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Enacted relations and the resilience of territorially embedded production systems in Europe

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Abstract

Globalization of food chains and scale increases in business models are dramatically affecting rural areas in Europe, by a simplification of land use, new urban-rural relations and reshaped social networks. While pressures on land use systems have been increasing due to the competition on commodity markets, the role of territorially embedded production systems remains crucial in keeping farm biodiversity and unique cultural landscapes, as well as social and cultural ties. Building on the social-ecological resilience approach (Darnhofer et al., 2016), this paper examines the resilience of territorially embedded production systems in different regions of Europe, including emergent and ongoing patterns of material, social and cultural relations. It shows how primary producers improve the resilience of their production systems in response to increasing pressures resulting from changing ecological, economic, social and cultural conditions. Three production systems are examined: carp farming in Middle Franconia, Germany; wine production in Tuscany, Italy; and olive oil production in Alentejo, Portugal. The paper adopts an adapted relational approach to conceptualise how resilience develops in terms of the ability of producers and their networks to develop new markets, reduce costs and add value. Different types of enacted relations (sets of mutually empowering connections in space and time) are identified, including relations among family members, between farmers, along the commodity chain and with other stakeholders, such as tourism, policy and regional administrations. Using these insights, the paper argues that it is important to shift the focus of agricultural resilience from the producer level to the network level, particularly how network dynamics emerge as relations enacted by diverse actors. These collaborative efforts have the potential to enable primary producers to maintain cultural landscapes, preserve their ecosystems and ensure the farms' economic survival and by extension help to maintain the socio-ecological resilience of territorial production systems.

Keywords: Relational resilience; Primary food producers; New markets, reduced costs and added value; Enacted relations; Germany, Italy and Portugal

Highlights

- The paper examines the resilience of smaller-scale primary producers within Europe.
- The authors adopt a relational approach to show how producers develop new markets, reduce costs, and add value to their products.
- The analysis identifies different types of enacted relations.
- Resilience emerges as a configuration of network relations enabled by adaptive capability.

1. Introduction

From a territorial perspective, production systems in the primary sector are often defined by the use of the land and their changes are typically assessed through changes in land use (Jepsen et al., 2015; Muñoz-Rojas et al., 2019; Pe'er et al., 2020). However, in order to understand the drivers of change that affect their survival, there is a need to acknowledge producer embeddedness in complex social-ecological and socio-technical systems (Schermer et al., 2016). This includes food production, processing and packaging, distribution and consumption; furthermore, these activities are both underpinned and constrained by competing environmental, social, economic, institutional and political dimensions, involving different actors, networks and their interactions (Ericksen, 2008; HLPE, 2017; Tendall et al., 2015). Moreover, production systems are inextricably connected to other systems (e.g. finance and ecosystems) exposing them to a range of both internal and external drivers that

can lead to sudden shocks, as well as to slower and yet profound changes (Kuhmonen 2018). Food consumption patterns are also continuously changing, typified for example by a rising demand for local and certified organic products in high-income countries where consumers pay increasing attention to the production process (OECD, 2021). In order to understand the room for manoeuvre of different production systems in the primary sector, new perspectives call for a relational approach that reveals interlinkages between drivers of change within and outside production systems (Willett et al., 2019; SAPEA, 2020; Darnhofer 2020a).

In particular, there is a call to understand how primary production systems that have evolved and remained embedded in their territory can survive today, so they can ensure the maintenance of unique cultural landscapes and of social ties in regions and territories (Jones et al. 2016; Sayer et al. 2013). Such land use systems have developed over millennia, with human activities intricately linked to environmental conditions (Malek et al. 2018; Pinto-Correia et al., 2016). Territorial embeddedness is understood as delineating strong ties to nature, landscape, and infrastructure as well as territorial and social ties in associated production systems (Tisenkopfs et al. 2020). Three main dimensions describe territorial embeddedness: geographic embeddedness in nature and locality, the use of specific local resources in production processes, and collaboration within local networks. These dimensions are crucial in maintaining land use diversity, landscape identity and farm biodiversity (Lomba et al., 2019). Production systems that are suitable to protect and maintain the value of cultural landscapes are typical for particular geographical areas across Europe. However, they are facing a range of challenges, which may be either endogenous or exogenous to the businesses and local actor networks involved (Grando et al., 2020). These include global-scale issues such as climate change and related weather impacts, an ageing working population, a lack of inter-generational succession, regulatory pressures and changes, access to finance, environmental limitations (either natural or policy imposed) and an underlying struggle to remain financially viable in the face of price volatility and challenging access to markets (Tendall et al., 2015). As such, there is concern about primary producers and their agency to navigate change in the

face of increasingly complex economic, social and ecological challenges (Czekaj et al., 2020; Darnhofer, 2014).

An important body of research is developing to examine how primary sector enterprises adapt to change and create resilience (e.g. Darnhofer, 2014; Herman et al., 2018). Darnhofer et al. (2016) introduced the relational approach to understand how “*resilience emerges out of the configuration of relations*” (p. 119) that may incorporate both human (e.g. social, economic, cultural, political, institutional) and non-human (e.g. biophysical, ecological) elements. The relational resilience approach is rooted in the analytical process of the interaction between ecological and social dynamics that can lead to enhancing or hampering resilience (Darnhofer et al., 2016). Building on this relations-based framework, this paper aims to broaden the focus beyond the producer level and associated land uses to the level of producers’ networks. In particular, the aim is to explore how networks of local producers emerge as relations enacted by diverse actors (i.e. sets of mutually empowering connections in space and time) and why understanding these relations is important to maintain territorially embedded production systems. It does this by examining three different primary production sectors in three European regions; carp farming in natural ponds in Middle Franconia, Bavaria in Germany; wine production in Tuscany, Italy; and olive oil production in the region of Alentejo, Portugal. What these case studies have in common is the underlying dense network of relations that to different extents enable producers to develop new markets, reduce costs or add value to their products, which in turn maintains enterprise viability and the wider system. Through its emphasis on network relations, this paper provides a way to operationalise ‘relational resilience’ by examining three structurally different territorially embedded production systems in Europe. In so doing, it follows Darnhofer (2010, p. 214; 2020b, p. 605) who argues that we should abandon notions of equilibrium within a social context and ‘expect the unexpected’, taking unpredictability and change as a starting point for resilience thinking.

The next two sections of the paper present the 'relational resilience' perspective, including its operationalisation. The methodology is explained in Section 4, before Sections 5 and 6 examine how the resilience of the production systems in the different case study sectors might be enhanced through the development of three particular configurations of relations: new markets, reduced costs and adding value. In the last section, the paper discusses the implications of these findings for the resilience of territorially embedded production systems and the value of taking a relational resilience perspective to examine relations between producers, producer' organisations and other key institutions.

