

Contested diffusion of transformative innovations. Micro- and macrolevel social capital in South Tyrol

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Abstract

The diffusion of radical transformative innovations is essential for a transition towards more sustainable food systems. However, scholars have paid little attention to the power struggles shaping this process. This article applies the concept of social capital to the multilevel perspective and uses qualitative data from field research and media analysis to investigate the case of a local food movement in South Tyrol, Italy. It poses the following question: How did the conventional regime in South Tyrol discourage transformative innovations to further their interests against the efforts of the movement? The results show that the movement built up microlevel social capital to diffuse transformative innovations. Conventional regime actors used existing macrolevel social capital to inhibit transformative innovations and promote gradual innovations instead. The article argues that radical transformative and gradual innovations were mutually exclusive in the case under study and therefore caused intense power conflicts. It concludes with recommendations for future research.

KEYWORDS

empowerment, food system transition, multilevel perspective, social capital, transformative innovation

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INTRODUCTION

Agricultural production and food consumption increasingly rely on social and ecological exploitation. Academics and civil society organisations from around the globe argue for a transition of current food systems towards a more sustainable equilibrium (IAASTD, 2009). The multilevel perspective (MLP) frames transition processes as co-evolutionary interactions between three analytical levels: social and technological innovations on the niche level may introduce change into relatively stable conventional food regimes if large-scale pressures from the landscape level open up a window of opportunity (Darnhofer, 2015; El Bilali, 2019; Geels, 2010; Geels & Schot, 2010). Scholars have lately criticised that technological innovation drives the overindustrialisation of food systems, thus stabilising unsustainable development trajectories (El Bilali, 2018; Loorbach et al., 2020). They emphasised that social innovation is crucial for a transition towards sustainable food systems (Chiffolleau & Loconto, 2018; El Bilali, 2019; Kirwan et al., 2013; Maye, 2018; Sutherland et al., 2015). This article focuses on the contested diffusion of ‘transformative’ social innovations that are meant to bring about a profound transition towards greater sustainability (Castro-Arce & Vanclay, 2020; Loorbach et al., 2020; Novy, 2017; Pel et al., 2020; Skrimizea et al., 2020).

Profound transitions are nonlinear processes including ‘fundamental, qualitative changes in societies’ cultures, structures and practices’. They are based on transformative changes that are driven by the agency of actors who initiate transformative innovations (Loorbach et al., 2020). Transformative innovations have a radical character because they address changes in the minds and actions of consumers and producers (bottom-up) as well as in the rules, institutions and relationships that stabilise existing structures in the conventional regime (top-down) (Castro-Arce & Vanclay, 2020; Pel et al., 2020). They often emerge locally in civic food initiatives and connect to global movements, which advance their ideas beyond the local level (Loorbach et al., 2020; Renting et al., 2012). Scholarly work on transformative innovation in the context of food systems has focused on well-known examples, such as the global movements for food sovereignty and agroecology (Juárez et al., 2018), slow food (Avelino et al., 2020), food policy councils (Sieveking, 2019) and community-supported agriculture (Chiffolleau & Loconto, 2018; Zoll et al., 2021). It should be extended to further examples and local cases to better explore the diversity of transformative innovations.

Networks are of crucial importance for the diffusion of any innovation—technological or social, gradual or radical. Scholars of transition studies have pointed out that networking enables social learning processes and contributes to the development of powerful niches that allow innovations to diffuse within the niche and into the regime (e.g., Kemp et al., 1998; Loorbach & Rotmans, 2006; Seyfang & Longhurst, 2016; Seyfang & Smith, 2007). In terms of transformative innovations, Loorbach et al. (2020) lately showed that food activists further their ideas and approaches along global networks of civic food initiatives to succeed in their efforts. However, a transition of the food system is not likely because alignments between institutions, practices, technologies and actor networks stabilise conventional regimes (Darnhofer, 2015; El Bilali, 2019; Geels & Schot, 2010). Based on these alignments, regime actors actively resist radical change (Darrot et al., 2015; Hess, 2016) and only allow for gradual innovations that are often market-driven and of a technological character (Darnhofer, 2015; Geels & Schot, 2007). In this context, we lack knowledge of the power struggles between regime actors that aim at reproducing existing social structures of conventional regimes and niche actors that aim at transforming these structures (Avelino, 2017; Darnhofer, 2015; El Bilali, 2019; Geels, 2010).

To address these research gaps, the article refers to the case of the rural community of Mals in the Italian province of South Tyrol. Grassroots initiatives in Mals allied into a local movement and took action for a sustainability transition of the local food system by developing transformative innovations. For instance, activists organised a legally binding referendum on the ban of chemical-synthetic pesticides in their community. But conventional farmers, the provincial government, extension services and farmers' organisations of the province contested their efforts and promoted land-use intensification instead (Ackerman-Leist, 2017). Activists, therefore, tried to diffuse their approaches beyond the local level, which caused even stronger conflicts with their opponents (Holtkamp & van Mierlo, 2022). The local movement in Mals refers to the niche level and its opponents to the conventional regime. The article seeks to answer the following question: How did the conventional regime in South Tyrol discourage transformative innovations to further their interests against the efforts of the niche? It applies the theoretical concept of social capital (Naranya, 1999; Woolcock, 1998, 2000) to the meta-framework of the MLP (Geels, 2010; Geels & Schot, 2010) to frame the qualitative empirical analysis of the case. The analysis focuses on the strategies of (dis)empowerment that regime and niche actors use in their efforts to prevail against the other. Following Avelino (2017) and Avelino et al. (2020), empowerment is the process through which actors gain the capacity to mobilise resources to achieve a goal.

The article argues that, in the case of Mals, niche and regime actors promote mutually excluding innovations, equivalent to the transformation versus the reproduction of the conventional regime (Avelino, 2017), which has led to intense conflicts. Both use different forms of social capital, more specifically micro- and macrolevel social capital, to further their specific interests. The article contributes to the literature by emphasising the role of local communities in the diffusion of transformative innovations, highlights the agency of both niche and regime actors in transforming and/or stabilising the regime and investigates the power mechanisms that shape this conflictive interaction. The article largely excludes the landscape level because individual actors may not influence it. It first outlines the theoretical framework, the case study and the qualitative methods used to answer the research question. Then, it presents and discusses the findings. It concludes with recommendations for future research on food system transition.

SOCIAL CAPITAL AND EMPOWERMENT

The following section outlines the theoretical concept of social capital and applies it to the level of the niche and the conventional regime, where actors promote different forms and degrees of innovation. Technological innovation is generally market-driven and heavily depends on top-down processes of research and development activities (Chiffolleau & Loconto, 2018; Kirwan et al., 2013; Neumeier, 2012). In its broadest sense, social innovation relates to changes in social relations (Pel et al., 2020). They often emerge in bottom-up processes as a reaction to a social problem and have a normative goal like sustainability (Bock, 2012; Chiffolleau & Loconto, 2018). Both technological and social innovation can have a gradual or radical character according to the degree of change they introduce into conventional regimes (Avelino, 2017).

The conventional regime is the locus of gradual innovation. It embraces mainstream actors and related intensive farming practices, technologies and cultural, cognitive, political and infrastructural institutions that have been created in previous decades. Regime elements are reproduced and path-dependent because a set of lock-in mechanisms inhibit profound changes. For example, existing regulations and policy networks favour the vested interests of incumbent regime actors. Production practices that have developed around intensive farming technologies now

stabilise the reproduction of these technologies (Geels, 2019). However, pressing environmental or social problems might cause regime internal friction. Regime actors, therefore, promote gradual technological innovations to repair these frictions and restabilise the regime (Avelino, 2017; Darnhofer, 2015). To facilitate the diffusion of gradual technological innovations, they may also promote gradual changes in social relations, for example, by reinforcing relations between farmers and agricultural extension services (Isham, 2002; Kumar, 2020). Gradual technological innovation might be meant to contribute to a social goal like food security, farmers' welfare or greater sustainability; however, it reinforces the dominating development trajectory of agricultural modernisation (Bock, 2012).

The niche relates to the locus where radical innovations develop (Darnhofer, 2015; Avelino, 2017). It embraces grassroots actors, like civic food initiatives, the food practices they promote, alternative farming technologies and newly emerging cultural, cognitive, political and infrastructural institutions. In contrast to the regime, relations between these elements are still fluid and not yet stabilised (Darnhofer, 2015; El Bilali, 2019; Geels & Schot, 2010). Niches, therefore, allow for radical transformative innovations, which refer to novel elements and relations on the niche level (bottom-up) that actively challenge rules, institutions and relations on the regime level (top-down) (Castro-Arce & Vanclay, 2020; Pel et al., 2020). Niche actors promote transformative innovations, amongst others, to shift power relations that lock in unsustainable development trajectories. In turn, a profound change in power relations might empower alternative farming technologies and practices (Avelino, 2017; Loorbach et al., 2020). The local conditions of the niche protect transformative innovations from oppression efforts by the regime, for example, ideologically attached niche actors support transformative innovations with resources like knowledge and financial means. However, regime actors have powerful means to contain the efforts of niche actors (Hess, 2016; Seyfang & Longhurst, 2016; Smith & Raven, 2012).

