in the BMR were identified. Subsequently, five additional individual actors and organizations were identified through interviews, bringing the total number to 157. This encompasses a broad spectrum of actors, varying significantly in their frequency of mention and the explicit description of their importance for the transition. Given the scope of this work, providing a detailed presentation of each individual actor is beyond its limits. Two organizational actors, however, stood out as being frequently highlighted in a key role in the local transition process. These are the political actor of the BMR, led by the regional manager, and the County Farmers' Association with its representatives.

In the following section, a selection of the most frequently mentioned motivations of the individual actors and representatives interviewed from the organizations for co-designing the agricultural and food system is presented.

The actors interviewed who are involved in production, that is, in agriculture, sheep farming, and agricultural associations, all showed a desire for healthy food production. They consider their work to be an important contribution to society. Some were born into families that produce food and, therefore, felt a commitment to maintain and develop the family farm from an early age. On a personal level, many describe their work as meaningful and purposeful. Fascination for the growth of plants, the joy of nature, or even new life, such as the birth of an animal, are mentioned as sources of motivation for their work. An actor working in the field of production explains this sense of purpose with his Christian faith and his admiration for God's creation. Actors who do not work in the producing and processing sector but are still involved in the agri-food sector, e.g., in educational work, similarly mentioned a strong appreciation for agricultural and handicraft activities.

Actors working in the organic sector were asked what drives them or has motivated them to convert to organic. It was noted that only some have always been in the organic sector and have never been involved with conventional production. Others only converted to the organic sector in the course of their career, motivated by the desire for more animal welfare, no factory farming and fewer (unnecessary) transport routes, but also the desire for higher quality food and greater appreciation for their work. Additionally, the increased demand for organic food was mentioned. This conversion was described as a very conscious and future-oriented step that had and still has an impact on their business, but also on their private lives.

During the interviews, the actors were also asked what motivated them to get involved in the BMR. It should be noted that only some of the interviewed persons were actively involved in the activities related to the BMR, for example, as a member of the steering or controlling committee. The motivations of these people were mainly strategic, such as strengthening their own marketing, further developing existing organic structures, or supporting new farmers in their conversion to organic agriculture. Another motivation was that through the activities of the BMR regional food can and should be made more present and its value clarified. As a source of motivation, the name of a deceased Heidenheim district governor was also frequently mentioned, who had actively promoted and implemented the BMR.

The greatest motivation for strengthening regionality was consistently expressed by the interviewees as enthusiasm for the great variety of products from the region and that more attention should be paid to this variety. One person underlined this by adding that they were born and raised in their region and proud of their homeland and their products. However, there were also critical voices on more regionality. One person stated that not everything that comes from the region is also good at the same time, and therefore one should be careful with pushing regionality. Another person went in a similar direction and stated that regionality always means a "give and take".

The connection to nature and the desire for sustainability were mentioned as reasons for advocating for greening. In this context, it was mentioned that greening should not be something short-term, but rather a long-term endeavor and requires perseverance. It was noted that the work for greening was meaningful and carried out with a clear conscience. It feels right to do. It also became apparent that most of the interviewees were not recent advocates of greening; rather, this motivation arose many years ago. For example, one of the interviewees mentioned that the Chernobyl disaster was the motivation to consciously join the Green Party and to get involved with Greenpeace in the 1980s. Greta Thunberg was mentioned as a current role model for greening.

The main motivation for respondents to engage with nutrition issues was the desire for "good" food. The word good was interpreted differently: for some, ‘good’ means regional and seasonal, while for others it must definitely be organic, and for another person it must be simply healthy. One person emphasized that the story behind the food is important and, therefore, she prefers regional production where the story can be conveyed directly.

4.2 Connections Between the Actors

In examining the connections between key actors within the region, Figure 4 illustrates the network linking these entities. Actors can establish formal ties, such as official partnerships or contractual agreements, as well as informal ties, encompassing personal relationships, inofficial collaborations, and social ties. Formal ties provide explicit organizational roles, responsibilities, and legal protections, yet they may exhibit rigidity and slow adaptability. Conversely, informal ties offer flexibility but may lack consistency and accountability, thereby introducing potential uncertainties.

In the following, the actors are briefly described on the basis of their ties to and among each other and according to their sector in the MAP.