2. Adopting a resilience perspective

The notion of resilience was originally conceived in relation to ecological systems and their adaptive capacity (Holling, 1973; 2001), to describe the ability of natural systems to persist in the face of significant natural disturbances such as fires or floods (Robinson and Carson, 2015). As such, "ecological resilience refers to a system's capacity to reorganise under change to reach a new equilibrium whilst retaining the same essential functions" (Robinson and Carson 2015, p. 1). However, the original notion of resilience has been adopted as a way to explain complex interactions within and between socio-ecological systems (Darnhofer, 2014; Herman et al., 2018). This 'socio-ecological' conception of resilience has been increasingly applied from 2000 onwards, in response to global food system challenges and intensifying processes of trade globalisation (Darnhofer, 2014; Tendall et al., 2015).

If we accept that resilience is about enhancing the ability of a system to respond to change, the key question then becomes "resilience to what and resilience for whom?" (Cutter 2016, p. 1). Whose resilience should be privileged? Who determines whether a system can be described as resilient? Is change necessary in order to develop resilience? What is the timescale over which resilience might be assessed? Resilience is temporally and spatially contingent, wherein individuals / institutions / regions etc. will not be resilient per se, in that

they are dependent on a range of ecological, economic and contextual factors, all of which will influence the potential for resilience of those involved (Darnhofer et al., 2010). From this perspective, “resilience is not a ‘thing’... [but] rather, resilience is the emergent result of ever-changing patterns of relations, relations that are material, social, cultural” (Darnhofer et al., 2016, p. 118).

This paper focusses on the relational resilience of territorially embedded primary production systems, but crucially with the analysis extended beyond the producer and its surrounding natural landscape to include producers’ networks of empowered relations embedded in each of the regional contexts examined. This includes the role of other actors outside or beyond primary production (e.g. other producers, advisors, value chain actors, chefs, tourist boards, regional development officers) that play a critical role in developing new markets, reducing costs and/or creating value added opportunities. The entry point for this analysis is thus the interacting economic, environmental, social and cultural conditions that define territorially embedded production systems. The engaged actors are characterised by their embeddedness into the region and its specific contexts, seeking to enable relations in order to help ensure their systems’ profitability and the competitiveness of their processing and/or sales cooperatives. Through the socio-ecological resilience approach, Darnhofer et al. (2016) define such ‘enacted relations’ as “*relations that are continuously remade in interaction with the past and with the current context*” (p. 112, emphasis added), including marketing, cost reduction and value added adaptations. Resilience is therefore an adaptive process and the relations that are enacted for and through these networks are the foundation that can enable particular production and associated land use systems to be resilient.

3. Operationalising a relational resilience framework

Figure 1 shows the core elements of the approach and illustrates the dynamics, main patterns and relations for the case study analysis. The resilience of each primary production system

and embedded regional context is on the y-axis, as a qualitative assessment of the sector over time. The analysis of the constellation of different actors involved took place during 2016 and 2017. Although this timescale is set (x-axis in Figure 1), the period described as the 'baseline constellation' varies between cases and primary production systems. The 'baseline constellation' is a snapshot of the complex conditions (economic, social, cultural and environmental) and related structures and processes that are relevant for, and influence, primary producers' decision-making in the case study area concerned. Each case study is defined as: a) a spatial unit of administrative reference and b) a specific primary production system in the area. The spatial units are two neighbouring NUTS 3 areas in Franconia and the NUTS 2 areas of Tuscany and Alentejo.

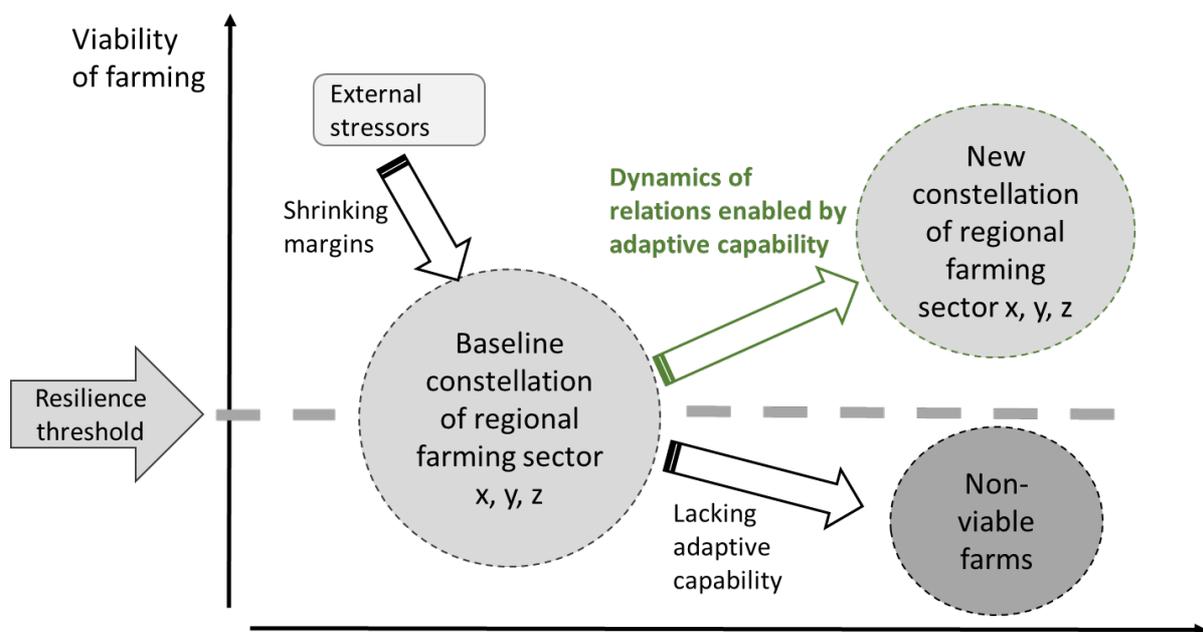


Figure 1: A framework to examine relational resilience and the adaptive capability of territorially embedded primary production systems

Instead of studying the resilience of each individual farm or producer, the paper examines the relations that surveyed producers have with public or private organisations. The focus is on 'new constellations', which in this case constitute the identification of emerging marketing opportunities and ways to reduce costs and / or add value to a given primary production

system and related food chain associations, including the dynamics of relations enabled by adaptive capability. The baseline constellation of the primary production system is the starting point to frame and direct the analysis of new enacted relations (i.e. a reference point to assess adaptive capability effects when producers link with external networks). External stresses such as the volatility of commodity prices trigger new constellations depending on the adaptive capability of the network as a whole. This prompts a number of questions in terms of the dynamics of relations. For example, what new relations are emerging? Did well-established relations gain in importance and grow stronger over time? Are new or established networks enhancing cooperation and/or adding value to their products?