Research often focuses on either one of these innovations—radical or gradual—but in practice, different understandings of innovation exist in parallel (Bock, 2012; Chiffoleau & Loconto, 2018; El Bilali, 2018; Neumeier, 2012) and may lead to power conflicts about how to achieve the complex goal of sustainability transition (Skrimizea et al., 2020). Networking has been regarded as a strategy of empowerment for grassroots niches that try to spread transformative innovations (Loorbach et al., 2020; Pel et al., 2020; Seyfang & Longhurst, 2016; Seyfang & Smith, 2007). More specifically, transition scholars often argue that grassroots initiatives build up social capital to strengthen their transformative innovations (Pant, 2016; Seyfang & Longhurst, 2016) and to deal with resistance from the regime (Becker et al., 2018). At the same time, high social capital deriving from alignment between regime actors has been considered a social lock-in mechanism of dominant development trajectories (Geels, 2019). However, the literature has not further detailed the social capital that regime actors use to inhibit some innovations while furthering others.

Bourdieu (1983) and Putnam (1993, 2001) popularised the term social capital, but it has been applied with different meanings by a range of scholars (Adler & Kwon, 2002). In this article, social capital is understood as 'the norms and networks that facilitate collective action' (Woolcock, 2000). To specify this perception, the article mainly relates to Woolcock (1998, 2000) and Naranya (1999). Woolcock applied two basic categories of social capital, embeddedness and autonomy, to an analytical micro- and macrolevel of society. The microlevel focuses on the private sphere of individuals and groups, and the macrolevel focuses on the public sphere of businesses and political as well as social institutions (Woolcock, 1998). Complementing this, Naranya (1999) brought the notion of power into the discourse. This article applies the two levels to the niche and the regime and analyses how niche and regime actors use micro- and macrolevel social capital to help or hinder transformative social innovations.

TABLE 1 Social capital in the regime and the niche (adapted according to Megyesi et al., 2010)

Macrolevel social capital in the regime	Synergy Regime actors use tight relations between interest groups within the regime to ensure effective policy-making in favour of gradual innovations	Organisational integrity Formalised and transparent rules and institutions of governance create general trust in the conventional regime
↑↓	Top-down and bottom-up linkages Relations between the niche and the regime allow individuals and groups to influence decision-making from the bottom-up. In turn, they allow decision-makers to gain support from individuals and groups for top-down policies	
Microlevel social capital in the niche	Bonds Niche actors build up mutual relations of trust within grassroots initiatives to gain internal strength	Bridges Horizontal relations between niche experiments allow gaining knowledge and external resources

Social capital scholars further developed Woolcock's basic analytical categories into five forms of social capital (for a review, see Megyesi et al., 2010; see Table 1). On the microlevel of the niche, bonding social capital refers to the mutual relations of trust between individuals and grassroots initiatives participating in a local niche experiment. Bridging social capital refers to horizontal relations between grassroots initiatives of different local niches (Pant, 2016; Putnam, 2001; Woolcock, 2000; Woolcock & Naranya, 2000). Bonds facilitate both co-operation and social control between actors within local niche experiments. They also enable social learning processes because members of grassroots initiatives negotiate existing values and beliefs (Pant, 2016). In addition, strong bonds allow niche actors to create bridging social capital to other grassroots initiatives, which allow them to gain resources from these groups (Pant, 2016; Seyfang & Longhurst, 2016). A balanced microlevel social capital of bonds and bridges is the most relevant strategy for niches to gain strength and diffuse transformative innovations on the niche level (Flora & Flora, 2008; Seyfang & Longhurst, 2016; Wilson, 2012).

The macrolevel accounts for the sociopolitical context of the niche, which influences the success of niche innovations (Seyfang & Longhurst, 2016). The notion of synergy refers to the degree to which members of formal regime actors, such as the government, food advisory services or farmers' associations, are connected (Woolcock, 1998). Strong synergy ensures an effective policy that is likely to support the interests of aligned regime actors rather than the ones of niche actors (Evans, 1996; Hess, 2016; Seyfang & Longhurst, 2016). Organisational integrity describes the degree to which the state can create general trust in institutions of formal governance through transparent and efficient regulative rules, conventions and norms (Seyfang & Longhurst, 2016; Woolcock, 1998). The degree and quality of organisational integrity and synergy are equally important for the capacity of regime actors to inhibit or promote innovation (Megyesi et al., 2010).

Finally, the notion of linking social capital refers to vertical relations between the microlevel of the niche and the level of the regime. They allow actors to interact across institutionalised power gaps, for example, grassroots initiatives in the niche and decision-makers in the regime and vice versa (Seyfang & Longhurst, 2016; Szreter & Woolcock, 2004). Niches might link to government officials and other decision-makers in the regime to gain more political influence, acquire external financial resources (Szreter & Woolcock, 2004; Woolcock & Naranya, 2000) and translate their

ideas into the regime (Seyfang & Longhurst, 2016). However, Seyfang and Longhurst (2016) found that such relations are less developed in grassroots initiatives. In turn, regime actors create linkages with individuals and groups on the local level to gain their civic support or for undesirable effects like corruption or clientelism (Szreter & Woolcock, 2004).

In summary, the social capital available to niche and regime actors involved in a conflict on sustainability transitions greatly shapes their capacity to enhance their interests (Naranya, 1999) and so determines whether radical or gradual innovation succeeds. Niche actors use bonding, bridging and linking social capital to scale up transformative social innovations within local niche experiments, replicate promising ideas in global networks between local niches and translate their ideas into the regime (Loorbach et al., 2020; Seyfang & Longhurst, 2016; Seyfang & Smith, 2007). By introducing radical changes into the structures of the regime, they may shift power from the regime towards the niche. In contrast, regime actors refer to organisational integrity, synergy and top-down linkages to stay in power and reproduce the regime (Geels, 2019; Hess, 2016; Naranya, 1999; Woolcock, 1998; Woolcock & Naranya, 2000).

Building on these conceptual insights, the article seeks to answer the following research questions:

- Why does the promotion of transformative innovations by the niche lead to intense conflict with the regime?
- How did local niche actors use microlevel social capital for the diffusion of radical transformative innovations?
- How did regime actors use macrolevel social capital to impede transformative innovations and promote gradual innovations instead?

CASE STUDY AND METHODS OF DATA COLLECTION

To answer the research questions, I analyse the case of the community of Mals. It belongs to the Autonomous Province of Bolzano – South Tyrol in Northern Italy which has far-reaching rights in policy-making and a population of 533,439 inhabitants (ASTAT, 2021; Figure 1a). Mals has approximately 5300 inhabitants (Gemeinde Mals, 2020) and is located in the Upper Vinschgau, a rural region at the head of the Alpine valley of Vinschgau (Figure 1b). An expansion of intensive orchards into the community of Mals sparked the movement ‘The Way of Mals’ [German ‘Der Malser Weg’]. Organic farmers and consumers in Mals allied to stop land-use intensification and initiate a sustainability transition of the local food system (Ackerman-Leist, 2017; Holtkamp & van Mierlo, 2022). The emerging movement (collective niche actor) organised a legally binding referendum on the ban of chemical synthetic pesticides in Mals. This provoked an intense power conflict with supporters of fruit growing in the province of South Tyrol (regime actors) (Ackerman-Leist, 2017; Zollet & Maharjan, 2021).

Throughout the Vinschgau Valley, a relatively flat and fertile valley floor is flanked by steep and meagre mountain slopes. Farming is highly concentrated on the valley floor, small in scale and characterised by traditional land ownership structures (Autonome Provinz Bozen–Südtirol, 2010). In the lower regions of the Vinschgau Valley, apple farming has constantly expanded and intensified since the mid-20th century. In contrast, Upper Vinschgau farms have largely preserved their practice of more extensive cattle farming because the microclimate at the head of the valley did not allow for intensive fruit growing (Autonome Provinz Bozen–Südtirol, 2010, 2019; Figure 1c).