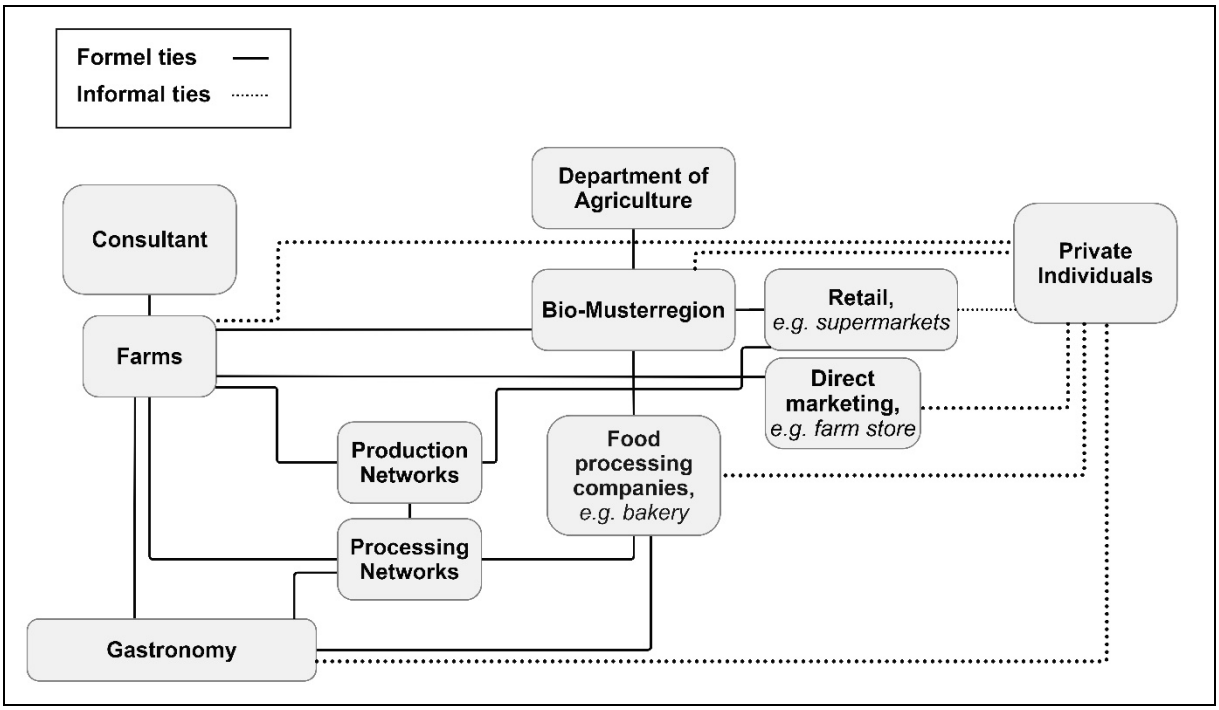

Figure 4. Predominant types of connection between actors

Source: authors' representation based on own research

Farms emerge as pivotal actors, producing the central commodity of the agricultural and food system: food. Operating within the market sector, farms maintain close and predominantly formal contacts with actors in processing, gastronomy, and retail. In addition, farms share ties among themselves, facilitated by formal agreements and informal channels, such as experience exchange and membership in associations such as organic associations or local neighborhood relations.

On the contrary, a significant actor in the state sector is the BMR and its regional manager. Unlike farms, their interactions are primarily informal, particularly with other actors like farms. Nevertheless, the BMR has formal connections with individual supermarkets, featuring regional organic products endorsed by the BMR.

The production and processing networks in the grain sector are also important in the region. Individual private citizens are equally important actors for the transition towards a more organic agri-food system. However, their relationships with other actors are rather informal.

The most important actor from the "community" sector is individual private persons who have ties to other actors mainly through their purchasing activities, be it in supermarkets or restaurants. Similarly, there are informal ties between farms and private individuals. On the one hand, this works indirectly through direct marketing, e.g., at farmers' markets, and on the other hand, at open days, e.g., the *Gläserne Produktion* (transparent production) events organized by the Baden-Württemberg agricultural administration, at which private visitors can gain an insight into agricultural production (Forum Ernährung Heidenheim, 2021).

4.3 Activities

As described in the previous chapters, there is a large number of actors in the region who are involved in the transition at different levels and with various activities. Each actor has a very specific profile, and it is beyond the scope of the paper to name them all. Therefore, we provide an overview of the most frequently mentioned and relevant activities in the context of a local

agriculture and food system transition. All the actors listed below were mentioned once or multiple times in the interviews by the respondents. Some of these actors were also personally interviewed, but they are not specifically marked for reasons of anonymity.

The BMR and its regional manager play a pivotal role in fostering networking and cooperation within the region. As an intermediary and facilitator, the BMR brings actors together and drives collective engagement.