The assessment of the longer-term development of specific territorially embedded production in a region reveals particular 'stressors' that threaten the 'basic constellation' (Figure 1). Figure 1 shows that these dynamics may result in a new constellation, which may be placed above the resilience threshold (i.e. characterises a situation where primary production systems are economically viable), or alternatively leads to their termination. Although Figure 1 suggests a baseline and a new constellation as a linear snapshot of a system's situation in a given period, underlying and often contradictory trends are continuously driving the sector, so the reality is complex and variegated. Network relations alone then do not enable adaptive capability, but are critical, as evident in the case studies below.

4. Methodology and empirical data

The case study data for this paper were drawn from work conducted as part of a major four-year EU-funded Horizon 2020 research project. The study areas (Figure 2) are different from economic, social and ecological perspectives. This diversity is important in order to illustrate a range of issues faced by primary producers, as well as to assess how their networks are cultivating relations in pursuit of developing new markets, reducing costs and adding value to ensure the wider production systems' ongoing resilience.

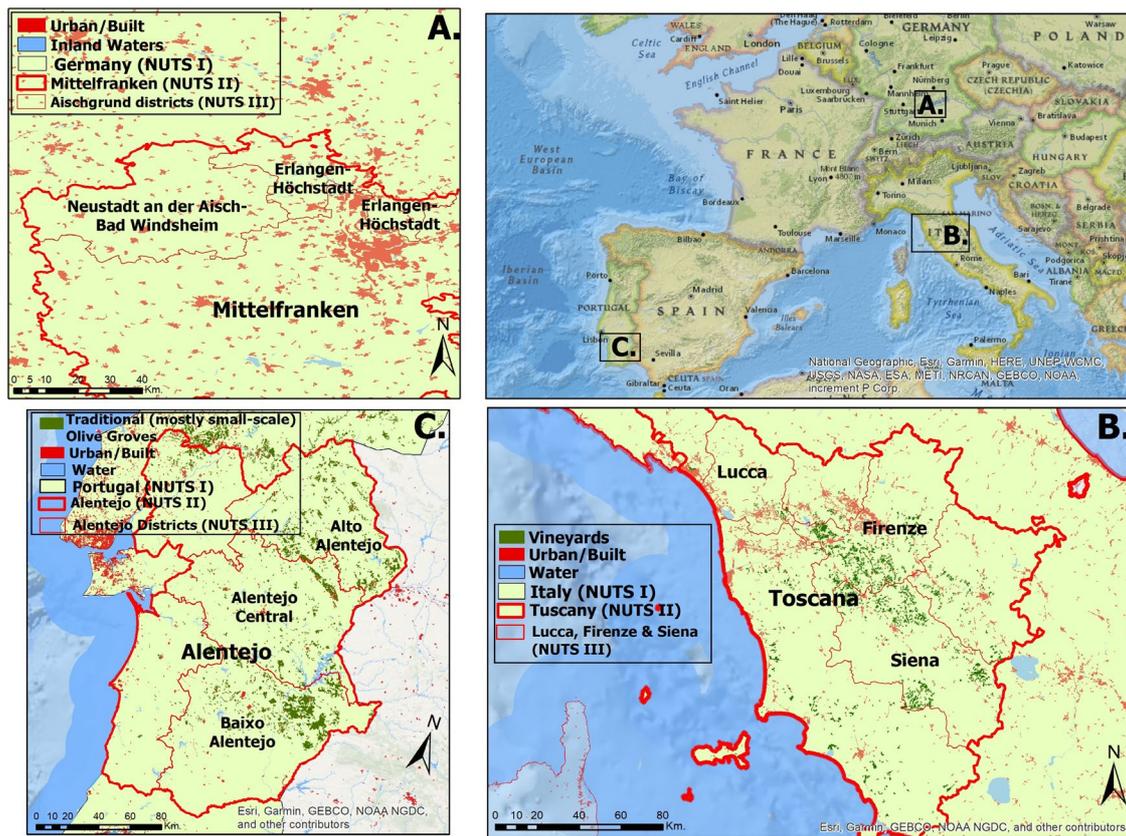


Figure 1: The three case study areas: A) Neustadt/Aisch and Bad Windsheim/Erlangen-Höchstadt in Middle Franconia, Germany; B) Lucca, Firenze and Siena in Tuscany, Italy; and C) Alto, Central and Baixo Alentejo in Alentejo, Portugal.

Source: CORINE LAND COVER 2018 (EEA-Copernicus, 2019).

A multi-method case study approach was designed to ensure iterative collation and analysis of complementary qualitative data, in combination with secondary sources and media data. In each case study region, secondary data collection involved desk-based analyses of: 1). the social, economic, ecological and cultural contexts for each commodity and related production; 2). the representation of key issues in different types of media (particularly news and industry press) for each commodity between 2005 and 2016 at national, regional and local levels; and 3). the market and regulatory conditions faced by producers in the sector. This provided discursive analysis of contexts, conditions and stressors for each commodity sector.

Research step	Carp in Middle Franconia	Wine in Tuscany	Olive oil in Alentejo
Interviews	6 semi-structured face-to-face interviews	10 semi-structured face-to-face interviews	10 semi-structured face-to-face interviews
Focus groups	2 focus groups, each with 8 fish producers	2 focus groups, with a total of 10 participants	3 focus groups, with a total of 11 producers
Workshops	Workshop with 12 representatives from the value chain, including producers and advisors	Workshop (and supporting interview) with 14 representatives from the wine supply-chain, as well as research and public administration	Workshop with 13 representatives from the value chain, research community and public administration, including farmers

Table 1: Data collection procedures for the German, Italian and Portuguese case studies

Primary data collection, as summarised in Table 1, then provided real world strategic analysis of conditions and market relations enacted to address them. It too consisted of three inter-linked elements: a). face-to-face, semi-structured interviews with experts involved in the commodity chain; b). a series of focus groups with primary producers in the sector; and c). a workshop and related activities with producers, supply chain actors, policymakers and other strategic stakeholders. The focus groups with producers focused on the identification and further elaboration of stressors and challenging and/or enabling conditions over time. Producers also reflected on strategies they enacted that aimed to help solve resilience-related problems, particularly in relation to market arrangements. The semi-structured interviews with selected experts from the sector or value chain, as well the workshops with mixed types of stakeholders, were organised to further ‘ground-truth’ the findings of the research, as well as to develop a series of scenarios with respect to the future resilience of territorially embedded production systems. This individual qualitative case study analysis process was then followed by a comparative analysis of the three case studies, applying the resilience framework outlined in Figure 1. This final task aimed at structuring the analysis in order to provide key comparative insights across the cases regarding relational resilience in each region. Specifically, it was organised to show how territorially embedded primary producers manage the change resulting

from enacted relations and the emergence of new markets and opportunities to reduce costs or add value to the products.