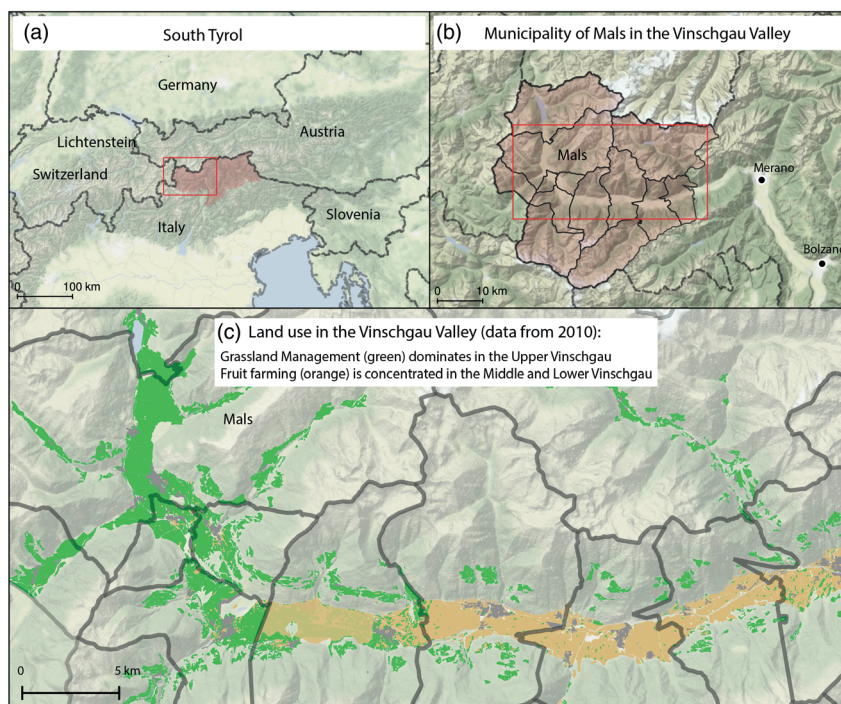


FIGURE 1 Situation of the case-study region in the Italian (a) and South Tyrolian contexts (b) with dominating forms of land-use in the Vinschgau Valley (c)

It was not until after 2009 that climate change and a new irrigation system allowed intensive fruit growing in the community of Mals.

Intensive fruit-growing is considered a more successful business model for South Tyrolian small-scale farmers (Dalla Via et al., 2013). On average, a cattle farmer in South Tyrol manages more land and invests more working days than a fruit farmer but has a lower income (ASTAT, 2014). Fruit farming (mostly apple orchards, some vineyards and a few other cultures) is economically the most important branch in the South Tyrolian agricultural sector. For its economic success, apple growing in South Tyrol developed to be the most intensive apple cultivation area in Europe, contributing up to 10% to the total European apple production. South Tyrolian fruit co-operatives export apples worldwide, making them the most important export product of the province (Autonome Provinz Bozen–Südtirol, 2019; Dalla Via et al., 2013; Südtiroler Apfelkonsortium, 2020).

The downside of fruit farming is a high application of pesticides, compared to grassland management (Antier et al., 2020; Zubrod et al., 2019). The use of pesticides in South Tyrol is, therefore, considerably higher than the Italian average (Istat, 2020), and Italy ranks among the greatest users of pesticides in Europe (FAO, 2021). The great spatial proximity of agricultural plots and human settlements on the valley floor means that pesticides drift from orchards and vineyards to non-target areas, such as organically farmed land and children's playgrounds (Linhart et al., 2019). Pesticide drifts and changes in the cultural landscape are the main reasons for the local movement 'The Way of Mals'.

To investigate the case, I triangulated different qualitative methods to avoid a biased interpretation (Flick, 2014). The main data were collected in 2018 and 2019. I used participatory observation

(Thierbach & Grit, 2014), semi-structured interviews (Helfferich, 2014) and media analysis (Klein, 2014). The observation included 4 weeks of voluntary work on an organic farm in Mals. I got involved in farm work and took part in meetings and actions of grassroots initiatives, whereby I gained information about the relations between actors involved in the conflict. I documented my observations in a diary and event protocols (see Appendices A and B). Towards the end of the observation period, I held semi-structured interviews with 17 leading niche activists from all grassroots initiatives that made up the movement. In addition, I interviewed three local conventional farmers opposed to the movement. One was a dairy farmer and a member of the local farmers' council. Two farmers had recently converted to fruit farming and were organised in a farmers' initiative against the movement (see Appendix C). I selected the interviewees by snowball sampling, recorded and protocolled the interviews while holding them, and partially transcribed the records. Through the interviews, I learned how niche and regime actors used their social capital to further their interests.

My field research was further limited by the fact that I was not able to access more members of the regime for an interview because their relations with the niche actors were highly emotional and conflicted at the time of data collection. Also, most of the interviewees were unable to reconstruct the timeline of events during the conflict exactly. Therefore, I completed my field research with a media analysis of 195 local newspaper and blog articles on the case in the period from 2004 until 2019. The main aim of the media analysis was to get an overview of all actors involved, their interests, and a timeline of events during the contention. In addition, selected media articles compensated for the lack of interviews with regime actors.

I analysed the media and blog articles along the principles of actor analysis by Reed et al. (2009). I categorised 'niche' and 'regime' actors according to their support or rejection of land-use intensification in Mals (see Appendix D). In addition, I differentiated the actions they took to strengthen their interests by year. The data of the fieldwork and selected media articles were examined by Mayring's (2019) content analysis. I deduced three main categories from the theoretical concepts outlined above. The first category deals with the contested forms of innovation that niche and regime actors promoted to steer agricultural development in Mals. It covers the codes 'transformative innovation' and 'gradual innovation'. The second category addresses the microlevel social capital of grassroots initiatives in Mals with the codes 'bonds', 'bridges' and 'bottom-up linkages'. The third category applies to macrolevel social capital of regime actors in South Tyrol with the codes 'synergy', 'organisational integrity' and 'top-down linkages'. I will structure my findings in the following section along these categories.

FINDINGS

Contested forms of social innovation

In this section, I will outline how niche and regime actors have tried to further their interests and why this led to intense conflicts. Local niche actors include organic dairy farmers and most consumers in Mals. They self-organised into multiple grassroots initiatives (D1–5, D8–14) that together formed the local movement 'The Way of Mals'. The movement gained the support of the mayor (D6) and the municipal council (D7). In addition, more and more regional and international civil society groups, organic farmers' associations, scientists and politicians (D15–37) backed the claims of the local movement. Their common interest is to stop land-use intensification and the

application of chemical pesticides and to initiate a sustainability transition of local food systems in Mals and internationally (D1–37).

A member of ‘The Way of Mals’ (C6) explained the reasons that sparked the movement as follows: *It was clear to us, if we keep doing nothing, our land, the Upper Vinschgau that we are proud of, will have the same problems as the Lower Vinschgau. That means [...], we will be enveloped by clouds of pesticides 30 times per year [...] and there is no feasible development for the rest of the farmers. Our agricultural plots are very small, and there is a constant wind, so it is impossible to keep pesticides within the plots. Organic farming [...] will hardly be possible.*

To operationalise their claims, ‘The Way of Mals’ promoted transformative innovations that implement a participatory mode of governing land-use in the municipality. First, niche actors self-organised to modify the municipal statutes and make citizens’ referenda at the municipal level legally binding. Then, they organised a local referendum on the ban on pesticides. They won the referendum and received 76% of the votes (D3, B1, B5). Following the referendum, niche actors initiated more transformative innovations, such as a citizens’ co-operative (D12) and a citizens’ budget (B3; see the next section). In addition, they engaged in founding alternative food networks like an organic farmers’ market, an organic valley and a community-supported organic dairy (B1) to transform local food consumption and production practices (C1, C3).

An activist (C5) elaborated on the emancipatory character of the movement: *‘The Way of Mals’ has two levels [...] people joined with different motivations [he lists motivations like health, biodiversity, organic farming]. And then there is a meta-level. The level of ‘The Way of Mals’, where I say [...], it is a form of participation. People co-operate to [...] shape the region and to make their region more attractive. And where they have the option to play an active part. Where politics provides a space for experimentation [...]. That is the unifying element.*

These findings indicate that local consumers and organic producers allied to create a local niche for experimenting with a more democratic local food governance that allows initiating a profound sustainability transition of the local food system. Transformative innovation radically changes formal political institutions (top-down) and local food practices (bottom-up).

In contrast, conventional dairy farmers in Mals form part of the conventional regime. When fruit growing became possible in the Upper Vinschgau, some local dairy farmers teamed up with established fruit farmers from neighbouring communities into a fruit growing association (D41) and a fruit production co-operative (D42) to manage a transition towards fruit farming in Mals collectively. They gained the support of other regime actors (D38–51), such as the provincial farmers’ association and its local and regional subdivisions (D39, D43, 44), agricultural extension services (D48, 49), fruit co-operatives (D46, 47) and the provincial government, as well as the majority of the parliament of South Tyrol (D40, D50, 51). Their common interest is to expand intensive fruit farming to improve the economic sustainability of small-scale farming in the Upper Vinschgau and the economic growth of the associated fruit sector in the Province of South Tyrol (D38–51).

To strengthen their interests and resist the movement’s claims, approximately 40 fruit farmers from Mals self-organised into a grassroots initiative called ‘Peasants’ Future’ [German: Bäuerliche Zukunft] (F38). A member of the group and former dairy farmer explained his decision to transfer to intensive fruit farming as follows [C19]: *When I took over the farm in 2000, I transferred from dairy farming to growing fruit and some vegetables. I own only 2–2.5 ha of land. I cannot survive on dairy farming because leasing additional land is increasingly insecure.*

In response to the movement’s claim to ban pesticides, the fruit farmer (C19) argues: *It is a problem because today many people want to get in on decisions who are not involved in farming anymore. [...] I have already invested in new injection nozzles and building hedges [...] because I*

don't want to harm my neighbours. But no one honours this investment. [...] Chemical-synthetic pesticides and fertilisers are a necessary evil that I too would prefer to omit.