Numerous farms in the regions, acting at the grassroot level early on embraced organic methods, much ahead of today's formal and established structures. In a pioneering approach they played a key role in shaping the region's organic landscape. An exemplary case is the *Talhof*, established in 1929. Remarkably, it holds the distinction of being Germany's oldest Demeter farm and the third oldest globally (*Talhof Heidenheim*, n.d.).

Several farms and farmers can likewise be described as being at the forefront. They actively promote transition processes, establish new standards, and demonstrate their practices. The aforementioned *Talhof* is an example of this. The farm has pushed the boundaries of what is usual and now includes a dairy and a café and markets its products not only locally, but also nationwide successfully under its name (*Talhof Heidenheim*, n.d.).

A regional event venue distinguishes itself by offering innovative gastronomic experiences solely using organic, preferably local, products. This concept gives the venue a unique selling point and gains public recognition.

An influential collective actor emerges as a producer association Kornkreis comprising approximately 50 organic grain producers from Heidenheim and neighboring districts, significantly contributing to networking and shaping the organic agricultural scene.

In the interviews, the late former district governor, a key advocate for the region's application to become a BMR, is credited with catalyzing the change process.

A region-specific magazine exclusively focusing on companies and individuals in the organic and conventional agricultural sector serves as a valuable platform, fostering dialogue between producers and consumers despite its recent inception and limited circulation.

Behind the scenes, numerous actors contribute quietly to greening the local agriculture and food system. Educational institutions and initiatives act as knowledge brokers, offering nutrition courses, farm excursions, and raising awareness. This includes, for example, the *Familienbildungsstätte Heidenheim e.V.* (Family Education Center). Initiatives like the food bank *Tafel* and *Food Sharing* address waste reduction. Additionally, the presence of activists like *Fridays for Future* and *Farmers for Future* underscores the region's commitment to environmentally conscious practices.

Our investigation did not uncover any actors actively hindering the transition process. Similarly, no single actor stood out as a particularly committed financial investor or business monopolist influencing developments.

5 Discussion

In the following, and addressing R4, we will discuss different types of actors' roles and their link to the sectors (Avelino, Wittmayer, 2016) and levels (Geels, 2002). Moreover, we will highlight the complex and fluid character of roles.

5.1 Types of Actors' Roles Within the Transition Process

Grassroots innovators have played a central role in initiating a transition in the region. Organic practices were implemented experimentally on a small scale, primarily on farms, in stores, and restaurants long before formal frameworks and guidelines were established at a higher administrative level. Similar examples of grassroots innovators driving change on a small scale and behind the scenes, mostly for their own agenda, have been documented in various case studies and contexts (Bodenheimer, Dütschke, 2021; Fuchs, 2014; Oliveira, Penha-Lopes, 2020). These innovators proactively identified and articulated challenges and aimed to develop solutions on their own (Bodenheimer, Dütschke, 2021; Fuchs, 2014). As new questions and challenges continue to arise in the course of the transition, new grassroots innovators also emerge over time. The motivations for such initiatives described in the literature – ethical/moral, religious, pragmatic, idealistic, socio-cultural, economic and environmental factors – are consistent with the findings of this study (Bellon, Lamine, 2009; Darnhofer et al., 2005; Hossain, 2016; Kallas et al., 2010; Veisi et al., 2017). Hossain (2016) notes that there is no uniform understanding of grassroots innovators, as their motivations and the times at which they take a role in a transition vary greatly. Furthermore, grassroots innovators face significant pressures, whether in terms of financial constraints or social expectations, and their resilience to cope with these challenges is often limited. As a result, failure is not uncommon. However, this aspect receives minimal attention in the research literature (Hossain, 2016). Taking the multi-level perspective, grassroots innovators operate in so-called niches (Geels, 2002).

In the context of the niche, the role of **frontrunners** within the region also emerges as particularly important. These individuals actively strive to set industry standards and gain recognition for their ideas, innovations, and practices (Loorbach, 2007; Loorbach, Rotmans, 2010). In contrast to grassroots innovators, they target the public. The frontrunners identified in the study embody these characteristics, as shown in the results section: organic farms venture into new business areas and expand their activities and innovative approaches, thus setting new standards and presenting themselves confidently to the public. The pioneers described by Nevens et al. (2013) as "visionary people" play a central role in managing the transition. According to Meadows (1999) leverage points in systems are strategic positions where small interventions can lead to significant changes. Frontrunners, acting at these leverage points, strategically influence norms, policies, and consumer behaviors within their sectors. By introducing novel practices and influencing market trends, they play a pivotal role in steering the transition towards sustainability (Geels, 2002; Meadows, 1999; Nevens et al., 2013). As grassroots innovators progress through the transition, they may assume the role of frontrunners, either in addition to their existing roles or entirely. It can be said that frontrunners tend to operate at the edge of the niche with a focus on the dominant regime (Geels, 2002; Geels, Schot, 2010; Nevens et al., 2013).