5. Enacting relations for primary producers in three European contexts

Drawing on the data sources described above, the next section examines the three case studies in more detail. It focuses on those relations and networks that were identified as significant for the resilience of the studied production systems. We organise the case study analysis chronologically at three levels (see Tables 2-4): firstly, to describe the baseline constellation; secondly, to identify external stressors and trace the type, quality and dynamics of enacted relations; and thirdly, to consider their effects in terms of the potential these changes have for the resilience of primary production systems.

5.1. Germany: connecting carp production to tourism and regional identity

The baseline constellation refers to a very long tradition. In Germany, carp has been produced for almost 1,000 years (FAO, 2020). One of the most important German production areas is the Aischgrund in Bavaria (Figure 2, Area A), which is dominated by producers who traditionally made their living from a combination of aquaculture and agriculture, with many working part-time. Traditionally, family members and friends helped with carp ponds. The relationships between carp producers with local restaurants (so-called 'fish-kitchens'), as well as the relations between fish farmers and arable farmers were always close. Most carp producers had long-term business relations with local fish traders. Apart from these individual business relations, they collaborated locally under the umbrella of pond cooperatives, which represented producers' vis-à-vis the water authorities. Moreover, since the 1970s, the fish producers cooperated closely with the local research and advice centre, which also help with the implementation and administration of policy programmes. In this sense, the baseline

	I) Baseline constellation and context	II) Emerging stressors and dynamics of enacted relations	III) Potential impact on relational resilience; emergence of new markets / adding value
Carp Ger- many	<ul style="list-style-type: none"> • Natural resources, landscape and related local culture was taken for granted (material relations). • Helping each other has a long tradition: family members, neighbours, friends (private relations). • Carp farmers cooperate with arable farmers and other fish farmers (individual business relationships). • Carp farmers sell fish to local fish kitchens (individual business relations). • Most fish farmers have long-term business relations with local fish traders (individual business relations). • Producers collaborate locally under the umbrella of pond cooperatives (organisational relations). • Pond cooperatives are required to represent producers vis-à-vis the water authorities (institutional relations). • If needed, fish farmers ask for training and advice from the publicly funded advisory centre; strong relations since the 1970s/80s (public-private relations). 	<ul style="list-style-type: none"> • Since the 1990s, local fish traders have increased cross-border supply; low-cost imports threatened local farm prices (market-related stressor). • Long-term trend of increasing costs for arable farming resulted in shrinking margins (most carp farmers produce arable crops for fish feed and sales). Moreover, good employment situation and high salaries in other industries in the metropolitan area caused low interest of potential successors in low-income farming (farm economic stressors). • Characteristic pond landscape and biodiversity was identified as critical for cultural identity in the 2000s; its maintenance was key tenet of the local rural development strategy (dynamics of human-material relations). • Carp became integral to cultural identity; registration of PGI 'the Aischgründer' was a joint effort of local policy, administration and key stakeholders; foundation of the non-profit association 'Karpfenland Aischgrund e.V.' (new / enhanced network of public-private relations). • More business cooperation (e.g. producers & chefs) driven by the regional management agency with ranger programme, certification of restaurants etc. (public-private relations). • Diversification at a farm level with restaurants, start own fish kitchens or liaising with processors to develop convenience fish products (new or enhanced individual business relations). 	<ul style="list-style-type: none"> • Traditional restaurants supplied by local producers ensured sales volumes and stability of local carp consumption (effect of demand stabilisation). • A small but growing network of restaurants aim to increase the sales of carp outside the region of Franconia (supported by the local tourism office and the PGI label); higher prices (effect of more carp sold at premium price). • Evidence of increased tourism from neighbouring regions that include visits to the carp museum, a tour through the pond landscape and 'fish kitchen' (effect of higher value added from rural tourism). • Added value through the development of innovative processing methods for carp; addressing younger consumer groups (ensuring value added for convenience product from carp; and a measure to stabilise demand among young consumers) • Although carp farmers had relationships with local pubs, the development of regional tourism enhanced existing business relations (PGI) (accompanying enhancement of rural tourism).

Source: Data and information from the case study analyses – carp farming in the Aischgrund, Middle Franconia, Germany (2016-2018)

Table 2: The unfolding of carp farmers' network relations: I) baseline and context, II) stressors and dynamics of relations and III) potential impact on resilience

constellation is one where carp production, as a cultural economy, is under-valued because carp production and the associated natural resources, landscape and local culture were taken for granted until the early 2000s.

The real stressors that eventually enacted new market relations emerged as a result of market pressures, particularly the import of freshwater fish (see Table 2). Imports continuously increased. They cover around one quarter of national carp consumption (DESTATIS, 2019). The European Commission (EC, 2017) identified that EU aquaculture needed to “...increase the competitiveness of its food products [...] and innovation opportunities offered by sustainable and resilient aquaculture production systems (EC, 2017)”. The problem was recognised in Germany also (BMEL, 2014). Even the national aquaculture strategy process could not help, which was set up to address the challenging situation regarding the market. The expected upswing in aquaculture production in Germany has thus failed to materialise and the sector has continued to decline (DESTATIS, 2019). Prices paid by fish traders are low and hardly cover the costs, in particular for products sold without value added properties.