The Peasants' Future group (D38) adds on its Facebook blog, *we are not against organic agriculture [...] If we want local agriculture to be innovative and interesting for the next generations, farmers need to have a free choice of production techniques.*

These quotes indicate that dairy farmers in Mals already form part of the conventional regime, but they struggle to compete because of the small size of their farms. Gradual social innovations, like forming fruit co-operatives, have helped former dairy farmers in Mals to increase the economic performance of their farms and secure their survival. To account for ethics like fairness and food safety, they adopt gradual technological innovations that reduce pesticide drifts. These innovations repair social and ecological frictions internal to the regime and thereby contribute to its reproduction.

Conflicts between the niche and the regime emerged because incremental innovations and radical transformative innovations are mutually exclusive in the case of Mals: Conventional farmers apply gradual social and technological innovations to grow fruit successfully while preventing pesticide drifts. But the natural and social condition of farming in the Upper Vinschgau does not allow for the use of pesticides without drifts. To protect organic farming and a safe living space, local citizens promote radical transformative changes like the ban on pesticides. This, in turn, would make intensive fruit farming impossible.

Microlevel social capital and diffusing transformative innovations

In this section, I will point out the microlevel social capital that niche actors created for the diffusion of transformative innovations against the resistance of the regime. Initially, grassroots initiatives in the local niche built up *bonding social capital* to increase their internal strength and scale up transformative innovations. Different activists of 'The Way of Mals' reasoned that co-operation was an important success factor for the movement's strength. All activists contributed to the movement with their competencies (C5, C4, C1, C6). For example, a group of physicians, pharmacists and biologists provided the movement with information about the harm pesticides do to the health of humans, animals and the natural environment (D8). A group of women appealed to the emotions of citizens by organising protest actions (D1). A municipal councillor was knowledgeable about direct democracy (D7, D21), and a group of organic farmers and consumers (D2) enhanced the legitimacy of the movement vis-à-vis the regime: *Part of our legitimation was that a farmer was the chairman [...]. He has always been the chairman, yes. Because the agricultural sector always says, we only do what we want to do. Nobody can tell us, it is our issue, our land (C5).*

Another factor was to build trust amongst the movement's participants by drawing on common values while tolerating different perspectives and strategies (C4-6). An activist (C4) detailed: *Everyone does something, all do something together. There were also a lot of controversies, but basically, everyone has the same goal of a pesticide-free community [...]. We also had a lot of fun, got closer, got to know other people, a dynamic developed. Togetherness is our strength!*

At some point, the movement formalised its bonding relations to resist containment strategies by the regime and to exert social control over its participants (D3). The chairman (C1) explained: *The grassroots initiatives are the soul of 'The Way of Mals'. In a meeting, we decided to work together and founded the promotor's committee. [...] We worked together, so the farmers' association could not split our group. [...] After the referendum, we dissolved the committee [...] on the same day, we founded the citizens' co-operative.*

The citizens' co-operative (D12) is a transformative innovation that pools private financial resources, knowledge and social relations to initiate alternative food networks that allow consumers and locals to adopt localised and organic production and consumption practices (C1, C3, C5).

The quotes indicate that bonds had different positive effects on scaling up transformative innovations. First, they allowed citizens in Mals to share competencies, create trust among them and deepen common values and beliefs. In this way, bonds initiated social learning processes that led to the formation of new transformative innovations. Second, bonds prevented niche-internal cleavages and thus enhanced the niche's internal strength.

Bridging social capital acquired resources and facilitated a replication of ideas. In the beginning of the conflict, bridges to a grassroots initiative from Malosco, a community located in the neighbouring province, inspired the movement in Mals to vote on the ban on pesticides. Malosco banned chemical-synthetic pesticides following a citizens' survey (C6). A local activist (C11) from Mals remembered: *And he once sent [...] people from the Val de Non to us to tell us how things are [...] with the pesticides and how they defend themselves. And I was there and heard that they took urine samples. And these were contaminated with pesticides.*

When activists in Mals started to organise for the referendum on banning pesticides, regime actors tried to obstruct their efforts (see the next section). In response, activists decided to broker new relations with regional (D14–17; D21–26) and international civil society groups (D27–33, D35) to raise international awareness of their claims and acquire new resources. An activist (C6) reflects: *External people are important to put pressure on the provincial government. [...] If a German tourist said that it smelled too much of poison here, then a lot would change.* As a form of international solidarity, bridges provided the movement with financial resources from donations and knowledge on campaigning strategies (A) that helped the movement deal with niche containment efforts by the regime (see the next section).

According to these findings, bridges contributed to the replication of ideas along international networks between local niche actors. These networks were able to exert political pressure on the conventional regime in South Tyrol from below. In addition, an exchange of knowledge and resources along these networks enhanced the capacity of niches to deal with resistance by the regime.

Moreover, the movement forged new *bottom-up linkages* with different policy levels to gain favourable political conditions for the diffusion of transformative innovations into the regime. At the local level, a citizen councillor explained that the new mayor of Mals supported the participatory Way of Mals by amending the municipal statutes because *the municipal council was not able to regulate the intensification of land-use for reasons of power, therefore citizens had to take up care* (C8). The mayor himself legitimised participatory decision-making on land-use because *citizens learn to take on responsibility for local developments* (C15). After he had conducted the referendum on banning pesticides in collaboration with the movement, he initiated a citizens' budget. It allowed the citizens of Mals to decide democratically on how the municipality should spend parts of the annual municipal household budget (C15, B3).

At the provincial level, an organic farmer was able to establish good linking relations with the councillor for agricultural affairs. He reported that he had talked to the councillor several times per year and that the councillor was the first one to take up the movement's claims by speaking up against the *fruit farming lobby* (A). Other activists forged new national and international linkages, for example, with parliamentarians in the Italian and the European parliament to lobby for their interests (C1, D37). In sum, these linkages led the provincial government to pass new regulations on spraying techniques (D20), making it compulsory to use new spraying nozzles and to keep

greater distances to nontarget areas (A, D20, D50). Additionally, the regime passed a law that regulates the creation of orchards in grassland areas to reduce pesticide drifts (A, D20, D50). These regulations reduce drifts onto nontarget areas, but they neither stop drifts completely nor give citizens more formal power to co-decide on local land-use (A, C6). In sum, bottom-up linkages at the local level were crucial to enable transformative innovations. Bottom-up linkages to regime actors only allowed for a translation of the movement's claims in the form of gradual technological innovations.

In summary, the local movement used bonds, bridges and bottom-up linkages to the local policy level to spread transformative innovations at the niche level. Resistance by the regime led the movement to extend its social capital beyond the local level and contributed to the diffusion of the movement's ideas within the international niche. Bottom-up linkages facilitated a translation of the niche's ideas into the regime but in a less radical way of technological innovations.

Macrolevel social capital and inhibiting transformative innovations

In the following section, I will refer to the macrolevel social capital that regime actors used to inhibit the diffusion of transformative innovations and promote gradual innovations instead. *Synergy* within South Tyrol is especially strong and favourable for the interests of agriculture because the agricultural organisations and the government are well-aligned. The governing South Tyrolian Popular Party (SVP), a people's party of the conservative political spectrum, traditionally supports the interests of farmers. According to an activist (C6), the political focus is on the interests of farmers because *all South Tyrolians still have an agricultural family background. In the case of conflict, they all stand up for the farmers.* At the same time, the farmers' association Südtiroler Bauernbund (D45) is an important political actor with traditionally strong ties to the SVP and the government. It represents the farmers of the province and exerts substantial power on politics at the municipal and provincial levels by providing a disproportionately large share of elected representatives (D45, A). This led an activist (C6) to say: *Südtiroler Bauernbund holds most of the political power. It is a perfectly organised lobby that has existed for over 100 years and is much better organised than craft associations.*

To support the expansion of orchards into the Upper Vinschgau, the farmers' association Südtiroler Bauernbund (D45) and the provincial government (D50) engaged in obstructing the implementation and diffusion of the local referendum on the ban of pesticides. Together with the Peasants Future group (D38), they started a judicial process to prohibit the referendum and a corresponding implementing provision to the ban on pesticides (D38, A). The judicial process dealt with the question of whether a municipality was allowed to step up pesticide regulations at the local level (C6, C11). An activist (C6) commented on the judicial situation as follows: *Municipalities [in South Tyrol] are not allowed to tighten national pesticide application laws. In Trentino, the law says exactly the opposite, the national law on the use of pesticides applies, but if the mayor thinks that stricter rules are necessary, then you can do that.*

At the same time, the farmers' association Südtiroler Bauernbund convinced conventional farmers operating orchards in Mals that there was no need to convert to organic farming because farmers could file a lawsuit against the ban on pesticides (D45). In addition, the government made 1300 conventional fruit farmers sign an injunction against external activists from Germany, who reported the case of Mals in books, films and a poster campaign, to stop what they viewed as a negative press about fruit growing in the province (D33, D27, D50). Last, activists claim that close relations between decision-makers in agriculture and other policy fields, such as culture

and tourism, prevent community members in Mals from obtaining provincial funding for the creation of alternative food networks (C5). The mayor (D6) explained: *Our activism has negative consequences for the municipality. I cannot access certain funds anymore.* These quotes indicate that regime actors may use high levels of synergy to actively contain a diffusion of transformative innovations by legal actions against the efforts of the niche, depriving them of financial resources and supporting vested interests of the regime.