In the study, an individual from the state sector was identified as a **change agent** who actively promoted change at the political level by encouraging the promotion of organic and regional value chains and initiating the application of the region as a BMR. However, according to van Poeck et al. (2017) a change agent encompasses other characteristics beyond those mentioned as a motivator, initiator and awareness-raiser, including that of a technician, revolutionary, or persuader. This versatility can position change agents in the niche or as hybrid actors between the niche and the regime (Bünger, 2018; Diaz et al., 2013). The change agent in this study is a hybrid actor who, on the one hand, is part of the prevailing regime by profession, but on the other hand embraces the views and ideas of the niche (Diaz et al., 2013). Hybrid actors are crucial in connecting niche activities with regime institutions, facilitating compatibility and playing a central role in the transition process (Diaz et al., 2013). Their openness to innovation and disruption of mainstream practices encourages collaboration with regime actors and contributes significantly to the dynamics of change. As cross-border actors, they not only bridge divergent logics, but also act as catalysts for innovation, guiding, and shaping the transition to more sustainable and adaptive systems (Bünger, 2018). Niche actors need to identify and involve hybrid actors to secure their interest and cooperation. Acting as allies, hybrid actors

then may help the niche to take over more and more space at the regime level. They provide important resources to strengthen the niche developments and increase their influence on the process by bringing greater leverage to the dominant regime (Diaz et al., 2013). This shows the importance of the aforementioned political change agent for the process.

In addition, the study identified the BMR and its regional manager as a prominent actor in the state sector, assuming the roles of **enabler** and **intermediary**. As such, it brings together established actors from different areas, serves as a point of contact for all interested parties, and aims to create impetus for further developments. Although a relatively young institution established in 2018, the BMR operates on a project-based funding model, lacking long-term permanence. Despite this, the BMR has demonstrated substantial momentum, significantly influencing the region in embracing more organic agriculture and regional value chains. Enablers like the BMR play a crucial role in setting the stage, initiating and mediating processes, and promoting participation with an inclusive approach to various perspectives (Nevens et al., 2013; Wittmayer, Schäpke, 2014). Acting strategically, the BMR operates as an intermediary and enabler at critical points within the system where interventions can lead to significant shifts. By facilitating collaborations and policy initiatives, it catalyzes systemic changes towards sustainability (Meadows, 1999; Nevens et al., 2013). Loorbach (2007) attributes the role of an (inter)mediator to governments. Additionally, depending on the transition's status, governments may also function as directors and decision-makers. However, in this study, these latter roles cannot be ascribed to the local government or to the BMR, which is part of the local government.

In our study, there were also roles that were expected but could not be found. For example, we did not identify any actors who impeded the transition and took on the role of **hinderers**. Naturally, the level of participation among actors varies widely, ranging from active engagement to limited participation or complete non-participation. There were, however, no indications for actors who work against the process. Several factors could explain this absence. Hinderers may not have been discussed in interviews due to concerns, such as fear of negative consequences if the information would get public, or interview partners being reluctant to talk negatively about others. Alternatively, interviewees may have perceived these roles as insignificant or overlooked their impact. We also did not ask specifically about hinderers in our interviews, since we did not do this for other specific roles either.

Additionally, no actors were identified as exerting a particular influence through a monopoly position or specific activities, such as funding, to steer developments in a particular direction.

5.2 Actors With Multiple Roles and Interplay of Actors in Different Roles

Research on actors with multiple roles in sustainable transition processes is relatively scarce. The majority of studies in this area originates from fields beyond the agri-food context, and often concentrates on individuals juggling diverse roles in life (e.g. Timm et al., 2020). Despite the differences in focus, it is reasonable to assume that some findings of these studies resonate with the ones presented here.

In the realm of transition dynamics, Lindkvist et al. (2023) emphasize that actors often take on multiple roles, which is particularly evident among actors in the state sector. This aligns with our study, where the BMR, acting as both enabler and intermediary, exemplifies this dual functionality. Notably, other actors in our study also operate in dual capacities, including a frontrunner from the market sector who also acts as a facilitator in the state sector.