Spurred by these and other developments in the region, territorially embedded carp producers have cultivated a series of new relations to develop new markets, reduce costs or add value to their carp. Key to this new constellation was the strengthening of the association ‘Carp Land Aischgrund’¹, which was founded by fish producers, gastronomy, local businesses and the Aischgrund communes. This public-private cooperation provided the foundation to fostering the alliances between stakeholders such as carp producers, representatives of county and fisheries authorities, tourist managers and entrepreneurs from gastronomy, farm stores and processors. Relations have evolved because of this association. For example, fish producers, breeders and local authorities registered the *Aischgrund Carp* as a Protected Geographical Indication (PGI) (Table 2). The cultural landscape of the Aischgrund has been recognised and

¹ ‘Karpfenland Aischgrund e.V.’, www.karpfenland-aischgrund.eu (accessed: 05.12.2021).

valued as critical to the socio-cultural identity of the region. As such, its maintenance has become a key tenet of not only nature conservation but also the economic development of the area. Existing relations amongst fish producers and between them and the local authority, as well as local gastronomic outlets, were important too in fostering a willingness to liaise and cooperate. Carp producers in Franconia were up to this point typically relatively independent producers and traders. Key for these producers has been to take advantage of the existing and expanding network in terms of marketing and adding value. New markets enabled by existing and new relations have created promising change in the area. Close cooperation between the producers and 'fish kitchens' has also ensured a stabilisation of demand. Many local people have eaten carp since childhood and continue to consume it, creating a significant and ongoing local demand (Raudner et al., 2015). In the meantime, carp is seen as integral to the cultural identity of the high-value natural landscape, making a direct link between farming and the maintenance of the landscape by carp production and tourism. Even with these positive developments, the economic situation remains challenging because losses tend to rise in the early production phase linked with relatively low market prices driven by imports of fresh fish from neighbouring countries.

5.2. Italy: wine production and the formation of multiple networks to access new markets

Tuscany is an Italian region historically suited to high-quality wines (Figure 2, Area B). Tuscan wines are globally renowned and convey territorial identity. Our analysis refers to a baseline constellation in the period of the late 1980s until the economic crisis (2006-2007). The demand for Tuscan wine was very high, driven by the popularity of some denominations. Despite a steady decline in Italian wine production in this period, the Tuscan supply chain grew continuously. The production system and some specific regional brands ensured a competitive advantage. This constellation was characterised by the coexistence of some large-scale

champions and numerous territorially embedded wineries organised in wine consortia for the designation of origin. The relations were characterised by an asymmetry in the distribution of power along the supply chain. Consortia acted as intermediaries that mediated power relations. Legal adjustments defined the consortia's mandatory role for the protection and promotion of the various Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI). This constellation was successful due to the cooperation rooted in long-term relations both within and between local families found in the wine consortia.

The increasing national and cross-border competition from other wine producing areas (from 2006 until 2020) has been a significant stressor (Table 3). Some wineries have expanded their distinctive competencies in order to overcome the location-specific advantages of their competitors (Wiersema and Bowen, 2008). In 2006, the market began to slow down and the individualised 'winery-wine-territory' business model, driven primarily by regional umbrella brands, could no longer guarantee a success story. The sector's fragmentation proved to be a major weakness (Vergamini et al., 2019). Rising costs of market access and new environmental challenges have also gradually eroded former advantages and put the profitability of many operations at risk (see Table 3). The analysis of this challenging period indicates that earlier experiences of successful market expansion have helped producers to establish new relations and adapt their business models. In addition, support came from regional policy, administration and the wine consortia. Policy support was significant (e.g. via The Chianti Classico 2000 Project²). Accompanying round tables, wine events, field trials and other networking opportunities ensured regular exchanges between public and private stakeholders. In 2016, producers took the chance to join forces and founded the association of Tuscan PDO and PDI wines (AVITO – association of consortia), which became a single major player in the region. AVITO was capable of providing a common and relevant representation on foreign markets. Within the region, it grew into the role of a mediator,

² For further information about The Chianti Classico 2000 Project:
www.chianticlassico.com/en/wine/characteristics/i-vitigni/ (accessed: 26.02.2020)

facilitating connections between the various consortia (16 consortia with 5,000 wineries). The new network is based on the long-term relationship of wineries within the different wine consortia. The characteristics emerge from the territories and their natural, cultural and social contexts. In response to the changes in the market and the growing competition, the region has also played a leading role as the meeting point between Tuscan wine producers and international trade. In the eleven editions of the sales event 'BuyWine', about 51,500 meetings were held for approximately 2,400 Tuscan winemakers and nearly 2,500 international buyers. At the same time (2016), Lucca Biodinamica' was founded. This new network emerged without any policy support. Biodynamic Lucca is the most concentrated biodynamic cluster of small wine producers in Italy. The group communicates the particular values of the Lucca territory. Compared to other wine networks in the region, producer relations in Lucca are family-orientated and owners are directly involved and share seeds, equipment, techniques and experiences.

	I) Baseline constellation and context	II) Emerging stressors and dynamics of enacted relations	III) Potential impact on relational resilience; emergence of new markets / adding value
Wine, Italy	<ul style="list-style-type: none"> • Cultural heritage sites and Tuscan landscape (natural resources, Mediterranean climate) were taken for granted (material relations). • Wine production in Tuscany saw booming markets since the 1980s; quality-driven innovations and terroir characteristics including close connections between producers and tourism; competitiveness and export success (mainly individual business relations). • The individual model “winery-wine-territory” was a win-win choice for many producers. Families focused on the winery’s unique identity. A large number of family farms realised high prices for their wine via direct marketing (strong relations with individual tourists, business ‘friends’ e.g. export agents). • Apart from that, the supply chain was fragmented (weak business relations). • Representatives of regional administration/policy played an important role in promoting regional wines (strong public-private relations). • Public and semi-public institutions established the well-structured wine producers’ consortia based on legislative changes from CAP reform (strong public-private relations). 	<ul style="list-style-type: none"> • Since 2006/07, the market began to slow down; wine remained the driver for regional identity; good experiences made in the past drove further development; producers aimed to benefit from culture and landscape again but (inter)national competition grew (market-related stressor). • Market concentration due to large-scale operators, shrinking demand and changing consumer habits overturned the initial advantage of the wineries’ unique identity (market-related stressor). • Fragmented supply chain weakened farmers’ bargaining position (weak value chain integration). • Despite the continued export success of some producers with ‘Chianti Classico’ or ‘Tuscany’ iconic brands, the sector started to suffer from its structural weakness: low profitability of many family farms due to rising costs. Progressive questioning of the individual business model “a winery-wine-territory” (structural weaknesses within the sector). • Emerging forms of territorial aggregation on the markets linked policy, administration and consortia; various support initiatives emerged e.g. the B2B trade platform Buy Wine (enhancing a new network). • Consortia drove networking and wine promotion to customers; foundation of A.VI.TO (enacted relations by an organisation). • Wineries invested to improve the quality of the rural landscape (improvement of material relations). • New relationships emerged in the territory linking quality-related organic and biodynamic producers in the Lucca area (enhancing a new network). 	<ul style="list-style-type: none"> • Ownership structure with strong family relations and successful vertical integration; diversification continued, which helped family owned wineries in the long-term (effect of strengthened vertical integration). • Registration and marketing of PDO continue to be important for added value marketing, in particular for international sales. However, lack of PDO registration flexibility hampers adjustments to new market trends (ensuring added value for exports). • Promotion resulted from close relation between regional bodies and consortia; strong image of Tuscan wine linked with tourism (policy support of both sectors). • Initially, consortia focused on protection of denominations; then widening of networking activities for local producers; foundation of AVITO association (overcome earlier fragmentation). • Business to business (B2B) trade event <i>Buy Wine</i> enhances added value by reducing transaction costs and by providing knowledge and information for producers. Out of a sample of 100 producers, 52% raised their average annual sales volume, 44.5% increased export volumes, 57% entered new markets, 45% received purchase offers at higher average prices and 35% developed more stable business relationships during event (realising added value). • <i>Biodynamic Lucca</i> represents enacted relations among organic farms ensuring the value communication of organic production, cultural heritage/natural environment; information and advice; less risks due to joint marketing (ensuring the farms’ viability).