For historic reasons, South Tyrol features a high level of *organisational integrity* within the conventional regime, which means that most of the population trusts the official institutions of governance. The SVP has been able to govern continuously since the end of World War II because mobilising the population into one single party was crucial for the province gaining legislative independence from Rome in many aspects, including agriculture (D50). The mayor of Mals (C15) argued that the highly integrated governance today is negative for the diffusion of transformative innovations because it suppresses nonconformity: *It is a weakness of our system that people don't dare to speak up because they are afraid. Sometimes people talk to me in private and say, they are happy that Mals goes this way, but they themselves don't dare to speak up.*

In contrast, trust in the governing institutions amongst activists is lower as can be assumed from a quote by an activist (C12): *A third of the judges of the administrative court are appointed by the South Tyrolean state parliament, another 20% by the state government directly. That means around 50% are political appointments. These are of course not our friends. That's why we expect a defeat for South Tyrol, but on the next level, in Trento and Rome, our chances are better.*

These quotes show that high levels of organisational integrity within the conventional regime in South Tyrol are an additional factor containing the diffusion of transformative innovations within the regional regime. Meanwhile, activists expect better chances on the level of the national regime where the jurisdiction is less entangled with politics.

The regime has strong *top-down linkages* that allow it to promote gradual instead of transformative innovations. By enforcing new regulations on the use of technological innovations to reduce pesticide drifts, the government convinced many organic farmers involved in the movement and their association to perceive the pesticide problem as less pressing (C6, A). Organic farmers' associations, therefore, agreed to private laws that promoted a reduction of pesticide drifts based on innovative spraying technologies (D20). Organic farmers' associations even refused to write a report on the financial viability of organic farming that the mayor of Mals requested from them to hand in at court (C6, C15). The mayor (C15) commented that *the extension service wrote that there is no alternative to chemical-synthetic pesticides and that no organic farmers' association dared to speak up against it. [...] It was shocking. [...] Agricultural actors are extremely well connected; lobbyism works very well.* Another activist (C6) reasoned that organic farmers' associations depend on the goodwill of the government. Therefore, they do not want to get involved in judicial conflicts. Overall, these quotes indicate that the regime used top-down linkages to demand loyalty from organic farmers.

In summary, the case shows that regime actors draw on existing synergy, organisational integrity and top-down linkages to hinder transformative innovations and promote gradual innovation instead. The niche furthered transformative innovations by creating bonding, bridging and linking social capital. An activist (C5) described this process of (dis)empowerment as follows: *I think it was an old style how [the regime] deals with it. By simply bulldozing over it with political power. But the movement in Mals came out of the middle of society [...] which also has a very strong network, [...] and which also brought its claims out nationwide [...] And that's why the old style didn't work because the group did not let go [...].* To conclude, in the words of another activist (C6), the case is a *political showdown on both sides.*

DISCUSSION

The main question in this article is, how did regime actors inhibit transformative innovations against niche actors trying to further them? Put differently, what strategies of (dis)empowerment did regime and niche actors use in their efforts to prevail against the other? First, the results showed that the niche in Mals and regime actors in South Tyrol promoted radical transformative and gradual innovations, respectively, to further their specific interests in the use of land in the Upper Vinschgau. This result is in line with Avelino (2017), who found that niche actors enact transformative innovations to initiate profound changes into the structures of conventional regimes. In contrast, regimes enact gradual innovations to stabilise existing structures of the regime (Avelino, 2017; Darnhofer, 2015). The movement in Mals tried to formally shift decision-making power on the use of pesticides to the niche level by institutionalising legally binding local referenda. With this strategy, the niche enabled more extensive land-use and alternative farming technology. Conventional regime actors in South Tyrol promoted gradual technological innovation to further their interest in land-use intensification and stay in power. Transformative and gradual innovations provoked intense conflicts between niche and regime actors because they not only involve different land-use interests (Skrimizea et al., 2020) but also fundamentally antagonistic forms of transformative and reproductive power (Avelino, 2017).

Second, niche and regime actors in the case of Mals used social capital as (dis)empowerment strategies. Niche actors in the movement built up microlevel social capital to gain internal strength, scaled up transformative innovation on the local level and replicated it in the wider context of the international niche (Seyfang & Longhurst, 2016). As observed in other cases (Pant, 2016; Seyfang & Longhurst, 2016), bonds allowed activists in Mals to spread their visions within local networks while preventing splits within the network through social control. Bridges gained the movement external resources from international activists and allowed them to spread their vision and ideas beyond the local level (see also Loorbach et al., 2020; Seyfang & Longhurst, 2016). The case adds to the literature that bridging relations proved to be an effective strategy to deal with niche containment strategies by the regime (see Hess, 2016) because international allies pressured the conventional regime in South Tyrol to respect the citizens' vote on banning pesticides.

Third, provincial regime actors in South Tyrol used macrolevel social capital to impede the diffusion of transformative innovations and instead promoted gradual innovation. Previous literature has already identified social capital between regime actors as a cause for locked-in development trajectories (Geels, 2019; Seyfang & Longhurst, 2016). The theoretical concept of macrolevel social capital allowed us to add more detail to this lock-in mechanism. Synergy—tight relations between conventional regime actors—allowed activists to disrupt the efforts of the niche by using means like initiating judicial processes against niche actors and depriving them of funding. In addition, regime actors drew on a high level of organisational integrity—general trust in the established political institutions—to suppress the solidarity of South Tyrolian citizens with the local movement. It is important to note that the use of macrolevel social capital is not a passive but an active lock-in mechanism that is based on the agency of regime actors. Our study, therefore, resembles the results of niche containment strategies by Hess (2016) for the renewable energy sector and specifies existing knowledge on regime resistance in the food sector (Becker et al., 2018; Darnhofer, 2015).

Fourth, the case of Mals proved that bottom-up and top-down linkages are important for the translation of claims across the institutionalised power gap between the niche and regime level (Seyfang & Longhurst, 2016; Szreter & Woolcock, 2004). At the local level of the niche, links

between activists and the local mayor of Mals were a necessary condition for developing transformative innovations and granting citizens greater decision-making power on the use of pesticides and the municipal budget (Woolcock & Naranya, 2000). At the regional level, however, bottom-up linkages by organic farmers only led regime actors to minimise pesticide drifts by promoting gradual innovations such as more efficient spraying nozzles (Seyfang & Longhurst, 2016). At the same time, regime actors used top-down linkages to ensure that parts of the niche, especially organic farmers and organic farmers' associations, accepted gradual innovations as a solution to the pesticide problem. The case of Mals shows that bottom-up and top-down linkages allow niche actors to influence the regime, but they also allow regimes to dampen niche efforts (Szreter & Woolcock, 2004).

The case under study allowed a more nuanced understanding of the use of different forms of social capital as (dis)empowerment strategies applied by niche and regime actors. Legally binding local referenda on the ban on pesticides add a new form of transformative innovation to the discourse on food system transition. Due to the nature of single case studies, a comparison with other cases is required to generalise the findings. Future research should also investigate the transformative potential of locked-in power conflicts over land-use. Skrimizea et al. (2020) suggest a conflict transformation, which is a mediated process that encourages regime and niche actors to co-create solutions for more sustainable land-use.

CONCLUSION

This article illustrated the (dis)empowerment strategies of a local niche movement and the regional conventional regime in South Tyrol over transformative innovations. The movement 'The Way of Mals' provoked intense power conflicts because the diffusion of transformative innovations radically shifted the structures of conventional regimes and was incompatible with gradual innovations promoted by the regime.

Applying the concept of social capital to the MLP showed that niche and regime actors used different forms of social capital to enhance their respective interests. Niche actors in Mals created microlevel social capital. Bonding and bridging social capital helped the movement in the diffusion of transformative social innovations at the niche level by facilitating internal strength and providing the niche with new resources. In turn, the regime actors in South Tyrol used existing macrolevel social capital to prevent an erosion of the regime's structures. Synergy between regime actors and a high level of organisational integrity in South Tyrol allowed them to actively contain the niche's efforts by means like legal actions, supporting vested interests while depriving the niche of funding, and general trust in established political institutions. Linking social capital between the niche and the regime allowed for a less radical translation of the niche's claims into the regime while decreasing the efforts of the niche for transformative changes.

The main contribution of this article is to provide a more nuanced picture of the role of social capital as a strategy for inhibiting or furthering transformative innovations. Derived from my case study, I suggest that future research should investigate how ongoing land-use conflicts may be transformed into viable solutions for a sustainability transition of local food systems.

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The author declares no conflict of interest.