This multi-faceted engagement underlines the versatility of the actors and shows that they are able to switch between different roles within and between sectors. Although such dual roles are not uncommon, they lead to multi-layered contexts that both constrain and expand interactions between actors and shape the dynamics of collaboration and innovation in the transition context (Lindkvist et al., 2023). As a result, the interplay between actors with different roles and the collaborative landscape becomes even more complex, offering both challenges and

opportunities. Taking on dual roles can be beneficial by promoting innovation and collaboration, but it also brings with it responsibilities, time commitments, and potential conflicts (Hölscher et al., 2018a; Timm et al., 2020). Successfully managing this complexity requires adaptability and a nuanced understanding of the different roles. While dual roles enrich the transition dynamics, they must be carefully managed to maximize their positive impact.

The results of the study show that the dynamic interplay of actors from different sectors – state, community, market, third sector – drives the transition in the region (Avelino, Wittmayer, 2016). The majority of the identified grassroots innovators and frontrunners were mainly found in the market sector and change agents mainly in the state sector, while intermediaries came from the state, market and third sector. However, there are also exceptions and no generalization can be made, which implies that roles cannot be rigidly assigned to certain actors, nor can actors be assigned certain roles *per se*. Also considering that there are some actors with dual roles, it can be shown that roles are fluid and adaptable over time and in different contexts (Hölscher et al., 2018a; Wittmayer et al., 2017). This complex network of actors and roles underscores the richness and flexibility of the transition process, emphasizing its dynamic nature.

To better understand these intricate connections and dynamics, Eva Schiffer's net-map approach offers an interesting starting point (Schiffer, Hauck, 2010). This participatory method of mapping networks of influence allows for a comprehensive analysis of social networks and provides a nuanced understanding of both formal and informal relationships between actors. However, the method used in this study and the data available are not sufficient to implement the net-map approach. Future studies applying this methodology in the context of regional agri-food transition processes could potentially provide valuable insights into the dynamics of actor networks.

6 Conclusion

The study showed that within the small region of the BMR, a large number of actors with diverse roles are actively contributing to the transition to more sustainable agriculture and regional value chains. The range of actors involved is diverse, some even taking on multiple roles and working in different sectors. The roles and actors described within the study provide only a small insight into the diversity and represent a snapshot of the current and dynamic landscape on the ground. This makes it clear how multi-layered and evolving the roles and contributions of actors are in the context of transition processes towards sustainability.

Furthermore, our findings show a differentiated interplay of actors operating at both the niche and regime levels. Especially at the niche level, a large number of actors with specialized roles are active. In order to make progress, networking and knowledge sharing between these niche actors must be promoted, possibly through peer-to-peer mechanisms. Equally important is the transfer of initiatives and knowledge from the niche level to the regime level. To effectively drive the transition process, support structures within the regime need to be strengthened, including the empowerment of change agents in the political sphere.

The MAP has proven to be a useful tool for identifying actors and can also be applied to other regions based on the experience gained in this study. While it can be assumed that comparable roles can be found in other regions, new roles may emerge depending on the respective context. Additionally, the frequency of certain roles may vary by region. For example, the hinderer role, which was not identified in this study, might be more prevalent in other areas. Building on this information, specific measures can be taken based on the presence of individual roles to navigate the transition process. For instance, if there is a lack of innovators, incentives for innovation could be created through funding. Conversely, if there are many hinderers, opportunities for dialogue and conflict resolution might be established.

Nevertheless, it is important to note two limitations of this study. First, due to its one-off nature, it is a static snapshot rather than a continuous analysis of ongoing transition and changing roles. This limitation is particularly important when considering that actors' roles are fluid and dynamic – one of the key findings of this study. Second, the study did not directly examine whether the identified actors saw themselves in accordance with the roles assigned to them by the researchers. These aspects are important areas for future research.

To conclude, the journey towards more sustainable agri-food systems is a collective endeavor that requires the commitment, innovation and resilience of all actors involved. The BMR serves as a microcosm for the broader challenges and opportunities associated with the transition of global agri-food systems. By further exploring and understanding the roles and interactions of actors in these processes, we can better manage the complexity of sustainability transitions, provide concrete actions to navigate the different roles and achieve our shared environmental and societal goals.

Acknowledgements

This research was funded by the Ministry of Science, Research and the Arts Baden-Württemberg within its program “Ökolandbauforschung Baden-Württemberg” (33-7533-24-11/7/3). Furthermore, we would like to express our sincere appreciation to our interview partners for their time and trust.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, Carolin Schweizerhof. The data are not publicly available due to the privacy of research participants.

Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

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