Source: Data and information from the case study analyses – wine production in Tuscany, Italy (2016-2018)

Table 3: The unfolding of wine producers’ network relations: I) baseline and context, II) stressors and dynamics of relations and III) potential impact on resilience

5.3. Portugal: olive oil production, new entrants and co-operative relations

Olive oil is characteristic and historically unique to the Mediterranean basin, both in terms of production and consumption, having become a cornerstone of the Mediterranean food system, whilst also contributing to regional identity through territorially embedded oil processing and iconic as a symbol of the region's cultural landscape. Family farms cultivate Portuguese varieties of olive trees with low-intensity production methods. In Southern Portugal, land use in the administrative areas of 'Alto', 'Baixo' and 'Central' Alentejo (NUTS-III) is largely shaped by olive oil production (Figure 2, Area C). Olive tree cultivation in the Mediterranean dryland areas was traditionally managed as rain fed land use systems (Vossen, 2007). In Alentejo, olive cultivars have always played a critical role in shaping the agricultural economy (Reis, 2014).

The analysis shows that the baseline constellation was characterised by traditional market arrangements that have inhibited territorially embedded, often small-scale producers to realise the full value of their produce. Instead, the farms' economic success largely depended on agricultural policy payments. Producer networks were built on personal relations with family members and friends. In traditional market channels, long-term cooperation, often based on personal relationships, has been the lubricant of producers' business relations with the local cooperative because of their substantial support to farmers (Table 4). Most territorially embedded producers have been members of local cooperatives. These mainly conventional cooperatives have been selling high-quality olive oil from Portuguese certified varieties to undifferentiated markets, thus achieving relatively low prices, given their higher quality standards. The small-scale cooperatives, similar to their individual members, have had difficulties innovating and adjusting to changing market conditions. The analysis of the baseline constellation also showed that producers near rural towns have been focussing on self-provisioning and the supply of local markets. Family relations have been key to ensuring multifunctionality at the farm level and the cohesion of local communities. A mixed network of

	I) Baseline constellation and context	II) Emerging stressors and dynamics of enacted relations	III) Potential impact on relational resilience; emergence of new markets / adding value
Olives and olive oil Portuguese	<ul style="list-style-type: none"> • Close cooperation of territorially embedded farmers within families, friends and neighbours who help out voluntarily (personal relations). • Common: Limited flexibility, farm management and commercial skills and adaptive capability at the farm level (private and individual business relations). • Long-term social and cultural habits: Farming families continued with routines and collaboration with other farmers and along the value chain (individual business relations). • Key role of small locally-based cooperatives based on long-term personal relationships in the local farming community, both in the olive oil (major) and table olive (minor) sectors (individual business relations). • Institutional arrangements: promotion of large-scale producers and orientation towards global markets by policy and administration; very limited support for short supply chains and local products (public-private business relations). 	<ul style="list-style-type: none"> • Since 2008/09, the situation for many farmers started to change; globalization of vegetable oil market, growing international competition (market-related stressor). • Large-scale producers benefited from irrigation schemes; ensuring international competitiveness (policy related stressor). • No institutional interest (poor policy measures and support) for new entrants and young farmers (lacking institutional relations). • Disadvantage for small-scale producers. Currently, it is unclear if emerging dynamics of enacted relations will gain momentum; alternatively, numerous family farms will most likely terminate farming (early dynamics of enacted relations). • Local markets and other direct marketing gain momentum but scope yet (revival of producer–consumer relations). • A culture of individualism and low associativism is persisting and hampering many stakeholders to engage in (new) relations. • A limited but growing number of new entrants took over farms; these are often individuals with stronger soft skills than those in original farming families; thus, they are more open to engage in local networks (emerging new relations). • Some farmers could add value by differentiation and cooperation; offer of innovative olive oil products (e.g. cosmetics); some new entrants combine sales with farm-based experiences for tourists (emerging new relations/networks). • Some private initiatives encourage farmers' knowledge exchange and learning (enhancement of informal networks). • New offers linking tourism and gastronomy (emerging new institutional arrangements in these inter-sectoral connections). • Confederation of Olive Oil Producers (CEPAAL) with local cooperatives aims for a common image for local products (e.g. PDO variety Galega) (early phase of enacted relations). 	<ul style="list-style-type: none"> • More than 60% of producers surveyed continue to sell via local cooperatives (existing relations), which face difficulties to develop new strategies and market connections. • New entrants and lifestyle farmers connect with urban consumers (new relations; maintenance/increasing added value to be confirmed). • Hybrid networks link neighbouring farmers, urban demand and/or family members helping out (new relations between farmers and new comers). • Few producers have own market stalls in towns and urban nodes (Lisbon, Évora) (realising new relations to add value). • Tourism networks and related relations between family farms and tourist agents, hotels, restaurants are still in an early phase but show potential to grow as tourism/gastronomy continue to grow (linking economic support with wine/tourism). • Registration and marketing of PDO/PDI is an extremely important condition for the marketing of Alentejo olive oil. • The initiative 'km-zero' supplies locally produced food to gastronomy (new large-scale institutional cooperation); raising awareness and demand for local/regional quality olive oil. • Often enacted relations between local cooperatives has not effectively added value to the sector, nor to the territory, at least yet. However, an increasing degree of openness by farmers and producers for the establishment of new relations such as new entrants and outsiders might foster positive changes and impacts on farmers' resilience (potential to add value). • Ongoing stressor: Global (undifferentiated) markets for olive oil set the prices. • Still challenging: Public policy intervention is not effectively linking olive production with tourism.