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Throughout the research process, I followed the Rules of Good Scientific Practice of the University of Innsbruck and the rules of the Austrian Agency for Research Integrity. Especially for the fieldwork, I respected the Code of Ethics by the International Sociological Association.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

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REFERENCES

- Ackerman-Leist, P. (2017) *A precautionary tale: how one small town banned pesticides, preserved its food heritage, and inspired a movement*. White River Junction, VT: Chelsea Green Publishing.
- Adler, P.S. & Kwon, S.-W. (2002) Social capital: prospects for a new concept. *The Academy of Management Review*, 27(1), 17–40. <https://doi.org/10.5465/amr.2002.5922314>
- Antier, C., Kudsk, P., Reboud, X., Ulber, L., Baret, P.V. & Messéan, A. (2020) Glyphosate use in the European agricultural sector and a framework for its further monitoring. *Sustainability*, 12(14), 56–82. <https://doi.org/10.3390/su12145682>
- ASTAT (2014) *Wirtschaftliche Analyse des Landwirtschaftssektors in Südtirol. Betriebswirtschaftliche Ausrichtung und Typologien der landwirtschaftlichen Betriebe bei der 6. Allgemeinen Landwirtschaftszählung 2010 (Bozen)*. Available at: https://astat.provincia.bz.it/downloads/mit55_2014.pdf [Accessed 21st June 2022].
- ASTAT (2021) *Demografische daten 2019*. Available at: https://astat.provinz.bz.it/de/aktuelles-publikationen-info.asp?news_action=4&news_article_id=651473 [Accessed 12th January 2021].
- Autonome Provinz Bozen–Südtirol. (2010) *Kulturlandschaft Südtirol. Der Wandel seit 1950*. Bozen: Athesiadruck.
- Autonome Provinz Bozen–Südtirol. (2019) *Agrar- und Forstbericht*. Bozen: Athesiadruck.
- Autonome Provinz Bozen–Südtirol. (2021) *Kompetenzen und Finanzierung der Autonomie*. Available at: <http://www.provinz.bz.it/politik-recht-aussenbeziehungen/autonomie/kompetenzen-finanzierung-autonomie.asp> [Accessed 11th February 2021].
- Avelino, F. (2017) Power in sustainability transitions: analysing power and (dis)empowerment in transformative change towards sustainability. *Environmental Policy and Governance*, 27(6), 505–520. <https://doi.org/10.1002/eet.1777>
- Avelino, F., Dumitru, A., Cipolla, C., Kunze, I. & Wittmayer, J. (2020) Translocal empowerment in transformative social innovation networks. *European Planning Studies*, 28(5), 955–977. <https://doi.org/10.1080/09654313.2019.1578339>
- Becker, S.L., Franke, F. & Gläsel, A. (2018) Regime pressures and organizational forms of community-based sustainability initiatives. *Environmental Innovation and Societal Transitions*, 29, 5–16. <https://doi.org/10.1016/j.eist.2017.10.004>

- Bock, B.B. (2012) Social innovation and sustainability; how to disentangle the buzzword and its application in the field of agriculture and rural development. *Studies in Agricultural Economics*, 114(2), 57–63. <https://doi.org/10.7896/j.1209>
- Bourdieu, P. (1983) Ökonomisches Kapital, kulturelles Kapital, soziales Kapital. In: Kreckel, R. (Ed.) *Soziale Ungleichheiten*. Göttingen: Schwartz, pp. 183–198.
- Castro-Arce, K. & Vanclay, F. (2020) Transformative social innovation for sustainable rural development: an analytical framework to assist community-based initiatives. *Journal of Rural Studies*, 74, 45–54. <https://doi.org/10.1016/j.jrurstud.2019.11.010>
- Chiffolleau, Y. & Loconto, A.M. (2018) Social innovation in agriculture and food. *International Journal of the Sociology of Agriculture and Food*, 24(3), 306–317.
- Dalla Via, J., Mantinger, H. & Baric, S. (2013) Die entwicklung des obstbaus in südtirol: I. die landwirtschaftliche aus- und weiterbildung. *Erwerbs-Obstbau*, 55(3-4), 109–119. <https://doi.org/10.1007/s10341-013-0191-1>
- Darnhofer, I. (2015) Socio-technical transition in farming. Key concepts. In: Sutherland, L.-A., Darnhofer, I., Wilson, G. & Zagata, L. (Eds.) *Transition pathways towards sustainability in agriculture. Case studies from Europe*. Wallingford, Oxfordshire: CABI, pp. 17–31.
- Darrot, C., Diaz, M., Tsakalou, E. & Zagata, L. (2015) ‘The missing actor: alternative agri-food networks and the resistance of key regime actors. In: Sutherland, L.-A., Darnhofer, I., Wilson, G. & Zagata, L. (Eds.) *Transition pathways towards sustainability in agriculture. Case studies from Europe*. Wallingford, Oxfordshire, CABI, pp. 143–156.
- El Bilali, H. (2018) Relation between innovation and sustainability in the agro-food system. *Italian Journal of Food Science*, 30(2), 200–225.
- El Bilali, H. (2019) The multi-level perspective in research on sustainability transitions in agriculture and food systems: a systematic review. *Agriculture*, 9(4), 74. <https://doi.org/10.3390/agriculture9040074>
- Evans, P. (1996) Government action, social capital and development: reviewing the evidence on synergy. *World Development*, 24(6), 1119–1132. [https://doi.org/10.1016/0305-750X\(96\)00021-6](https://doi.org/10.1016/0305-750X(96)00021-6)
- FAO. (2021) *FAOSTAT. Data on pesticide use*. Available at: <https://www.fao.org/faostat/en/?#data> [Accessed 20th August 2021].
- Flick, U. (2014) Gütekriterien qualitativer Sozialforschung. In: Baur, N. & Blasius, J. (Eds.) *Handbuch methoden der empirischen sozialforschung*. Wiesbaden: Springer VS, pp. 411–423.
- Flora, C.B. & Flora, J.L. (2008) *Rural communities. legacy and change*. Boulder Co: Westview Press.
- Geels, F. & Schot, J. (2007) Typology of sociotechnical transition pathways. *Research Policy*, 36, 399–417. <https://doi.org/10.1016/j.respol.2007.01.003>
- Geels, F. & Schot, J. (2010) The dynamics of transitions. a socio-technological perspective. In: Grin, J., Rotmans, J., Schot, J., Geels, F.W. & Loorbach, D. (Eds.) *Transitions to sustainable development. New directions in the study of long term transformative change*. New York: Routledge.
- Geels, F.W. (2010) Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy*, 39(4), 495–510. <https://doi.org/10.1016/j.respol.2010.01.022>
- Geels, F. W. (2019) Socio-technical transitions to sustainability: a review of criticisms and elaborations of the multi-level perspective. *Current Opinion in Environmental Sustainability*, 39, 187–201. <https://doi.org/10.1016/j.cosust.2019.06.009>
- Gemeinde Mals (13.10.(2020)) *Gemeindeverwaltung Mals. Zahlen und Fakten*. Available at: https://www.gemeinde.mals.bz.it/de/Gemeinde-Verwaltung/Zahlen_und_Fakten [Accessed 13th October 2020].
- Helfferich, C. (2014) Leitfaden- und experteninterviews. In: Baur, N. & Blasius, J. (Eds.) *Handbuch methoden der empirischen sozialforschung*. Wiesbaden: Springer VS, pp. 559–574.
- Hess, D.J. (2016) The politics of niche-regime conflicts: distributed solar energy in the United States. *Environmental Innovation and Societal Transitions*, 19, 42–50. <https://doi.org/10.1016/j.eist.2015.09.002>
- Holtkamp, C. & van Mierlo, T. (2022) Paving a way towards food democratisation: mechanisms in contentious niche development. *Sustainability*, 14(3), 1553. <https://doi.org/10.3390/su14031553>
- IAASTD (2009) *Global report. Agriculture at a crossroads*. Washington, DC: Island Press.
- Isham, J. (2002) The effect of social capital on fertiliser adoption: evidence from rural Tanzania. *Journal of African Economics*, 11(1), 39–60. <https://doi.org/10.1093/jae/11.1.39>
- Istat. (2020) *Fitosanitari. Quantità di principi attivi contenuti nei prodotti fitosanitari per ettaro di superficie trattabile (kg)*. Available at: <http://dati.istat.it/#> [Accessed 13th August 2020].

- Juárez, P., Trentini, F. & Becerra, L. (2018) Transformative social innovation for food sovereignty. The disruptive alternative. *International Journal of Sociology of Agriculture & Food*, 24(3), 318–335.
- Kemp, R., Schot, J. & Hoogma, R. (1998) Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technology Analysis & Strategic Management*, 10(2), 175–198.
- Kirwan, J., Ilbery, B., Maye, D. & Carey, J. (2013) Grassroots social innovations and food localisation: an investigation of the Local Food programme in England. *Global Environmental Change*, 23(5), 830–837. <https://doi.org/10.1016/j.gloenvcha.2012.12.004>
- Klein, H. (2014) Zeitungsartikel. In: Baur, N. & Blasius, J. (Eds.) *Handbuch methoden der empirischen Sozialforschung*. Wiesbaden: Springer VS, pp. 841–846.
- Kumar, S. (2020) Social capital and diffusion of innovations. An analysis of farm households in rural Punjab. In: Singh, L. & Gill, A. (Eds.) *Agriculture innovation systems in Asia. Towards inclusive rural development*. New York, NY: Routledge, pp. 235–275.
- Linhardt, C., Niedrist, G.H., Nagler, M., Nagrani, R., Temml, V., Bardelli, T., Wilhelm, T., Riedl, A., Zaller, J.G., Clausing, P. & Hertoge, K. (2019) Pesticide contamination and associated risk factors at public playgrounds near intensively managed apple and wine orchards. *Environmental Sciences Europe*, 31(1), 120. <https://doi.org/10.1186/s12302-019-0206-0>
- Loorbach, D., Wittmayer, J., Avelino, F., von Wirth, T. & Frantzeskaki, N. (2020) Transformative innovation and translocal diffusion. *Environmental Innovation and Societal Transitions*, 35, 251–260. <https://doi.org/10.1016/j.eist.2020.01.009>
- Loorbach, D. & Rotmans, J. (2006) Managing transitions for sustainable development. In: Olsthoorn, X. & Wic-zorek, A.J. (Eds.) *Understanding industrial transformation. Views from different disciplines*. Dordrecht: Springer, pp. 187–206.
- Maye, D. (2018) Examining innovation for sustainability from the bottom up: an analysis of the permaculture community in England. *Sociologia Ruralis*, 58(2), 331–350. <https://doi.org/10.1111/soru.12141>
- Mayring, P. (2019) Qualitative content analysis. Demarcation, varieties, developments. *Forum Qualitative Social Research*, 20(3), 16.
- Megyesi, B., Kelemen, E. & Schermer, M. (2010) Social capital as a success factor for collective farmers marketing initiatives. *International Journal of Sociology of Agriculture and Food*, 18(1), 89–103.
- Naranya, D. (1999) *Bonds and bridges. Social capital and poverty*. Washington, DC: The World Bank.
- Neumeier, S. (2012) Why do social innovations in rural development matter and should they be considered more seriously in rural development research?— Proposal for a stronger focus on social innovations in rural development research. *Sociologia Ruralis*, 52(1), 48–69. <https://doi.org/10.1111/j.1467-9523.2011.00553.x>
- Novy, A. (2017) *Transformative Social Innovation. Multilevel Governance and Development*. SRE Discussion Papers from WU Vienna University of Economics and Business 5. Available at: <https://EconPapers.repec.org/RePEc:wii:wus009:5619> [Accessed 13th August 2020].
- Pant, L.P. (2016) Paradox of mainstreaming agroecology for regional and rural food security in developing countries. *Technological Forecasting and Social Change*, 111, 305–316. <https://doi.org/10.1016/j.techfore.2016.03.001>
- Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., Kunze, I., Dorland, J., Wittmayer, J.M. & Jørgensen, M.S. (2020) Towards a theory of transformative social innovation: a relational framework and 12 propositions. *Research Policy*, 49(8), 104080. <https://doi.org/10.1016/j.respol.2020.104080>
- Putnam, R.D. (1993) *Making democracy work. Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.
- Putnam, R.D. (2001) *Bowling alone. The collapse and revival of American community*. New York, NY: Simon & Schuster.
- Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C.H. & Stringer, L.C. (2009) Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management*, 90(5), 1933–1949. <https://doi.org/10.1016/j.jenvman.2009.01.001>
- Renting, H., Schermer, M. & Rossi, A. (2012) Building food democracy: exploring civic food networks and newly emerging forms of food citizenship. *International Journal of Sociology of Agriculture and Food*, 19, 289–307.
- Seyfang, G. & Longhurst, N. (2016) What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches. *Technology Analysis & Strategic Management*, 28(1), 1–23.
- Seyfang, G. & Smith, A. (2007) Grassroots innovations for sustainable development: towards a new research and policy agenda. *Environmental Politics*, 16(4), 584–603. <https://doi.org/10.1080/09644010701419121>

- Sieveking, A. (2019) Food policy councils as loci for practising food democracy? Insights from the case of Oldenburg, Germany. *Politics and Governance*, 7(4), 48–58. <https://doi.org/10.17645/pag.v7i4.2081>
- Skrimizea, E., Lecuyer, L., Bunnefeld, N., Butler, J. R., Fickel, T. et al. (2020) Sustainable agriculture: recognizing the potential of conflict as a positive driver for transformative change. In: Bohan, D.A. & Vanbergen, J. (Eds.) *The future of agricultural landscapes*. Amsterdam: The Academic Press, pp. 255–311.
- Smith, A. & Raven, R. (2012) What is protective space? Reconsidering niches in transitions to sustainability. *Research Policy*, 41(6), 1025–1036. <https://doi.org/10.1016/j.respol.2011.12.012>
- Sutherland, L.-A., Darnhofer, I., Wilson, G.A., Zagata, L. (Eds.) (2015) *Transition pathways towards sustainability in agriculture: case studies from Europe*, Wallingford, Oxfordshire: CABI.
- Südtiroler Apfelkonsortium. (2020) *Apfelanbaugebiet Südtirol. Wo sich Äpfel zu Hause fühlen*. Available at: <https://www.suedtirolerapfel.com/de/suedtirol-und-der-apfelanbau/anbaugebiet.html> [Accessed 18th October 2020].</bib
- Szreter, S. & Woolcock, M. (2004) Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*, 33(4), 650–667. <https://doi.org/10.1093/ije/dyh013>
- Thierbach, C. & Grit, P. (2014) Beobachtung. In: Baur, N. & Blasius, J. (Eds.) *Handbuch methoden der empirischen Sozialforschung*, Wiesbaden: Springer VS, pp. 855–865.
- Wilson, G.A. (2012) *Community resilience and environmental transitions*. London: Routledge.
- Woolcock (1998) Social capital and economic development. Toward a theoretical synthesis and policy framework. *Theory and Society*, 27(2), 151–208. <https://doi.org/10.1023/A:1006884930135>
- Woolcock, M. (2000) The place of social capital in understanding social and economic outcomes. *Canadian Journal of Policy Research*, 9, 65–88.
- Woolcock, M. & Naranya, D. (2000) Social capital. Implications for development theory, research, and policy. *The World Bank Research Observer*, 15(2), 225–249. <https://doi.org/10.1093/wbro/15.2.225>
- Zoll, F., Specht, K. & Siebert, R. (2021) Alternative = transformative? Investigating drivers of transformation in alternative food networks in Germany. *Sociologia Ruralis*, 61(3), 638–659. <https://doi.org/10.1111/soru.12350>
- Zollet, S. & Maharjan, K.L. (2021) Resisting the vineyard invasion: anti-pesticide movements as a vehicle for territorial food democracy and just sustainability transitions. *Journal of Rural Studies*, 86, 318–329. <https://doi.org/10.1016/j.jrurstud.2021.06.020>
- Zubrod, J.P., Bundschuh, M., Arts, G., Brühl, C. A., Imfeld, G., Knäbel, A., Payraudeau, S., Rasmussen, J.J., Rohr, J., Scharmüller, A., Smalling, K., Stehle, S., Schulz, R. & Schäfer, R.B. (2019) Fungicides: an overlooked pesticide class? *Environmental Science & Technology*, 53(7), 3347–3365.

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APPENDIX A: Field diary

Id	Categories of observation	Days	No. of pages
A	Space, actors, actions, artefacts, aims, emotions, statements, relations	26	41

APPENDIX B: Event protocols

Id	Occasion	Content of event	Date	No. of participants
B1	Board meeting of citizens' co-operative 'DA'	Report about ongoing projects	5 September 2018	5
B2	Meeting with board members of citizens' co-operative 'DA'	Draft concept for a guided tour on "The Way of Mals"	25 September 2018	3
B3	Public meeting on citizens' budget	Inform citizens about citizens' budget	21 September 2018	12
B4	Seed festival	Facilitate exchange of seeds	23 February 2019	App. 100
B5	General assembly of citizens' co-operative 'DA'	Annual report, discharge executive board members and elections	23 February 2019	App. 30
B6	Festival on regional development 'Hier&Da Obervinschgau'	Networking between civil society groups and awareness building for transformation	11 April 2019–14 April 2019	App. 250
B7	Workshop on holding a guided tour	Workshop on holding guided tours on 'The Way of Mals'	22 July 2019	App. 4