Source: Data and information from the case study analyses – olive and olive oil production in Alto, Central and Baixo Alentejo, Portugal (2016-2018)

Table 4: The unfolding of olive producers' network relations: I) baseline and context, II) stressors and dynamics of relations and III) potential impact on resilience

hybrid relations (Ortiz-Miranda et al., 2013) has persisted within families, friends and neighbours. However, producers have had limited formal cooperation beyond some joint processing in private or cooperative local oil mills. Representatives of policy and administrative bodies have also engaged very little in relations with territorially embedded olive producers. Instead, they have focused on support for intensive olive production, most of which is destined for global markets.

Stressors emerged for the sector in the wake of the financial crisis in 2007/08, when global (undifferentiated) markets set the prices for vegetable oil. Portuguese policy support favoured large-scale producers through the establishment of irrigation schemes in Alentejo (Silveira et al., 2018). Between 2012 and 2018, the area of olive groves in the district of Baixo Alentejo has expanded by a further 16,000 hectares. A new type of olive oil producer has therefore established, based on new production systems and business models, transforming olive oil into a global commodity and fully integrated in the global market. This development affected the territorially embedded producers of high quality oil since their farm gate prices and access to production factors changed. At the same time, a culture of individualism and a lack of strong associative institutions persisted, an attitude that has been hampering the willingness of producers and associated actors to innovate and engage in new relations. The dynamics of enacted relations for this case study emerged from the Mediterranean tradition of agricultural land use and food consumption (Ortiz-Miranda et al., 2013; Pinto-Correia et al., 2017). The cooperation for the registration and marketing of PDO/PDI was extremely important for the quality marketing of Alentejo olive oil (Table 4). Moreover, rural and local tourism has been expanding in Alentejo, supporting newly established tourism networks and relations between visitors and local businesses. New linkages between olive tree farming and tourism were established without policy support. The volatility of the situation for these olive oil producers requires ongoing adjustment processes. Potential pathways include the engagement with agents from other sectors, including tourists and urban food consumers because they offer

the opportunity for olive producers, which are characterised by their territorial embeddedness, to add value to their product.

6. Discussion

The focus of this paper has been on territorially embedded primary production systems and the adaptive capability of the actors involved to change through enacted relations. Three diverse production systems and European contexts were selected in order to move beyond general assessments of the resilience of the territorially embedded production systems. The case studies were organised to contextualise economic, social, cultural and environmental challenges (as outlined by Czekaj et al., 2020) in order to understand how and what kind of relations and networks can affect the resilience of primary production systems (Willet et al., 2019). Table 5 clusters the different patterns of social, cultural and material relations captured in Tables 2-4, which we label: family relations (1), individual business relations between producers (2), business relations with formal organisations (3), relations with public institutions (4) and material relations (5), including nature, landscape and territorial strategies that link product to place. The network relations, comprising combinations of (1) 'family members/friends', (2) 'producers', (3) 'local officials', and (4) 'material relations', signify horizontal cooperation within the area. Vertical cooperation takes place along the commodity chain, and often beyond the region. The analysis reveals that the dynamics of weakening or enacted relations play a key role, as described by Darnhofer et al. (2016). Enacted relations have the potential to contribute to the reduction of costs and can add value to local products. New markets and added value arrangements emerge not only from producer engagements in the value chain, but also from wider social and material relations in the region (Schermer et al., 2016). Networks, as noted in all three cases, emerge through patterns of relations and the collaborative efforts of diverse actors engaged in territorially embedded production systems. Network relations affect the resilience of territorially embedded production systems.

Below we elaborate the five network relations which emerged from the analysis herein to: firstly, emphasise the unfinished nature of resilience, emerging in context as an adaptive process (Darnhofer et al., 2016); and secondly, signify support networks for embedded systems that nurture adaptive capacities as sets of enacted relations. The first set of relations are *between family members* who live on the farm or in the area and often determine the opportunity to diversify on-farm processes or products (Table 5). Many wine producers and some carp producers, for example, added value to their primary products by on-farm processing and direct marketing often because of familial relations e.g. labour resource to attend markets and sell, for instance, biodynamic wine or certified olive oil directly to local consumers or tourists. Relations among a wider network of family and friends were particularly evident for olive growers. These relations ensure the continuation of the production process, even though they are constrained by limited institutional relations. In Franconia, family members have strong bonds with farming relatives, but the willingness of the younger generation to work in the sector is reduced due to the low profitability of carp farming.

The analysis shows for all cases the significant impacts of the second category, *enacted individual business relations*, particularly producers with processors and sales businesses (Tables 2-4). New or strengthened relations contribute to the production systems' resilience through the creation of collective structures, where networks facilitate access to new market opportunities, reduce transaction costs and provide opportunities to bargain over prices or future contracts (wine case). In the olive oil and fish cases, cooperation with neighbouring farms is crucial because it enables work processes and reduces costs by e.g. machinery sharing. However, Portuguese olive producers show that horizontal cooperation is not as frequent and strong as it could or should be. However, new and promising relations among olive growers emerged due to newcomers who have taken over the olive orchards of the family or established their own (part-time) farm. The carp and wine cases have new extended short value chains, which offer the typical product outside the region. Producers pursue a combination of horizontal coordination and territorial consolidation strategies. These are

oriented towards the development of innovative commercial and learning networks in order to add value to the products (Table 5). Some niche value chains emerge from growing (the carp case) or fostering existing relations with local gastronomy (the wine case).

The third cluster of relations are *enacted relations through producer organisations* (Table 5). Producers' associations or cooperatives are contract-based (formal) relations and networks that enable horizontal coordination. Since not all of them are successful, the nature of underlying enacted relations is critical. In the Tuscan wine case, territorially embedded producers benefit from relations enacted through the wine consortia and AVITO association (Table 5). These consortia bring together relevant actors engaged. Structures are continuously improving and give producers collective power to negotiate prices for quality wine

	Carp production in the Aischgrund		Wine production in Tuscany		Olive and olive oil production in Alentejo	
	Relative importance*	Current trends	Relative importance	Current trends	Relative importance	Current trends
1. Family relations						
• Family members	+	→	+++	→	+++	→
• Family networks	++	→	++	→	+++	↗
2. Business relations of farmers						
• Neighbouring farms	++	→	++	→	++	→
• Direct marketing (consumer)	o	→	+++	↗	+	→
• Gastronomy	++	↗	++	→	+	↗
• Processor, sales/export firm	+++	↘	+++	↘	+++	↘
3. Business relations of producer organisations						
• Horizontal (farmers)	++	→	+++	→	++	→
• Vertical (value chain)	+	↗	++	↗	+	↘
4. Public – private relations						
• Farmers and local authority (mandatory)	+++	→	++	→	+	→
• Farmers – tourism/regional management (voluntary)	++	↗	+++	↗	+	↗
• Farmers – training/advice (voluntary)	+++	↘	++	→	+	↘
5. Material relations						
• Based on formal registration (PDO, PGI)	++	↗	+++	↗	++	↗
• Enabled by strategic regional management	++	↗	+++	→	+	↗
• Enabled by cultural heritage	+	↗	+++	→	++	↗

* + low relative importance of the enacted relations; ++ medium relative importance; +++ high relative importance; o not relevant

** → stable relations and networks; ↗ new and improving relations; ↘ less or weakening relations

Source: data and information from the case study analyses (2016-2018)

Table 5: Relative importance and underlying dynamics of enacted relations

The 'Buy Wine' event also illustrates how relations enacted along the value chain can create new marketing opportunities for wine producers. However, relationships between wineries located in the same territory can also be conflictual e.g. tensions between the Chianti area and the coast of Tuscany. Apart from production and market issues, these tensions have their roots in cultural, social and political issues that historically characterise the different Tuscan territories (Vergamini et al., 2019).

In Alentejo, sales-oriented companies add value to olives supplied mainly by large-scale member estates because they sell on national, European and international quantity-orientated markets (Silveira et al. 2018). They do not deal with the low-scale volumes from territorially embedded production systems. Instead, these producers have to sell through their local cooperatives, if they are not included in the group of those who are able to establish individual business relations with processors and other sectors as tourism. The problem with traditional cooperatives is that they are kept in a mainstream path dependency: they are based on low wages and low-income expectation for producers. Even for a high-quality product, they obtain lower prices and therefore low added value to producers. Although relations are maintained through long-term business partnerships and close connections with their members, they have so far demonstrated a remarkably low flexibility in establishing new business relations (Table 5). This results in a business strategy that is not as resilient as could be expected from the existing relations. In the carp case, traditional cooperatives also exist but they do not engage in marketing. Instead, the pond cooperatives ensure joint water management, which is crucial for the functioning of the production system and the maintenance of the cultural landscape in the area (Jones et al., 2016). These examples emphasise a central argument emerging from these data, which is the idea that to understand the resilience of territorially embedded production systems (Tisenkopfs et al., 2020), we need to consider the influence of key institutional arrangements and the networks of relations in the region concerned.

To extend this point about network relations and institutions, the fourth cluster is *policy supported network relations*. These initiatives connect local producers to markets at different scales and provide opportunities for the high-value marketing of fish, wine or olive oil (Table 5). This is important if producers seek autonomy outside more commercial brands / certifications, using territorial networks to communicate values and product authenticity. The strategies of Tuscan wine producers and institutional stakeholders, for example, rely on a mixture of public and private instruments such as digital platforms, local communities of practice and networking activities (Vergamini et al. 2019). The wine consortia and their umbrella organisation (AVITO) initiated the annual meeting event for sellers and buyers with its online platform (*Buy Wine*). In the Alentejo region, a dedicated public strategy to support locally embedded production systems is absent. Lacking relations between farming families and public institutions contributes to uncertainty over the future profitability of low-intensity olive groves. A publicly funded facilitation of relations with processors and traders, as seen in Tuscany, is not in place for carp producers either. However, public advisors of the Bavarian centre for agriculture engage in long-term relations with the carp producers, which helped to strengthen the producers' position in local administration and rural tourism engagement. The centre supported for example the development of the publicly-funded regional management organisation, the *Carp Land Aischgrund* association, which is critical because it promotes and coordinates the marketing of regional carp and connects networks that would not normally talk to each other or work together (restaurants, tourism and recreational centres, etc.). This public-private initiative contributes to a more resilient local economy and the adaptive capability of fish producers in the region. Such a diversification of the economy relies on close connections to the cultural landscape and ecosystem services (Tisenkopfs et al. 2020).

The fifth cluster of enacted relations is *material relations* (Table 5). Biophysical and cultural relations are of particular importance because they resulted in the registration of *Aischgründer Carp*, *Tuscan wine* and *Alentejo olive oil* as PDO or PGI. The certification of these products is a precondition for differentiation and added value to be realised in a market segments. The

development pathways of the three farming sectors also emphasises the role of unique cultural and material relations between soils, climate, landscapes and ecosystem services. Territorially embedded farming systems are the basis for relations that affect directly the opportunity to add value to the products, as well as contributing to long-term resilience. These material relations, beyond simply an economic arrangement, hold, for example, carp farming and tourism together.

7. Conclusions

The case studies show how producers become active agents of change, or at least develop the capability to enable change that helps to ensure the maintenance and profitability of the specific territorially embedded production system. Our evidence reinforces the value in taking a relational resilience approach that can account for producers' embeddedness in horizontal and vertical cooperation. The examples from Tuscany and the Aischgrund area show that policy and regulations can be critical in enabling the latent capabilities of producers and businesses to be realised. Producers do not generally act merely as passive recipients in these processes and relations, even when – as seen in the Alentejo region – a culture of individualism and low associativism prevails. The chronology of cases (from baseline constellation and market stressors to networks of relations and their effects) reveals a process of on-going patterns of relations. Resilience is not, as Darnhofer (2016, p. 118) puts it, “a ‘thing’... [but] rather, resilience is the emergent result of ever-changing patterns of relations, relations that are material, social, cultural”.

Relations are therefore foundational for resilience. However, this relational perspective is not easy for policy intervention, which prefers static, tangible, material structures. The relational approach applied here is particularly useful in this regard because it provides a way to define and capture the specificity of personal, individual and organisational business relations, public-private relations and material relations and their potential to support the resilience of territorially embedded production systems. New relations within well-organised associations can help to tip the power

dynamic back in favour of those production systems that ensure the maintenance of the cultural landscape and relating natural resources in different European areas. Horizontal co-ordination is a significant medium to enact relations and address the imbalances of power in value chains. In fact, relations between farming families and traditional cooperatives and supporting public bodies only continue and provide sufficient stability for shared marketing activities or joint certification if they are based on stable long-term relationships. The formation of networks allows producers, who aim to maintain territorially embedded production, to develop markets, reduce costs and add value to their products.

Examining three structurally different territorially embedded production systems in Europe has shed light into what the drivers of change can be. The case studies include some examples on how they can be supported, both to enhance their chances of surviving as territorially embedded primary producers and in turn ensuring the preservation of the valued cultural landscapes they create. Given the exemplary nature of this analysis, more work is needed in future research to create an enabling environment for the enhancement of the fruitful relations outlined here, including arrangements to leverage market and non-market support. New questions emerge too e.g. for the role of supply chain actors, of farm advisors or other support services as well as for public or private funding programmes. In particular, a better understanding of the mechanisms – for example in the field of capacity development – is needed that will support existing and new networks of enacted relations.

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