APPENDIX B: Interviews

Id	Organisation/profession	Gender	Date	Length
C1	Chairman of promoters' committee; pharmacists	M	8 September 2018	01:06:42
C2	Member of civil society group 'Hollawint'; hairdresser	F	26 November 2018	01:30:05
C3	Director of citizens' co-operative 'DA'	M	12 September 2018	00:26:57
C4	Member of civil society group 'Hollawint'	F	12 September 2018	01:15:31
C5	Chairman of citizens' co-operative 'DA' and member of civil society group 'Adam & Epfl'; scientist	M	13 September 2018	00:32:29
C6	Chairman of environmental protection group 'Umweltschutzgruppe Vinschgau'; veterinary	M	13 September 2018	00:54:53
C7	Member of organic farmers' association 'Bund Alternativer Anbauer'; organic farmer	M	18 September 2018	00:27:22
C8	Director of social co-operative 'Vinterra' and member of civil society group 'Direkte Demokratie'; organic farmer; municipal councillor	F	18 September 2018	00:35:50

(Continues)

Id	Organisation/profession	Gender	Date	Length
C9	Member of civil society group 'Hollawint'; paediatrician	F	19 September 2018	00:27:28
C10	Board member of organic famers' association 'Bioland'; organic farmer	M	19 September 2018	00:46:41
C11	Member of environmental protection group and of 'Hollawint'; childminder	F	20 September 2018	00:42:38
C12	Operator of agro-ecological show garden in Mals; pensioner	M	20 September 2018	01:19:41
C13	Organic farmer; employee of citizens' co-operative 'DA'	F	20 September 2018	01:26:29
C14	Member of civil society group 'Heimatschutzverein'; biologist	M	24 September 2018	01:20:54
C15	Mayor	M	25 November 11-2018	00:48:04
C16	Member of civil society group 'Adam & Epfl'; architect	M	25 September 2018	00:57:16
C17	Member of environmental protection group, ranger	M	25 September 2018	00:52:41
C18	Conventional dairy farmer; member of the local board of farmers, which is associated in the regional farmers' association 'Südtiroler Bauernbund'	M	26 September 2018	01:26:01
C19	Conventional fruit grower; member of civil society group 'Bäuerliche Zukunft'	M	20 October 2018	00:28:19
C20	Conventional fruit grower; member of civil society group 'Bäuerliche Zukunft'	M	21 October 2018	01:58:36

APPENDIX D: Actors' analysis

Id	Actor	Interests	Foundation	Area of influence
Local niche actors acting against agricultural intensification and regional, national and international supporters				
D1	Civil society group 'Hollawint'	Raise awareness of pesticides and for alternatives	June 2013	Mals
D2	Civil society group 'Adam und Epfl'	Create public awareness of the expansion of intensive orchards	2011	Mals
D3	Promoters committee	Initiate a local referendum on the ban of pesticides	February 2013	Mals

(Continues)

Id	Actor	Interests	Foundation	Area of influence
D4	Civil society group 'Heimatpflegeverein Mals'	Care for the environment and natural monuments in Mals	2009	Mals
D5	Civil society group 'Kornkammer Vinschgau'	Promote local life cycles by growing crops locally	2010	Mals
D6	New mayor Ulrich Veith (2009–2020)	Represent the interests of the majority of citizens. Support direct democracy in Mals	2009–2020	Mals
D7	The municipal council of Mals (2009–2014/2015–2020)	Partially support direct democracy in Mals		Mals
D8	Civil society group of physicians, pharmacists and biologists	Create awareness of negative health effects of pesticides in agriculture	2013	Mals
D9	Group of organic farmers in Mals	Protect livelihood and biodiversity	2010	Mals
D10	Civil society group 'Umweltschutzgruppe Vinschgau'	Promote the protection of the environment and quality of life	1981	Mals and Upper Vinschgau
D11	Konrad Messner regional development office	Promote sustainable regional development	Before 2010	Mals and Upper Vinschgau
D12	"Citizens' co-operative 'Bürgergenossenschaft Obervinschgau'"	Promote sustainable regional development based on regional life cycles	2016	Mals and Upper Vinschgau
D13	Local businesses supporting the movement	Establish a market for alternative local products and services, for example, organic hotel	Before 2010	Mals and Upper Vinschgau
D14	Artists, for example, Gianni Bodini	Create awareness of the case for Mals	Before 2010	Mals and internationally
D15	Organic farm 'Kräuterschlössl'	Produce organic herbs, fight against pesticide drifts in Middle Vinschgau	1979	Middle Vinschgau
D16	Civil Society Organisation 'Dachverband für Natur- und Umweltschutz'	Promote environmental protection	1982	South Tyrol
D17	Organic box scheme organisation 'Biokistl Südtirol'	Establish niche market for organic food	Before 2010	South Tyrol

(Continues)

Id	Actor	Interests	Foundation	Area of influence
D18	Organic farmers' association 'Bund Alternativer Anbauer'	Establish niche market for organic food, represent interests of members farmers	1987	South Tyrol
D19	Organic farmers' association 'Arbeitsgruppe biodynamischer Bauern Südtirol'	Establish niche market for organic food, represent interests of member farmers	Before 2010	South Tyrol
D20	Organic farmers' association 'Bioland Südtirol'	Establish niche market for organic food, represent interests of member farmers	1991	South Tyrol
D21	Initiative direkte Demokratie Südtirol	Promote direct democracy in South Tyrol	1994	South Tyrol
D22	Verbraucherzentrale Südtirol	Promote interests of consumers	Before 2010	South Tyrol
D23	Green party	Promote a policy that stands for environmental protection	Before 2010	South Tyrol
D24	Imkerbund	Protect health and habitat of bees, represent interests of beekeepers	Before 2010	South Tyrol
D25	Heimatspflegerverband Südtirol	Care for the environment and natural monuments in Mals	1905	South Tyrol
D26	Alpenverein Südtirol	Promote tourism and environmental protection in the Alps	Before 2010	South Tyrol
D27	Schiebel Movieproduction	Create awareness for the case of Mals	2015	South Tyrol/EU
D28	Genussgemeinschaft München	Direct marketing of local products	Before 2010	Munich and surroundings
D29	Vollkorn München	Marketing of organic products	Before 2010	Munich and surroundings
D30	WWF Trient/Alto Adige	Promote protection of nature and habitat of wild animals	Before 2010	region of Trentino-Alto Adige/EU
D31	Ackergifte nein Danke!	Campaign against pesticides in agriculture	Before 2010	Germany/EU
D32	Pesticide action network	Promote agriculture without pesticides	2013	Italy/EU

(Continues)

Id	Actor	Interests	Foundation	Area of influence
D33	Umweltinstitut München	Promote environmental protection in Europe	1905	Germany/Europe
D34	International scientists, for example, toxicologist Irene Witte	Create knowledge for campaign	Before 2010	Internationally
D35	Right livelihood laureates, Vandana Shiva, Hans Herren, Monika Hauser	Promote food sovereignty globally	Before 2010	Internationally
D36	Bioland International	Promote interests of organic farmers internationally	Before 2010	Internationally
D37	International politicians, for example, Martin Schmidt, EU-parliamentarian	Promote green agricultural policy at national and international level	/	EU and internationally
Regime actors in South Tyrol promoting agricultural intensification and judicial actors in South Tyrol and Italy				
D38	Civil society group 'Peasants Future'	Promote interests of fruit farmers in response to local movement. Opposed to the ban on pesticides because intensive fruit farming improves the financial sustainability of small-scale farms	2014	Mals
D39	Local group of main farmers' association 'Südtiroler Bauernbund'	Promote interest and connect local farmers	Before 2010	Mals
D40	Former mayor, Josef Noggler	Promote intensification of agriculture in Mals, for example, by building modern sprinklers	1991-2009	Mals
D41	Local association of fruit farmers 'Landwirtschaftlicher Förderverein St. Veith'	Promote agricultural change in the Upper Vinschgau	2009	Upper Vinschgau
D42	Fruit production co-operative 'Obervinschgauer Produktionsgenossenschaft'	Co-operative storage and marketing of fruit	1963	Upper Vinschgau
D43	Regional group of main farmers' association 'Südtiroler Bauernbund'	Promote interests and connect local farmers	Before 2010	Vinschgau
D45	Farmers' association 'Südtiroler Bauernbund'	Promote interests of farmers in South Tyrol	1904	South Tyrol

(Continues)

Id	Actor	Interests	Foundation	Area of influence
D44	Consortium for water rights, Vinschgau	Administer water concessions and support the construction of modern irrigation system in Upper Vinschgau	Before 2010	Vinschgau
D46	Fruit marketing co-operative Vinschgau, 'VI.P Vinschgau Südtirol'	Marketing fruit produced in Vinschgau in South Tyrol; interested in expanding orchards	1990	Vinschgau and internationally
D47	Fruit export co-operative for South Tyrol and Trentino 'from'	Export co-operative for apples from South Tyrol and Trentino	2009	Region of Trentino-South Tyrol and internationally
D48	Extension service for orchards and vine: 'Beratungsring Obst- und Weinbau'	Privately organised extension service in the sector of fruit and wine	1957	South Tyrol
D49	Agricultural research institute and extension service 'Versuchszentrum Laimburg'	Applied research on agriculture in South Tyrol	1975	South Tyrol
D50	Government of South Tyrol	Promote intensive farming, prevent ban on pesticides	/	South Tyrol
D51	Parliament of South Tyrol	Reject law that regulates the monitoring of pesticide drifts	/	South Tyrol